

## SOURCES OF DATA

## Death and fetal-death statistics

Mortality statistics for 1981 are, as for all previous years except 1972, based on information from records of all deaths occurring in the United States. Fetal-death statistics for every year are based on all reports of fetal death received by the National Center for Health Statistics (NCHS).

The death-registration system and the fetal-death reporting system of the United States encompass the 50 States, the District of Columbia, New York City (which is independent of New York State for the purpose of death registration), Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands. In the statistical tabulations of this publication, *United States* refers only to the aggregate of the 50 States (including New York City) and the District of Columbia. Tabulations for Guam, Puerto Rico, and the Virgin Islands are shown separately in this volume. No data have ever been included for American Samoa or the Trust Territory of the Pacific Islands.

The Virgin Islands was admitted to the "registration area" for deaths in 1924, Puerto Rico, in 1932; and Guam, in 1970. Tabulations of death statistics for Puerto Rico and the Virgin Islands were regularly shown in the annual volumes of *Vital Statistics of the United States* from the year of their admission through 1971 except for the years 1967 through 1969, and tabulations for Guam were included for 1970 and 1971. Death statistics for Puerto Rico, the Virgin Islands, and Guam were not included in the 1972 volume but have been included in section 8 of the volumes for each of the years 1973–78 and in section 9 beginning with 1979. Information for 1972 for these three areas was published in the respective annual vital statistics reports of the Department of Health of the Commonwealth of Puerto Rico, the Department of Health of the Virgin Islands, and the Department of Public Health and Social Services of the Government of Guam.

Procedures used by NCHS to collect death statistics have changed over the years. Before 1971, tabulations of deaths and fetal deaths were based solely on information obtained by NCHS from copies of the original certificates. The information from these copies was edited, coded, and tabulated. For 1960–70, all mortality information taken from these records was transferred by NCHS to magnetic tape for computer processing.

Beginning with 1971, an increasing number of States have provided NCHS with computer tapes of data coded according to NCHS specifications and provided to NCHS through the Vital Statistics Cooperative Program. The year in which State-coded demographic data were first transmitted to NCHS is shown below for New York City, Puerto Rico, and each of the 45 States now furnishing demographic data.

1971	Florida	1976	Alabama Kentucky Minnesota Nevada Texas West Virginia
1972	Maine Missouri New Hampshire Rhode Island Vermont	1977	Alaska Idaho Massachusetts New York City Ohio Puerto Rico
1973	Colorado Michigan New York (except New York City)	1978	Indiana Utah Washington
1974	Illinois Iowa Kansas Montana Nebraska Oregon South Carolina	1979	Connecticut Hawaii Mississippi New Jersey Pennsylvania Wyoming
1975	Louisiana Maryland North Carolina Oklahoma Tennessee Virginia Wisconsin	1980	Arkansas New Mexico South Dakota

For the remaining five States, the District of Columbia, the Virgin Islands, and Guam, mortality statistics for 1981

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are based on information obtained directly by NCHS from copies of the original certificates received from the registration offices.

In 1974, States began coding medical (cause-of-death) data on computer tapes according to NCHS specifications. The year in which State-coded medical data were first transmitted to NCHS is shown below for the 15 States now furnishing such data.

1974	1980
Iowa	Colorado
Michigan	Kansas
	Massachusetts
	Mississippi
1975	New Hampshire
Louisiana	Pennsylvania
Nebraska	South Carolina
North Carolina	
Virginia	1981
Wisconsin	Maine

For 1980 and previous years except 1972, for the remaining States that were not furnishing such data, NCHS coded the medical information from copies of the original certificates received from the registration offices for all deaths occurring in these areas. For 1981, it was necessary to change these procedures because of a backlog in coding and processing that resulted from personnel and budgetary restrictions. To produce the mortality files on a timely basis with reduced resources, NCHS used State-coded underlying cause-of-death information supplied by 19 States for 50 percent of the records. These States were Alabama, Arizona, Arkansas, California, Florida, Georgia, Idaho, Illinois, Indiana, Kentucky, Montana, North Dakota, Ohio, Oklahoma, Rhode Island, Tennessee, Texas, Washington, and West Virginia. NCHS coded the medical information for the other 50 percent of the records for these States as well as for 100 percent of the records for the remaining 21 registration areas. The remaining 21 areas were Alaska, Connecticut, Delaware, District of Columbia, Hawaii, Maryland, Minnesota, Missouri, Nevada, New Jersey, New Mexico, New York State, New York City, Oregon, South Dakota, Utah, Vermont, Wyoming, Puerto Rico, Virgin Islands, and Guam.

Fetal-death data are obtained directly from copies of original reports of fetal deaths received by NCHS except New York State (excluding New York City), which began submitting State-coded data in 1980. Fetal-death data are not published by NCHS for the Virgin Islands and Guam.

Mortality statistics for 1972 were based on information obtained from a 50-percent sample of death records instead of from all records as in other years. The sample resulted from personnel and budgetary restrictions. Sampling variation associated with the 50-percent sample are described below in the section on Estimates of errors arising from 50-percent sample for 1972.

### Standard certificates and reports

The U.S. Standard Certificate of Death and the U.S. Standard Report of Fetal Death, issued by the Public Health Service, have served for many years as the principal means of attaining uniformity in the content of documents used to collect information on these events. They have been modified in each State to the extent required by the particular needs of the State or by special provisions of the State vital statistics law. However, the certificates or reports of most States conform closely in content and arrangement to the standards.

The first issue of the U.S. Standard Certificate of Death appeared in 1900. Since then, it has been revised periodically by the national vital statistics agency through consultation with State health officers and registrars; Federal agencies concerned with vital statistics; national, State, and county medical societies; and others working in such fields as public health, social welfare, demography, and insurance. This revision procedure has assured careful evaluation of each item in terms of its current and future usefulness for legal, medical and health, demographic, and research purposes. New items have been added when necessary, and old items have been modified to ensure better reporting, or in some cases have been dropped when their usefulness appeared to be limited.

New revisions of the U.S. Standard Certificate of Death and the U.S. Standard Report of Fetal Death were recommended for State use beginning January 1, 1978. The U.S. Standard Certificate of Death and the U.S. Standard Report of Fetal Death are shown in figures 7-A and 7-B. The certificate of death shown in figure 7-A is for use by either a physician, a medical examiner, or a coroner. Two other forms of the U.S. Standard Certificate of Death are available; they are similar to the one shown except that the section on certification is designed for the physician's signature on one, and for the medical examiner's or coroner's signature on the other.

Among the changes in the new revision were the addition of (1) an item asking "If Hosp. or Inst., Indicate DOA, OP/Emer. Rm., Inpatient" and (2) an item "Was Decedent Ever in U.S. Armed Forces?" The latter item was previously on the certificate but was deleted during 1968 through 1977. An item on whether autopsy findings were considered for determining cause of death was dropped.

### HISTORY

The first death statistics published by the Federal Government concerned events in 1850 and were based on statistics collected during the decennial census of that year. In 1880 a national "registration area" was created for deaths. Originally consisting of two States (Massachusetts and New Jersey), the District of Columbia, and several large cities having efficient systems for death registrations, the death-registration area continued to expand until 1933, when it included the entire United States for the first time. Tables that show data for death-registration States include the

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FIGURE 7-A.

PHYSICIAN, MEDICAL EXAMINER OR CORONER  
U.S. STANDARD  
**CERTIFICATE OF DEATH**

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OMB No. 68R 1901

SOCIAL SECURITY NUMBER

	1 DECEASED NAME FIRST MIDDLE LAST	2 SEX	3 DATE OF DEATH M / DAY / YEAR	
	4 RACE (Indicate whether American) AGE LAST BIRTHDAY MONTH DAY YEAR	5a UNDER 1 YEAR	5b UNDER 1 DAY	
	6 CITY, TOWN OR LOCATION OF DEATH	7a HOSPITAL OR OTHER INSTITUTION Name (Street, Room, Building, etc.)	7b HOUSE OR STREET NUMBER OR OTHER ADDRESS	
DECEASED	8 STATE OF BIRTH (If not a U.S. citizen)	9 CITIZEN OF WHAT COUNTRY	10 MARRIED NEVER MARRIED WIDOWED DIVORCED	
	11 SOCIAL SECURITY NUMBER	12 USUAL OCCUPATION (If not a U.S. citizen, indicate in parentheses the occupation in the country of birth)	13 KIND OF BUSINESS OR INDUSTRY	
DEATH OCCURRED IN STATE OF RESIDENCE (If not a U.S. citizen, indicate in parentheses the state of residence)	14a RESIDENCE STATE	14b COUNTY	14c CITY, TOWN OR LOCATION	
	15a FATHER NAME FIRST MIDDLE LAST	15b MOTHER MAIDEN NAME FIRST MIDDLE LAST	15c STREET AND NUMBER	
PARENTS	16a INFORMANT NAME (Type of Informant)	16b MAILING ADDRESS	16c CITY, TOWN OR LOCATION	
	17a BURIAL, CREMATION, REMOVAL, OTHER (Specify)	17b CEMETERY OR CREMATORY NAME	17c LOCATION	
DISPOSITION	18a FUNERAL SERVICE LICENSEE OF Person Acting as Such (Specify)	18b NAME OF FACILITY	18c ADDRESS OF FACILITY	
	19a	19b	19c	
CERTIFIER	20a To be Completed by CERTIFYING PHYSICIAN Only		20b To be Completed by MEDICAL EXAMINER or CORONER Only	
	21a DATE SIGNED (M / DAY / YEAR)	21c HOUR OF DEATH	21b DATE SIGNED (M / DAY / YEAR)	21d HOUR OF DEATH
	22a NAME OF ATTENDING PHYSICIAN IF OTHER THAN CERTIFIER (Type of Informant)	22b PRONOUNCED DEAD (M / DAY / YEAR)	22c PRONOUNCED DEAD (M / DAY / YEAR)	22d AT
	23 NAME AND ADDRESS OF CERTIFIER (PHYSICIAN, MEDICAL EXAMINER OR CORONER) (Type of Informant)			
CONDITIONS OF ANY WHICH GAVE RISE TO IMMEDIATE CAUSE STARTING THE UNDERLYING CAUSE LAST	24a (Signature)	24b DATE RECEIVED BY REGISTRAR (M / DAY / YEAR)		
	25 IMMEDIATE CAUSE (ENTER ONLY ONE CAUSE PER LINE FOR 1a), 1b), AND 1c))			
CAUSE OF DEATH	PART I		PART II	
	1a) DUE TO OR AS A CONSEQUENCE OF		OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a), (b), and (c)	
	1b) DUE TO OR AS A CONSEQUENCE OF		26 AUTOPSY (Specify)	
1c) OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a), (b), and (c)		27 WAS CASE REFERRED TO MEDICAL EXAMINER OR CORONER (Type of Informant)		
28a ACCIDENT SUICIDE HOMICIDE UNDETERMINED OR PENDING INVESTIGATION	28b DATE OF INJURY (M / DAY / YEAR)	28c HOUR OF INJURY	28d DESCRIBE HOW INJURY OCCURRED	
29a INJURY AT WORK (Specify the nature of work)	29b PLACE OF INJURY (At home, farm, street, factory, office or building, etc.)	29c LOCATION	29d STREET AND NUMBER	
29a	29b	29c	29d	

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District of Columbia for all years; registration cities in non-registration States are not included. For more details on the history of the death-registration area see the Technical Appendix in *Vital Statistics of the United States, 1979*, Volume II, Mortality, Part A, section 7, pages 3-4, and the section "History and Organization of the Vital Statistics System," chapter 1, *Vital Statistics of the United States, 1950*, Volume 1, pages 2-19.

Statistics on fetal deaths were first published for the birth-registration area in 1918, and then every year beginning with 1922.

**CLASSIFICATION OF DATA**

The principal value of vital statistics data is realized through the presentation of rates, which are computed by relating the vital events of a class to the population of a similarly defined class. Vital statistics and population sta-

tistics must therefore be classified according to similarly defined systems and tabulated in comparable groups. Even when the variables common to both, such as geographic area, age, sex, and race, have been similarly classified and tabulated, differences between the enumeration method of obtaining population data and the registration method of obtaining vital statistics data may result in significant discrepancies.

The general rules used in the classification of geographic and personal items for deaths and fetal deaths are set forth in two NCHS instruction manuals.<sup>1,2</sup>

A discussion of the classification of certain important items is presented below.

**Classification by occurrence and residence**

Tabulations for the United States and specified geographic areas in this report are by place of residence un-

FIGURE 7-B.

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U S STANDARD  
**REPORT OF FETAL DEATH**

STATE FILE NUMBER \_\_\_\_\_

COUNTY OF DELIVERY \_\_\_\_\_

HOSPITAL NAME (Print or type full name, street and number) \_\_\_\_\_ CITY, TOWN OR LOCATION OF DELIVERY \_\_\_\_\_

1a \_\_\_\_\_ 1b \_\_\_\_\_ 1c \_\_\_\_\_

DATE OF DELIVERY (Month Day Year) \_\_\_\_\_ HOUR OF DELIVERY \_\_\_\_\_ SEX OF FETUS \_\_\_\_\_ WEIGHT OF FETUS \_\_\_\_\_

2a \_\_\_\_\_ 2b \_\_\_\_\_ M 3 \_\_\_\_\_ 4 \_\_\_\_\_

MOTHER—MAIDEN NAME FIRST MIDDLE LAST AGE (At time of birth) \_\_\_\_\_ RESIDENCE STATE \_\_\_\_\_ COUNTY \_\_\_\_\_

5a \_\_\_\_\_ 5b \_\_\_\_\_ 6a \_\_\_\_\_ 6b \_\_\_\_\_

CITY, TOWN OR LOCATION \_\_\_\_\_ STREET AND NUMBER \_\_\_\_\_ INSIDE CITY LIMITS (Specify) \_\_\_\_\_ PREGNANCY HISTORY (Complete each section)

6c \_\_\_\_\_ 6d \_\_\_\_\_ 6e \_\_\_\_\_ 6f \_\_\_\_\_

RACE (e.g. White, Black, American Indian, etc.) (Specify) \_\_\_\_\_ EDUCATION (Specify only highest grade completed) \_\_\_\_\_ DATE LAST NORMAL MENSES BEGAN (Month Day Year) \_\_\_\_\_ IS MOTHER MARRIED? (Specify year if not) \_\_\_\_\_

7 \_\_\_\_\_ 8 \_\_\_\_\_ 9 \_\_\_\_\_ 10 \_\_\_\_\_

MONTH OF PREGNANCY PRENATAL CARE BEGAN (First, second, etc. Specify) \_\_\_\_\_ PRENATAL VISITS (Total number, if none so state) \_\_\_\_\_ THIS BIRTH—Single (twin, triplet, etc. Specify) \_\_\_\_\_ IF NOT SINGLE BIRTH—Born first, second, third, etc. (Specify) \_\_\_\_\_ DATE OF LAST LIVE BIRTH (Month Year) \_\_\_\_\_ DATE OF LAST OTHER TERMINATION (as indicated in d or e above) (Month Year) \_\_\_\_\_

12a \_\_\_\_\_ 12b \_\_\_\_\_ 12c \_\_\_\_\_ 12d \_\_\_\_\_ 11c \_\_\_\_\_ 11d \_\_\_\_\_ 11e \_\_\_\_\_ 11f \_\_\_\_\_

FATHER NAME FIRST MIDDLE LAST AGE (At time of this delivery) \_\_\_\_\_ RACE (e.g. White, Black, American Indian, etc.) (Specify) \_\_\_\_\_ EDUCATION (Specify only highest grade completed) \_\_\_\_\_

14a \_\_\_\_\_ 14b \_\_\_\_\_ 14c \_\_\_\_\_ 14d \_\_\_\_\_

15 PART I IMMEDIATE CAUSE (ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), AND (c).) \_\_\_\_\_ Specify Fetal or Maternal

(a) \_\_\_\_\_ Due to or as a consequence of \_\_\_\_\_ Specify Fetal or Maternal

(b) \_\_\_\_\_ Due to or as a consequence of \_\_\_\_\_ Specify Fetal or Maternal

(c) \_\_\_\_\_

PART II OTHER SIGNIFICANT CONDITIONS OF FETUS OR MOTHER (Conditions contributing to fetal death but not related to cause given in (a)) \_\_\_\_\_ FETUS DIED BEFORE LABOR DURING LABOR OR DELIVERY UNKNOWN (Specify) \_\_\_\_\_ PHYSICIAN'S ESTIMATE OF GESTATION \_\_\_\_\_ AUTOPSY (Specify yes or no) \_\_\_\_\_

16 \_\_\_\_\_ 17 \_\_\_\_\_ Weeks \_\_\_\_\_ 18 \_\_\_\_\_

COMPLICATIONS OF PREGNANCY (Describe or write none) \_\_\_\_\_ COMPLICATIONS OF LABOR AND OR DELIVERY (Describe or write none) \_\_\_\_\_

19 \_\_\_\_\_ 20 \_\_\_\_\_

CONCURRENT ILLNESSES OR CONDITIONS AFFECTING THE PREGNANCY (Describe or write none) \_\_\_\_\_ CONGENITAL MALFORMATIONS OR ANOMALIES OF FETUS (Describe or write none) \_\_\_\_\_

21 \_\_\_\_\_ 22 \_\_\_\_\_

NAME OF PHYSICIAN OR ATTENDANT (Type or print) \_\_\_\_\_ NAME OF PERSON COMPLETING REPORT (Type or print) \_\_\_\_\_ TITLE \_\_\_\_\_

23 \_\_\_\_\_ 24 \_\_\_\_\_

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MOTHER

FATHER

CAUSE OF FETAL DEATH

MULTIPLE BIRTHS (Enter State File Number for multiple LIVE BIRTHS)

FETAL DEATH(S)

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less stated as by place of occurrence. Before 1970, resident mortality statistics for the United States included all deaths occurring in the United States, with deaths of "non-residents of the United States" assigned to place of death. "Deaths of nonresidents of the United States" refers to deaths that occur in the United States of nonresident aliens, nationals residing abroad, and residents of Puerto Rico, the Virgin Islands, Guam, and other territories of the United States. Beginning with 1970, deaths of nonresidents of the United States are not included in tables by place of residence.

Tables by place of occurrence, on the other hand, include deaths of both residents and nonresidents of the United States. Consequently, for each year beginning with 1970, the total number of deaths in the United States by place of occurrence was somewhat greater than the total by place of residence. For 1981 this difference amounted to 3,328 deaths.

Mortality statistics by place of occurrence are shown in tables 1-10, 1-18, 1-19, 1-28, 1-29, 3-1, 3-8, 8-1, and 8-7.

Before 1970, except for 1964 and 1965, deaths of non-residents of the United States occurring in the United States were treated as deaths of residents of the exact place of occurrence, which in most instances was an urban area. In 1964 and 1965, deaths of nonresidents of the United States occurring in the United States were allocated as deaths of residents of the balance of the county in which they occurred.

**Residence error**—Results of a 1960 study showed that the classification of residence information on the death certificates corresponded closely to the residence classification of the census records for the decedents whose records were matched.<sup>3</sup>

A comparison of the results of this study of deaths with those for a previous matched record study of births<sup>4</sup> showed

that the quality of residence data had considerably improved between 1950 and 1960. Both studies found that the NCHS classifications overstated events in urban areas in comparison with the U.S. Bureau of the Census classification. The magnitude of the difference was substantially less for deaths in 1960 than it was for births in 1950.

Two factors contributed to this difference in magnitude. First, an item was added to the U.S. Standard Certificate of Death in 1956, asking if residence was inside or outside city limits. This new item aided in properly allocating the residence of persons living near cities but outside the corporate limits. Second, there was more likelihood of movement for hospital utilization for births than for deaths.

### Geographic classification

The rules followed in the classification of geographic areas for deaths and fetal deaths are contained in the two instruction manuals referred to previously.<sup>1,2</sup>

The geographic codes assigned by the National Center for Health Statistics during data reduction of source information on birth, death, and fetal-death records are given in another instruction manual.<sup>5</sup>

*Standard metropolitan statistical areas*—The standard metropolitan statistical areas (SMSA's) in this report are those established by the U.S. Office of Management and Budget, using final 1980 census population counts,<sup>6</sup> and used by the U.S. Bureau of the Census, except in the New England States.

Except in the New England States, an SMSA is a county or a group of contiguous counties containing a city of 50,000 inhabitants or more or an urbanized area of 50,000 with a total metropolitan population of at least 100,000. In addition to the county or counties containing such a city or area, contiguous counties are included in an SMSA if, according to specified criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city or urbanized area.<sup>7</sup>

In the New England States the U.S. Office of Management and Budget uses towns and cities rather than counties as geographic components of SMSA's. The National Center for Health Statistics cannot, however, use the SMSA classification for these States because its data are not coded to identify all towns. Instead, NCHS uses New England County Metropolitan Areas (NECMA's). These areas, established by the U.S. Office of Management and Budget, are made up of county units.<sup>8,9</sup>

*Metropolitan and nonmetropolitan counties*—Independent cities and counties included in SMSA's or in NECMA's are included in data for metropolitan counties; all other counties are classified as nonmetropolitan.

*Population-size groups*—Vital statistics data for cities and certain other urban places for 1970 through 1981 are classified according to the population enumerated in the 1970 Census of Population. Data are available for individual cities and other urban places of 10,000 or more popula-

tion. Data for the remaining areas not separately identified are shown in the tables under the heading "balance of area" or "balance of county."

Urban places other than incorporated cities for which vital statistics data are shown in this report include the following.

1. Each town in New England and each township in New Jersey and Pennsylvania that had no incorporated municipality as a subdivision and had either 25,000 inhabitants or more, or a population of 10,000 to 25,000 and a density of 1,500 persons or more per square mile.
2. Each county in States other than the New England States, New Jersey, and Pennsylvania that had no incorporated municipality within its boundary and had a density of 1,500 persons or more per square mile. (Arlington County, Virginia, is the only county classified as urban under this rule.)

Before 1964, places were classified as "urban" or "rural." The Technical Appendixes for earlier years discuss the previous classification system.

### State or country of birth

Mortality statistics by State or country of birth (table 1-32) became available beginning with 1979. State or country of birth of a decedent is assigned to 1 of the 50 States or the District of Columbia; or to Puerto Rico, the Virgin Islands, or Guam—if specified on the death certificate. The place of birth is also tabulated for Canada, Cuba, Mexico, and for the Remainder of the World. Deaths for which information on State or country of birth was unknown, not stated, or not classifiable accounted for a small proportion of all deaths in 1981, about 0.5 percent.

Early mortality reports published by the U.S. Bureau of the Census contained tables showing nativity of parents as well as nativity of decedent. Publication of these tables was discontinued in 1933. Mortality data showing nativity of decedent were again published in annual reports for 1939-41 and for 1950.

### Age

The age recorded on the death record is the age at last birthday. With respect to the computation of death rates, the age classification used by the U.S. Bureau of the Census is also based on the age of the person in completed years.

For computation of age-specific and age-adjusted death rates, deaths with age not stated are excluded. For life table computation, deaths with age not stated are distributed proportionately.

## Race

For vital statistics in the United States in 1981, deaths are classified by race—white, black, Indian, Chinese, Japanese, Filipino, other Asian or Pacific Islander, and other races. Mortality data for Filipino and other Asian or Pacific Islander were shown for the first time in 1979.

The white category includes, in addition to persons reported as white, those reported as Mexican, Puerto Rican, Cuban, and all other Caucasians. The Indian category includes American, Alaskan, Canadian, Eskimo, and Aleut. If the racial entry on the death certificate indicates a mixture of Hawaiian and any other race, the entry is coded to Hawaiian. If the race is given as a mixture of white and any other race, the entry is coded to the appropriate other race. If a mixture of races other than white is given (except Hawaiian), the entry is coded to the first race listed. This procedure for coding the first race listed has been in use since 1969. Before 1969, if the entry for race was a mixture of black and any other race except Hawaiian, the entry was coded to black.

Most of the tables in this report, however, do not show data for this detailed classification by race. In about half of all the tables the divisions are white, all other (including black), and black separately. In other tables by race, where the main purpose is to isolate the major groups, the classifications are simply white and all other.

*Race not stated.*—For 1981 the number of death records for which race was not stated was 1,287, or 0.1 percent of the total deaths. Death records with race entry not stated are assigned to a racial designation as follows: If the preceding record is coded white, the code assignment is made to white; if the code is other than white, the assignment is made to black. Before 1964 all records with race not stated were assigned to white except records of residents of New Jersey for 1962–64.

*New Jersey, 1962–64.*—New Jersey omitted the race item from its certificates of live birth, death, and fetal death in use in the beginning of 1962. The item was restored during the latter part of 1962. However, the certificate revision without the race item was used for most of 1962 as well as 1963. Therefore figures by race for 1962 and 1963 exclude New Jersey. For 1964, 6.8 percent of the death records in use for residents of New Jersey did not contain the race item.

Adjustments made in vital statistics to take into account the omission of the race item in New Jersey for part of the certificates filed during 1962 through 1964 are described in the Technical Appendix of *Vital Statistics of the United States* for each of those data years.

## Marital status

Mortality statistics by marital status (table 1–31) became available in 1979 for the first time since 1961. (Previously they had been published only in the annual reports for the years 1949–51 and 1959–61.) Several reports an-

alyzing mortality by marital status have been published, including the special study based on 1959–61 data.<sup>10</sup> Reference to earlier reports may be found in the appendix of part B of the 1959–61 special study.

Mortality statistics by marital status are tabulated separately for never married, married, widowed, and divorced. Certificates in which the marriage is specified as being annulled are classified as never married. Where marital status is specified as separated or common-law marriage, it is classified as married. Of the 1,915,938 resident deaths 15 years of age and over in 1981, 8,465 certificates (0.4) had marital status not stated.

## Place of death and status of decedent

Mortality statistics by place of death were published in 1979 for the first time since 1958 (tables 1–28 and 1–29). In addition, mortality data were also available for the first time in 1979 for the status of decedent when death occurred in a hospital or medical center (table 1–28). These data were obtained from the following two items that appear on the U.S. Standard Certificate of Death:

- Item 7c. Hospital or Other Institution—Name (If not in either, give street and number)
- Item 7d. If Hosp. or Inst. Indicate DOA, OP/Emer. Rm., Inpatient (Specify)

All of the States and the District of Columbia have item 7c (or its equivalent) on the death certificate. For 44 of the 45 States in the Vital Statistics Cooperative Program, NCHS accepts the State definition, classification, or codes for hospitals, medical centers, or other institutions. For New Mexico, the remaining five States not in the Program, and the District of Columbia, NCHS classifies and codes to a hospital or medical center according to whether the terms “hospital” or “medical center” are entered as part of the name in item 7c or its equivalent. If the terms “hospital” or “medical center” are not entered as part of the name, the entry is coded to one of the following according to the information entered in item 7c on the certificate: (1) other institutions, (2) all other reported entries, or (3) unknown, not stated.

Table 1–28 shows mortality data for the total of the following 40 States (including New York City) that have item 7d or its equivalent on their death certificates:

Alaska	Iowa
Arizona	Kansas
Arkansas	Kentucky
Colorado	Maine
Florida	Michigan
Georgia	Mississippi
Hawaii	Missouri
Idaho	Montana
Illinois	Nebraska
Indiana	Nevada

New Hampshire	South Carolina
New Jersey	South Dakota
New Mexico	Tennessee
New York	Utah
North Carolina	Vermont
North Dakota	Virginia
Ohio	Washington
Oregon	West Virginia
Pennsylvania	Wisconsin
Rhode Island	Wyoming

Effective with data for 1980, the coding of place of death and status of decedent was changed. A new coding category was added: "Dead on arrival—hospital, clinic, medical center name not given." Deaths coded to this category are tabulated in table 1-28 as "Dead on arrival" and in table 1-29 as "Not in hospital or medical center." Had the 1979 coding categories been used, these deaths would have been tabulated as "Place unknown."

### Mortality by month and date of death

Deaths by month have been regularly tabulated and published in the annual report for each year beginning with data year 1900. For 1981, deaths by month are shown in tables 1-19, 1-20, 1-23, 1-30, 2-12, 2-13, 2-14, and 3-9.

Date of death was first published for data year 1972. In addition, unpublished data for selected causes by date of death for 1962 are available from NCHS.

Number of deaths by date of death in this report are shown in table 1-30 for the total number of deaths and for the number of deaths for the following three causes, for which the greatest interest in date of occurrence of death has been expressed: Motor vehicle accidents, Suicide, and Homicide and legal intervention.

These data show the frequency distribution of deaths for the selected causes by day of week. They also make it possible to identify holidays with peak numbers of deaths from specified causes.

### Report of autopsy

Before 1972, the last year for which autopsy data were tabulated was 1958. For 1972-81, all registration areas requested information on the death certificate as to whether autopsies were performed. For 1981, autopsies were reported on 279,656 death certificates (14.1 percent of the total, table 1-27).

Information as to whether the autopsy findings were used in determining the causes of death were tabulated for 1972-73 for all but nine registration areas and from 1974-77 for all but eight registration areas. The item "autopsy findings used" was deleted from the 1978 U.S. Standard Certificate of Death.

For seven of the cause-of-death categories shown in table 1-27, autopsies were reported as performed for 50

percent or more of all deaths (Shigellosis and amebiasis, Meningococcal infection, Measles, Pregnancy with abortive outcome, Other complications of pregnancy, childbirth, and the puerperium, Homicide and legal intervention, and All other external causes).

There were four other categories for which 40 percent or more of the death certificates reported autopsies. Autopsies were reported for only 8.6 percent of the Major cardiovascular diseases. Among all causes other than major cardiovascular diseases, autopsies were reported for 19.5 percent of all deaths.

### Cause of death

*Cause-of-death classification*—Since 1949, cause-of-death statistics have been based on the underlying cause of death, which is defined as "(a) the disease or injury which initiated the train of events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury."<sup>11</sup>

For a given death the underlying cause is selected from an array of conditions given in the cause-of-death section on the death certificate. These conditions are translated into medical codes through use of the classification structure and selection and modification rules contained in the applicable revision of the *International Classification of Diseases (ICD)* published by the World Health Organization (WHO). Selection rules provide guidance for systematically identifying the underlying cause of death in terms of the format of reported conditions and their causal relationship. Modification rules are intended to improve the usefulness of mortality statistics by giving preference to certain classification categories over others and/or to consolidate two or more conditions on the certificate into a single classification category.

As a statistical datum, the underlying cause of death is a simple, one-dimensional statistic; it is conceptually easy to understand and a well accepted measure of mortality. It identifies the initiating cause of death and is therefore most useful to public health officials in developing measures to prevent the start of the chain of events leading to death. The rules for coding underlying causes of death are included with the ICD as a means of standardizing classification, which contributes toward uniformity in mortality medical statistics among countries.

Beginning with data year 1979 the cause-of-death statistics published by the National Center for Health Statistics have been classified according to the Ninth Revision of the *International Classification of Diseases (ICD-9)*.<sup>11</sup> In addition to specifying that the Classification be used, WHO—in an effort to promote international comparability—recommended a basic list for tabulation of mortality data. This is in contrast to the several special lists recommended by WHO for use under the Eighth Revision. The system recommended under the Ninth Revision is more flexible, allowing for the construction of tabulation lists from the rubrics of a basic list

The recommended Basic Tabulation List (BTL) under the Ninth Revision consists of 57 two-digit rubrics that add to the "all causes" total. Within each two-digit rubric, up to 9 three-digit rubrics numbered from 0 to 8 are identified, but these do not add to the total of the two-digit rubric. The residual of each two-digit rubric, the difference between the two-digit total and the sum of its three-digit rubrics, is given the number 9. The WHO Mortality List, a subset of the titles contained in the BTL, consists of 50 rubrics, which are a minimum for the national display of mortality data. The two-digit rubrics of the BTL 01 through 46 provide for the tabulation of nonviolent deaths to ICD categories 001–799. Rubrics relating to chapter 17 (nature-of-injury causes 47 through 56) are not used by NCHS for selecting underlying cause of death; rather, preference is given to rubrics E47 through E56. The 57th two-digit rubric VO is the Supplementary Classification of Factors Influencing Health Status and Contact with Health Services and is not appropriate for the tabulation of mortality data.

Five lists of causes have been developed for tabulation and publication of mortality data by NCHS: The Each-Cause List, List of 282 Selected Causes, List of 72 Selected Causes, List of 61 Selected Causes of Infant Death, and List of 34 Selected Causes. These lists were designed to be as comparable as possible to the NCHS lists more recently in use under the Eighth Revision. However, complete comparability could not always be achieved.

The Each-Cause List is made up of each three-digit category of the WHO Detailed List and each four-digit subcategory to which deaths may be validly assigned. The list is used for tabulation for the entire United States. The published each-cause table does not show the four-digit subcategories provided for Motor vehicle accidents (E810–E825); however, these subcategories, which identify persons injured, are shown in the accident tables of this report (section 5). Special fifth-digit subcategories are also used in the accident tables to identify place of accident when deaths from nontransport accidents are shown. These are not shown in the each-cause table.

The List of 282 Selected Causes of Death is constructed from BTL rubrics 01–46 and E47–E56. Each of the 56 BTL titles can be obtained either directly or by combining titles in the List. At the three-digit level, however, the BTL is modified more extensively. For some causes more detail was desired and new three-digit rubrics have been added to the list. Where less detail was needed, three-digit rubrics were combined. Moreover, each of the 50 rubrics of the WHO Mortality List can be obtained from the List of 282 Selected Causes of Death. The List is used in tables published for the United States and each State.

The List of 72 Selected Causes of Death was constructed by combining titles in the List of 282 Selected Causes of Death. It is used in tables published for the United States and each State, and for standard metropolitan statistical areas.

The List of 61 Selected Causes of Infant Death shows more detailed titles for Congenital anomalies and Certain

conditions originating in the perinatal period than any other list except the Each-Cause List.

The List of 34 Selected Causes of Death was created by combining titles in the List of 72 Selected Causes. A table using this list is published to show detailed geographic areas.

*Effect of list revisions*—The International Lists, in use in this country since 1900, have been revised approximately every 10 years so that the disease classification may be consistent with advances in medical science and with changes in diagnostic practice. Each revision of the International Lists has produced some break in comparability of cause-of-death statistics. Cause-of-death statistics beginning with 1979 are classified by NCHS according to the ICD–9.<sup>11</sup> For a discussion of each of the classifications used with death statistics since 1900, see the Technical Appendix in *Vital Statistics of the United States, 1979, Volume II, Mortality, Part A, section 7, pages 9–14.*

A dual coding study was undertaken between the Ninth and the Eighth Revisions to measure the extent of discontinuity in cause-of-death statistics resulting from introducing the new Revision. An initial study has been published for the list of 72 causes and the list of 10 infant causes, both of which appear in the *Monthly Vital Statistics Report*.<sup>12</sup> The 72-cause list is also a basic list used in this volume. Comparability studies were also undertaken between the Eighth and Seventh, Seventh and Sixth, and Sixth and Fifth Revisions. For additional information about these studies, again see the 1979 Technical Appendix.

*Coding in 1981*—The National Center for Health Statistics prepares for its cause-of-death coding clerks an instruction manual that contains decisions and interpretations that apply each year. These manuals are revised annually, chiefly to bring coding procedures into alignment with new developments in reporting practices and in medical opinions as to the etiology and causal relationship of diseases and to eliminate inconsistencies in coding procedures.<sup>13</sup>

During the processing of the 1981 mortality file, which was partially carried out in 1983, the code assignment for the Acquired Immunity Deficiency Syndrome (AIDS) was changed from ICD No. 279.3 to ICD No. 279.1, both are subcategories of Disorders involving the immune mechanism (ICD No. 279). Beginning with the implementation of ICD–9 in 1979, AIDS had been assigned to Unspecified immunity deficiency (ICD No. 279.3) since it was not included as an entry in the index to ICD–9. In early 1983, the World Health Organization assigned AIDS to Deficiency of cell-mediated immunity (ICD No. 279.1). This change resulted in approximately 90 percent of the AIDS deaths being assigned to ICD No. 279.3 and about 10 percent to ICD No. 279.1 in the 1981 mortality file.

*Medical certification*—The use of a standard classification list, although essential for State, regional, and international comparison, does not assure strict comparability of the tabulated figures. A high degree of comparability between areas could be attained only if all records of cause of death were reported with equal accuracy and completeness. The medical certification of cause of death can be made only by

a qualified person, usually a physician, a medical examiner, or a coroner. Therefore, the reliability and accuracy of cause-of-death statistics are, to a large extent, governed by the ability of the certifier to make the proper diagnosis and by the care with which he or she completes the death certificate.

A number of studies have been undertaken on the quality of medical certification on the death certificate. In general, these have been for relatively small samples and for limited geographic areas. A bibliography, prepared by NCHS, covering 128 references over a period of 23 years indicates that no definitive conclusions have been reached about the quality of medical certification on the death certificate.<sup>14</sup> No country has a well-defined program for systematically assessing the quality of medical certifications reported on death certificates or for measuring the error effects on the levels and trends of cause-of-death statistics.

One index of the quality of reporting causes of death is the proportion of death certificates coded to the Ninth Revision ICD-9 Nos. 780-796, 798-799, which are the rubrics for Symptoms, signs, and other ill-defined conditions. While there are cases for which it is not possible to determine the causes of death, this proportion indicates the care and consideration given to the certification by the medical certifier. It may also be used as a rough measure of the specificity of the medical diagnoses made by the certifier in various areas and, to a small degree, the extent to which autopsies are performed and their findings used in determining the underlying cause of death entered on the death certificate. In 1981, 1.4 percent of all reported deaths in the United States were assigned to ill-defined or unknown causes. However, this percentage varied among the States, from 0.4 percent for Rhode Island to 8.8 percent for New Mexico.

*Automated selection of underlying cause of death*—Beginning with data year 1968, NCHS began using a computer system for assigning the underlying cause of death. It has been used every year since to select the underlying cause of death. The system is called "Automated Classification of Medical Entities" (ACME).

The ACME system applies the same rules for selecting the underlying cause as applied by a nosologist; however, under this system, the computer consistently applies the same criteria, thus eliminating intercoder variation in this step of the process.

The ACME computer program requires the coding of all conditions shown on the medical certification. These codes are matched automatically against decision tables that consistently select the underlying cause of death for each record according to international rules. The decision tables provide not only a comprehensive relationship between the conditions classifiable by ICD when applying the rules of selection and modification, but also decisions used when the underlying cause of death is assigned by ACME.

Decision tables were developed by NCHS staff on the basis of their experience in coding underlying causes of death under the earlier manual coding system and as a result of periodic independent validations. These tables are periodically updated to reflect additional new information on

the relationship among medical conditions. For 1981, the content of these tables was identical to that of the decision tables instruction manual for data year 1980, except for printing corrections.<sup>15</sup>

*Cause-of-death ranking*—Cause-of-death ranking (except for infants) is based on the List of 72 Selected Causes of Death. Cause-of-death ranking for infants is based on the List of 61 Selected Causes of Infant Death. The group titles Major cardiovascular diseases and Symptoms, signs, and ill-defined conditions are not ranked from the List of 72 Selected Causes, and Certain conditions originating in the perinatal period and Symptoms, signs, and ill-defined conditions are not ranked from the List of 61 Selected Causes of Infant Death. In addition, category titles that begin with the words "Other" or "All Other" are not ranked to determine the leading causes of death. When one of the titles that represents a subtotal is ranked (such as Tuberculosis), its component parts (in this case, Tuberculosis of respiratory system and Other tuberculosis) are not ranked.

### Maternal deaths

Maternal deaths are those for which the certifying physician has designated a maternal condition as the underlying cause of death. Maternal conditions are those assigned to Complications of pregnancy, childbirth, and the puerperium (ICD-9 Nos. 630-676). In the Ninth Revision, WHO for the first time has defined a maternal death as follows:

A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.<sup>11</sup>

Under the Eighth Revision, maternal deaths were assigned to category title "Complications of pregnancy, childbirth, and the puerperium" (ICDA-8 Nos. 630-678). While WHO did not define maternal mortality, there was an NCHS classification rule that limited a maternal death to a death within a year after termination of pregnancy from any "maternal cause," that is, any cause within the range of ICDA-8 Nos. 630-678. This rule applied only if a duration of time for the condition was given. If no duration was specified and the underlying cause of death was a maternal condition, then the duration was assumed to be within a year and the death was coded by NCHS as a maternal death. The change from an under-1-year limitation on duration used in the Eighth Revision to an under-42-days limitation used in the Ninth Revision is not expected to have much effect on the comparability of maternal mortality statistics. However, comparability is affected by the following classification change. Under the Ninth Revision, maternal causes have been expanded to include Indirect obstetric causes (ICD-9 Nos.

647–648). These causes include infective and parasitic conditions and other current conditions in the mother that are classifiable elsewhere but which complicate pregnancy, childbirth, and the puerperium, such as syphilis, tuberculosis, diabetes mellitus, drug dependence, and congenital cardiovascular disorders.

**Infant deaths**

An infant death is defined as death under 1 year of age. The term excludes fetal deaths. Infant deaths are usually divided into two categories according to age, neonatal and postneonatal. Neonatal deaths are those which occur during the first 27 days of life, and postneonatal deaths are those which occur between 28 days and 1 year of age. It has generally been believed that different factors influencing the child's survival predominate in these two periods: Factors associated with prenatal development, heredity, and the birth process were considered dominant in the neonatal period, while environmental factors, such as nutrition, hygiene, and accidents were considered more important in the postneonatal period. Recently, however, the distinction between these two periods has blurred due in part to advances in neonatology, which have enabled more very small, premature infants to survive the neonatal period.

Indices of infant mortality are designed to show the likelihood that live births with certain characteristics will survive the first year of life, or, conversely, will die during the first year of life. For infant mortality, the "population at risk" is approximated by live births that occur in a calendar year. Infant, neonatal, and postneonatal mortality rates in section 2 and table 8–2 are computed on the basis of the number of live births. In section 1 all infant death rates are based on the estimated population under 1 year of age.

Causes of death for infants are tabulated according to a list of causes that is different from the list of causes for the population of all ages, except for the Each-Cause List. (See section on effect of list revisions.)

**Fetal deaths**

In May 1950 the World Health Organization recommended the following definition of fetal death be adopted for international use:

Death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.<sup>16</sup>

The term "fetal death" was defined on an all-inclusive basis to end confusion arising from use of such terms as stillbirth, abortion, and miscarriage.

Shortly thereafter, this definition of fetal death was adopted by the National Center for Health Statistics as the

nationally recommended standard. Currently all registration areas except Puerto Rico have definitions similar to the standard definition.<sup>17</sup> Puerto Rico has no formal definition.

As another step toward increasing the comparability of data on fetal deaths for different countries, the World Health Organization recommended that for statistical purposes fetal deaths be classified as early, intermediate, and late. These groups are defined as follows:

Less than 20 completed weeks of gestation (early fetal deaths) . . . . .	Group I
20 completed weeks of gestation but less than 28 (intermediate fetal deaths) . . . . .	Group II
28 completed weeks of gestation and over (late fetal deaths) . . . . .	Group III
Gestation period not classifiable in groups I, II, and III . . . . .	Group IV

Note that in table 3–13, group IV consists of fetal deaths with gestation not stated but presumed to be 20 weeks or more gestation.

Until 1939 the nationally recommended procedure for registration of a fetal death required the filing of both a live-birth and a death certificate. In 1939 a separate Standard Certificate of Stillbirth (fetal death) was created to replace the former procedure. This was revised in 1949, 1955, 1956, and 1968. In 1978 the Standard Certificate of Fetal Death was replaced by the Standard Report of Fetal Death (figure 7–B).

The 1977 revision of the *Model State Vital Statistics Act and Model State Vital Statistics Regulations*,<sup>18</sup> recommended that spontaneous fetal deaths of 20 weeks or more gestation, or a weight of 350 grams or more, and all induced terminations of pregnancy regardless of gestational age be reported and further that they be reported on separate forms. These forms are to be considered legally required statistical reports rather than legal documents.

Beginning with 1970 fetal deaths, procedures were implemented that attempted to separate reports of spontaneous fetal deaths from those of induced terminations of pregnancy. These procedures were implemented because the health implications are different for spontaneous fetal deaths and induced terminations of pregnancy. These procedures are still in use.

*Comparability and completeness of data*—Registration area requirements for reporting fetal deaths vary. Most of these areas require reporting fetal deaths of gestations of 20 weeks or more. Table 3–1 shows the minimum period of gestation required by each State for fetal-death reporting. There is substantial evidence that not all fetal deaths for which reporting is required are reported.<sup>19</sup>

For registration areas not requiring the reporting of fetal deaths of all periods of gestation, underreporting is more likely to occur in the earlier gestational periods. This is illustrated by the fact that for most areas requiring report-

ing of fetal deaths of 20 weeks or more, the total number reported for 20–23 weeks is lower than the numbers reported for 24–27 and 28–31 weeks. For areas requiring the reporting of all fetal deaths, however, the opposite is generally true.

Another type of reporting problem arises from the inconsistent application of the definition of fetal death by individual registration areas. For example, some live-born infants who die shortly after birth, particularly those born prematurely who die before the umbilical cord is severed or while the placenta is still attached, may be erroneously reported as fetal deaths. This type of error may be more of a problem in States lacking a precise definition of fetal death.

To maximize the comparability of data by year and by State, most of the tables in section 3 are based on fetal deaths occurring at gestations of 20 weeks or more. These tables also include fetal deaths of not stated gestation for those States requiring reporting at 20 weeks or more only. Beginning with 1969, fetal deaths of not stated gestation were excluded for States requiring reporting of all products of conception except for those with a stated birth weight of 500 grams or more. In 1981 this rule was applied to the following States: Colorado, Georgia, Hawaii, New York (including New York City), Rhode Island, and Virginia. Each year there are some exceptions to this procedure. Arkansas was one such exception in 1981, requiring the reporting of fetal deaths of all periods of gestation; however, all fetal deaths of not stated gestation were assumed to be of 20 weeks or more gestation.

The data in table 3–3 include only fetal deaths to residents of those areas in the United States that report all periods of gestation. The areas are Colorado, Georgia, Hawaii, New York, Rhode Island, and Virginia. Although Arkansas reports all periods of gestation, it is excluded from this table because of a noncomparable reporting practice explained below. This reporting practice, however, should not appreciably affect the Arkansas data for fetal deaths of 28 weeks or more gestation.

*Arkansas*—Arkansas has been using two reporting forms for fetal death: A confidential spontaneous abortion form and a fetal death certificate. Beginning with data year 1981, Arkansas specified that fetal deaths of less than 28 weeks gestation, or weighing less than 1,000 grams could be reported on the spontaneous abortion form rather than on their report of fetal death. While the National Center for Health Statistics receives their reports of fetal death, it does not receive their confidential abortion reports. Accordingly, counts of fetal deaths of gestational age 20 to 27 weeks decreased from 100 deaths reported in 1980 to 39 reported in 1981. This reporting practice results in noncomparability of fetal death data for fetal deaths under 28 weeks gestation between Arkansas and other reporting areas.

*District of Columbia*—Beginning in 1981, the District of Columbia changed its reporting requirements for spontaneous fetal deaths from “passed the fifth month of uterogestation” to “20 completed weeks or more or a weight of 500 grams or more.”

*Kentucky*—Beginning in 1981, Kentucky changed its reporting requirements for spontaneous fetal deaths from “20 weeks gestation or more” to “a weight of 350 grams or more or a gestational age of 20 weeks or more.”

*Maine*—Beginning with data year 1978, Maine changed its reporting requirements for spontaneous fetal deaths from “all periods of gestation” to “20 weeks or more.” This change affects the tabulation of fetal deaths with not stated gestational age, including trend data in table 3–7. Whereas data for 1977 include fetal deaths of not stated gestational age only if birth weight was stated as 500 grams or more, data for 1978–81 include all fetal deaths of not stated gestational age.

*New Mexico*—Beginning in 1980, New Mexico changed its reporting requirements for spontaneous fetal deaths from “20 completed weeks” to “500 grams or more.” Gestational age of the 183 fetal deaths occurring in New Mexico was not coded in 1981 and therefore was assigned to gestational age not stated (tables 3–1, 3–6, 3–7, 3–13, and 3–17). Of these occurrences, 170 were to residents of New Mexico and 13 to nonresidents. Fetal deaths reported by specified period of gestation (tables 3–13 and 3–17) are those occurring outside New Mexico to residents of New Mexico. The distribution of fetal deaths by gestational age for the Mountain Division and the United States was slightly affected.

*South Dakota*—Beginning in 1979, South Dakota changed its reporting requirements for spontaneous fetal deaths from “20 weeks or more gestation” to a weight of “more than 500 grams.”

*Tennessee*—Beginning in 1979, Tennessee changed its reporting requirements for spontaneous fetal deaths from “20 weeks or more gestation” to “500 grams or more, or, in the absence of weight, of 22 completed weeks’ gestation or more.”

*Period of gestation*—The period of gestation is the number of completed weeks elapsed between the first day of the last normal menstrual period and the date of delivery. The first day of the last normal menstrual period (LMP) is used as the initial date as it can be more accurately determined than the date of conception, which usually occurs 2 weeks after LMP. Data on period of gestation are computed from information on “date of delivery” and “date last normal menses began.” If “date last normal menses began” is not on the record or the calculated gestation falls beyond a duration considered biologically plausible, “gestation in weeks” or “Physician’s estimate of gestation” is used. When the period of gestation is reported in months on the report, it is allocated to gestational intervals in weeks as follows:

1–3 months to under 16 weeks

4 months to 16–19 weeks

5 months to 20–23 weeks

6 months to 24–27 weeks

7 months to 28–31 weeks

8 months to 32–35 weeks

9 months to 40 weeks

10 months and over to 43 weeks and over

The areas reporting LMP in 1981 are shown in table A.

**SECTION 7 — TECHNICAL APPENDIX — PAGE 12**

**Table A. Areas reporting selected items on the fetal death record: Each reporting area, 1981**

Area	All periods of gestation	Date last normal menstrual period began (LMP)	Birth weight			Pregnancy history	Marital status
			Pounds and ounces	Grams	Either pounds and ounces or grams		
Alabama		X				X	X
Alaska		X	X				X
Arizona		X				X	X
Arkansas	X <sup>1</sup>		X				
California		X		X		X <sup>2</sup>	
Colorado	X	X					X
Connecticut			X				
Delaware			X				X
District of Columbia		X	X				X
Florida		X					X
Georgia	X	X			X	X	X
Hawaii	X	X		X		X	X
Idaho		X	X			X	X
Illinois		X	X				X
Indiana		X	X			X	X
Iowa		X				X	X
Kansas		X				X	X
Kentucky		X				X	X
Louisiana		X	X				X
Maine		X				X	X
Maryland		X			X		
Massachusetts		X				X	X
Michigan		X				X	
Minnesota		X					X
Mississippi		X			X	X	X
Missouri		X				X	X
Montana		X				X	
Nebraska		X				X	X
Nevada		X				X	X
New Hampshire		X				X	X
New Jersey		X	X				X
New Mexico				X		X	X
New York	X	X			X	X	
New York City	X	X			X	X	
North Carolina		X	X				X
North Dakota		X			X	X	X
Ohio		X		X		X	
Oklahoma		X	X				X
Oregon		X				X	X
Pennsylvania		X	X				X
Rhode Island	X	X	X			X	X
South Carolina		X				X	X
South Dakota						X	X
Tennessee		X				X	X
Texas		X			X		
Utah		X				X	X
Vermont		X					
Virginia	X	X		X			X
Washington		X				X <sup>2</sup>	X
West Virginia		X	X				X
Wisconsin		X			X	X	X
Wyoming		X				X	X
Puerto Rico			X				X
Virgin Islands	X	X					X
Guam		X				X	X

<sup>1</sup>Requires the reporting of all periods of gestation; however, those under 20 weeks are not transmitted to NCHS.  
<sup>2</sup>Specifies not to include induced terminations

*Birth weight*—Of the 55 registration areas (including the 50 States, the District of Columbia, New York City, Puerto Rico, the Virgin Islands, and Guam), 26 do not specify how weight should be given; 16 specify that weight should be given in pounds and ounces, 5 specify grams; and the remaining 8 areas specify weight should be given either in pounds and ounces or in grams (see table A). Data on fetal deaths for the Virgin Islands and Guam are not published by NCHS.

In the tabulation and presentation of these data, the metric system (grams) has been used to facilitate comparison with other data published in the United States and internationally. The equivalents of the gram intervals in pounds and ounces are as follows:

Less than 350 grams =	0 lb 12 oz or less
350– 499 grams =	0 lb 13 oz– 1 lb 1 oz
500– 999 grams =	1 lb 2 oz– 2 lb 3 oz
1,000–1,499 grams =	2 lb 4 oz– 3 lb 4 oz
1,500–1,999 grams =	3 lb 5 oz– 4 lb 6 oz
2,000–2,499 grams =	4 lb 7 oz– 5 lb 8 oz
2,500–2,999 grams =	5 lb 9 oz– 6 lb 9 oz
3,000–3,499 grams =	6 lb 10 oz– 7 lb 11 oz
3,500–3,999 grams =	7 lb 12 oz– 8 lb 13 oz
4,000–4,499 grams =	8 lb 14 oz– 9 lb 14 oz
4,500–4,999 grams =	9 lb 15 oz–11 lb 0 oz
5,000 grams or more =	11 lb 1 oz or more

With the introduction of the Ninth Revision International Classification of Diseases, the birth-weight classification intervals for perinatal mortality statistics were shifted downward by 1 gram, as shown above. Previously, the intervals were, for example, 1,001–1,500; 1,501–2,000; etc.

*Race*—The race of the fetus is ordinarily classified based on the race of the parents. If the parents are of different races, the following rules apply. (1) When only one parent is white, the fetus is assigned the other parent's race. (2) When neither parent is white, the fetus is assigned the father's race with one exception: If the mother is Hawaiian or Part-Hawaiian, the fetus is classified as Hawaiian.

When the race of one parent is missing or ill defined, the race of the other determines that of the fetus. When race of both parents is missing, the race of the fetus is allocated to the specific race of the fetus on the preceding record.

*Total-birth order*—Total-birth order refers to the sum of the live births and other terminations (including both spontaneous fetal deaths and induced terminations of pregnancy) that a woman has had including the fetal death being recorded. For example, if a woman has previously given birth to two live babies and to one born dead, the next fetal death to occur, is counted as number four in total-birth order.

In the 1978 revision of the Standard Report of Fetal Death, total-birth order is calculated from four items on pregnancy history: Number of previous live births, now living; number of previous live births, now dead; number of

other terminations before 20 weeks, and number of other terminations after 20 weeks.

All registration areas use the two standard items pertaining to the number of previous live births. Thirty-one areas use the two standard items pertaining to the number of "other terminations" before and after 20 weeks gestation. 5 report "other terminations" of 20 weeks or more, 15 do not differentiate "other terminations" by gestational age, and 4 areas use other criteria for differentiating spontaneous and induced terminations. Total-birth order for all areas is calculated from the sum of available information. Thus, information on total-birth order may not be completely comparable among the registration areas.

*Marital status*—Table 3–4 shows fetal deaths and fetal-death ratios by mother's marital status. Excluded from this table are 11 States and New York City that did not report mother's marital status on the fetal death report in 1981 as shown in table A. Because live births comprise the denominator of the ratio, marital status must also be reported for mothers of live births. Starting in 1980, marital status of the mother of the live birth was inferred for States that did not report it on the birth certificate.

There are no quantitative data on the characteristics of unmarried women who may misreport their marital status or who fail to register fetal deaths. Underreporting may be greater for the unmarried group than for the married group.

*Age of mother*—The fetal-death report asks for the mother's "age (at time of delivery)," and the ages are edited in NCHS for upper and lower limits. When mothers are reported to be under 10 years of age or 50 years and over, the age of the mother is considered not stated and is assigned as follows: Age on all fetal-death records with age of mother not stated is allocated according to the age appearing on the record previously processed for a mother of identical race and having the same total-birth order (total of live births and other terminations).

### Perinatal mortality

*Perinatal definitions*—Beginning with data year 1979, perinatal mortality data for the United States and each State have been published in section 4. The World Health Organization in the Ninth Revision of the International Classification of Diseases (ICD–9) recommended that "national perinatal statistics should include all fetuses and infants delivered weighing at least 500 grams (or when birth weight is unavailable, the corresponding gestational age (22 weeks) or body length (25 cm crown-heel)), whether alive or dead. . . ." It was further recommended that "countries should present, solely for international comparisons, 'standard perinatal statistics' in which both the numerator and denominator of all rates are restricted to fetuses and infants weighing 1,000 grams or more (or, where birth weight is unavailable, the corresponding gestational age (28 weeks) or body length (35 cm crown-heel))." Because birth weight and gestational age are not reported on the death certificate in the United States, NCHS was unable to

recommend adopting these definitions. Three definitions of perinatal mortality are currently used by NCHS: Perinatal Definition I, generally used for international comparisons, which includes fetal deaths of 28 weeks or more gestation and infant deaths of less than 7 days; Perinatal Definition II, which includes fetal deaths of 20 weeks or more gestation and infant deaths of less than 28 days; and Perinatal Definition III, which includes fetal deaths of 20 weeks or more gestation and infant deaths of less than 7 days.

Variations in fetal death reporting requirements and practices have implications for comparing perinatal rates among States. Since reporting is generally poorer near the lower limit of the reporting requirement, States which require reporting of all products of pregnancy regardless of gestation are likely to have more complete reporting of fetal deaths of 20 weeks or more than are other States. The larger number of fetal deaths reported by these "all periods" States may result in higher perinatal rates compared to States whose reporting is less complete. Accordingly, reporting completeness may account, in part, for differences among the State perinatal rates, particularly differences for definitions II and III, which use data for fetal deaths of 20–27 weeks.

Gestational age of the 183 fetal deaths occurring in New Mexico was not coded in 1981 (see section on Fetal Deaths—New Mexico). Most of these were to residents of New Mexico. Although counts of perinatal deaths for Perinatal Definition I for New Mexico and the United States may be affected, the effect is assumed to be very small, and perinatal mortality rates and ratios for New Mexico may also be slightly affected (tables 4–4 and 4–5).

*Not stated*—Fetal deaths with gestational age not stated are presumed to be of 20 weeks gestation or more if (1) the State requires reporting of all fetal deaths of gestational age 20 weeks or more or (2) the fetus weighed 500 grams or more, in those States requiring reporting of all fetal deaths regardless of gestational age. For Definition I, fetal deaths with gestation not stated but presumed to be 20 weeks or more are allocated to the category 28 weeks or more, according to the proportion of fetal deaths with stated gestational age that falls into that category. For definitions II and III, fetal deaths with presumed gestation of 20 weeks or more are included with those of stated gestation of 20 weeks or more.

For all three definitions, following the distribution of gestation not stated described above, fetal deaths with not-stated sex are allocated within gestational age groups on the basis of the distribution of stated cases.

## QUALITY OF DATA

### Completeness of registration

All States have adopted laws that require the registration of births and deaths, and the reporting of fetal deaths.

It is believed that over 99 percent of the births and deaths occurring in this country are registered.

Reporting requirements for fetal deaths vary somewhat from State to State (see "Comparability and completeness of data"). Overall reporting completeness is not as good for fetal deaths as for births and deaths, but it is believed to be relatively complete for fetal deaths of 28 weeks gestation or more. National statistical data on fetal deaths include only those fetal deaths with stated or presumed gestation of 20 weeks or more.

### Massachusetts data

The 1964 statistics for deaths exclude approximately 6,000 events registered in Massachusetts, primarily to residents of that State. Microfilm copies of these records were not received by NCHS. Figures for the United States and the New England Division are also somewhat affected.

### Quality control procedures

*Demographic items on the death certificate*—As previously indicated, for 1981 the mortality data for these items were obtained from two sources: (1) Microfilm images of the original certificates furnished by five States, the District of Columbia, and the Virgin Islands, and photocopies from Guam; and (2) records on data tape furnished by the remaining 45 States, New York City, and Puerto Rico. For the five States, the District of Columbia, the Virgin Islands, and Guam that sent only copies of the original certificates, the demographic items were coded for 100 percent of the death certificates. The demographic coding for a 10-percent sample of the certificates was independently verified.

As part of the quality control procedures for mortality data each registration area has to go through a calibration period during which it must achieve the specified error tolerance level of 2 percent per item for 3 consecutive months, based on NCHS independent verification of a 50-percent sample of that area's records. Once the area has achieved the required error tolerance level, a sample of 250 records per month is used to monitor quality of coding.

Most of the areas had achieved the specified tolerance error before 1981; accordingly, for these areas the demographic items on about 250 records per area per month were independently verified by NCHS. These areas include New York City, Puerto Rico, and 44 of the 45 States that furnished data on computer tape to NCHS. For the remaining State (New Mexico) the data were verified on a 50-percent basis for the entire year. The estimated average error rate for all demographic items in the entire 1981 mortality file was 0.25 percent.

These verification procedures involve controlling two types of error (coding and entering into the data record tape) at the same time, and the error rates are a combined measure of both types. While it may be assumed that the entering errors are randomly distributed across all items on

the record, this assumption cannot be made as readily for coding errors. Although systematic errors in coding infrequent events may escape detection during sample verification, it is probable that some of these errors were detected during the initial period when 50 percent of the file was being verified, thus providing an opportunity to retrain the coders.

*Medical items on the death certificate*—As for demographic data, mortality medical data are also subject to quality control procedures which control for errors of both coding and data entry. Each of the 15 registration areas that furnished NCHS with coded medical information according to NCHS specifications first had to qualify for sample verification. During an initial calibration period, the area had to achieve a specified error tolerance level of less than 5 percent for coding all medical items for 3 consecutive months, based on independent verification by NCHS, for all records. After the area has achieved the required error tolerance level, a sample of 250 records per month is used to monitor quality of medical coding. For these 15 States, the average coding error rate in 1981 was just over 3 percent.

In 1981, as described previously, NCHS used State-coded underlying cause-of-death information for 50 percent of deaths occurring in 19 States. For these areas, the 50-percent sample of even-numbered records coded by NCHS was used for quality control over the States' coding. The estimated average error rate for the underlying cause data for these areas was 5 percent. For the 21 registration areas that were coded entirely by NCHS, a 1-percent sample of the records was independently coded for quality control purposes. The estimated average error rate for these areas was about 3 percent.

The ACME system for selecting the underlying cause of death through computer application contributes to the quality control of medical items on the death certificate (see the section on automated selection of underlying cause of death).

*Demographic items on the report of fetal death*—For 1981, all data on fetal deaths were coded under contract by the U.S. Bureau of the Census except New York State (excluding New York City), which submitted State-coded data. Coding and entering information on data tapes were verified on a 100-percent basis because of the relatively small number of records involved.

*Other control procedures*—After coding and entering on data tape are completed, record counts are balanced against control totals for each shipment of records from a registration area. Editing procedures ensure that records with inconsistent or impossible codes are modified. Inconsistent codes are those, for example, where there is contradiction between cause of death and age or sex of the decedent. Records so identified during the computer-editing process are either corrected by reference to the source record or adjusted by arbitrary code assignment.<sup>20</sup> All subsequent operations in tabulating and in preparing tables are verified during the computer processing or by statistical clerks.

### Estimates of errors arising from 50-percent sample for 1972

Death statistics for 1972 in this report (excluding fetal-death statistics) are based on a 50-percent sample of all deaths occurring in the 50 States and the District of Columbia.

A description of the sample design and a table of the percent errors of the estimated numbers of deaths by size of estimate and total deaths in the area are shown in the Technical Appendix of *Vital Statistics of the United States*, Volume II, Mortality, Part A, 1972.

## COMPUTATION OF RATES AND OTHER MEASURES

### Population bases

The death rates shown in this report are computed on the basis of population statistics prepared by the U.S. Bureau of the Census. Rates for 1940, 1950, 1960, 1970, and 1980 are based on the population enumerated as of April 1 in the censuses of those years. Rates for all other years are based on the estimated midyear (July 1) population for the respective years. Death rates for the United States, individual States, and SMSA's are based on the total resident populations of the respective areas. Except as noted, these populations exclude the Armed Forces abroad but include the Armed Forces stationed in each area.

The resident populations of the birth- and death-registration States for 1900-32 and of the United States for 1900-81 are shown in table 7-1. In addition, the population including Armed Forces abroad is shown for the United States. Table B shows the sources for these populations.

*Population estimates for 1981*—The population of the United States by age, race, and sex is shown in table 7-2. The population for each State by broad age groups is shown in table 7-3.

*Population estimates for 1980*—The population estimates for 1980 were based on the April 1, 1980 census enumeration. The figures by race in the 1980 census were affected by changes in reporting practices for race, particularly by the Hispanic population, and in coding and classifying racial groups in the 1980 census. One particular change has created a major inconsistency between the 1980 census data and historical data series, including censuses and vital statistics. About 40 percent of the Hispanic population counted in 1980, over 5.8 million persons, did not mark one of the specified races listed on the census questionnaire but instead marked the "Other" category. In the 1980 census, coding procedures were modified for persons who marked "Other" race and wrote in a national origin designation of a Latin American country or a specific Hispanic origin group in response to the question on race. These persons remained in the "Other" racial category in 1980 census data; in previous censuses and in vital statistics,

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Table B. Sources for resident population and population including Armed Forces abroad: Birth- and death-registration States, 1900-1932, and United States, 1900-1981

Year	Source
1981 -----	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 929, May 1983.
1980 -----	U.S. Bureau of the Census, <i>U.S. Census of Population: 1980, Number of Inhabitants</i> , PC80-1-A1, United States Summary, 1983.
1971-79 ---	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 917, July 1982.
1970 -----	U.S. Bureau of the Census, <i>U.S. Census of Population: 1970, Number of Inhabitants</i> , Final Report PC(1)-A1, United States Summary, 1971.
1961-69 ---	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 519, April 1974.
1960 -----	U.S. Bureau of the Census, <i>U.S. Census of Population: 1960, Number of Inhabitants</i> , PC(1)-A1, United States Summary, 1964.
1951-59 ---	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 310, June 30, 1965.
1940-50 ---	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 499, May 1973.
1930-39 ---	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 499, May 1973, and National Office of Vital Statistics, <i>Vital Statistics Rates in the United States, 1900-1940</i> . 1947.
1920-29 ---	National Office of Vital Statistics, <i>Vital Statistics Rates in the United States, 1900-1940</i> . 1947.
1917-19 ---	Same as for 1930-39.
1900-16 ---	Same as for 1920-29.

such responses had almost always been coded to the "White" category.

In order to maintain comparability, the "Other" racial category in the 1980 census has been reallocated to be consistent with previous procedures. Persons who marked the "Other" racial category and reported any Spanish origin on the Spanish origin question (5,840,648 persons) were distributed to white and black races in proportion to the distribution of persons of Hispanic origin who reported their race to be white or black. This was done for each age-sex group. As a result of this procedure, 5,705,155 persons were added to the white population and 135,493 persons to the black population. Persons who marked the "Other" racial category and reported that they were not of Spanish origin (916,338 persons) were distributed as follows: 20 percent in each age-sex group were added to the "Asian and Pacific Islander" category (183,268 persons), and 80 percent were added to the "White" category (733,070 persons). The count of American Indians, Eskimos, and Aleuts was not affected by these procedures. Unpublished tabulations of these modified census counts were obtained from the U.S. Bureau of the Census and used to compute the 1980 rates.

*Population estimates for 1971-79*—Death rates in this volume for 1971-79 are revised, based on revised population estimates that are consistent with the 1980 census levels. The 1980 census counted approximately 5.5 million more persons than had previously been estimated for April 1, 1980.<sup>21</sup> The revised estimates for the United States by age, race, and sex are published by the U.S. Bureau of the Census in the *Current Population Reports*, Series P-25, Number 917. Unpublished revised estimates for States were obtained from the U.S. Bureau of the Census. The revised estimates for Puerto Rico, the Virgin Islands, and Guam are published in the *Current Population Reports*, Series P-25, Number 919.

*Population estimates for 1961-69*—Death rates in this volume for 1961-69 are based on revised estimates of the

population and thus may differ slightly from rates published before 1976. The rates shown in tables 1-1 and 1-2, the life table values in table 6-5, and the population estimates in table 7-1 for each year in the period 1961-69 have been revised to reflect modified population bases, as published in the U.S. Bureau of Census, *Current Population Reports*, Series P-25, No. 519. The data shown in table 1-10 for 1961-69 have not been revised.

*Rates and ratios based on live births*—Infant, and maternal mortality rates, and fetal death and perinatal mortality rates and ratios are computed on the basis of the number of live births.

*New Jersey*—As previously indicated, data by race are not available for New Jersey for 1962 and 1963. Therefore for 1962 and 1963 the National Center for Health Statistics estimated a population by age, race, and sex excluding New Jersey for rates shown by race. The methodology used to estimate the revised population excluding New Jersey is discussed in the Technical Appendixes of the 1962 and 1963 reports.

**Net census undercount**

Mortality statistics may be subject to underregistration of deaths and misreporting of the demographic characteristics reported on the death certificate.<sup>22</sup> Mortality statistics are not adjusted for possible age misreporting. Another source of error in death statistics is the population figures used in computing death rates. Population estimates are affected by undercounts or overcounts in the decennial census. The net census undercount is determined by undercount, by misreporting, and by misclassification of demographic characteristics. Death rates in this volume are computed with population estimates that are not adjusted for net census undercount. However, mortality rates based on populations adjusted for net census undercount may be more accurate than rates based on the unadjusted populations.

The U.S. Bureau of the Census has conducted extensive research to evaluate the completeness of coverage of the U.S. population (including undercount and misstatement of age, race, and sex) in the last four decennial censuses—1950, 1960, 1970, and 1980. These studies provide estimates of the national population that was not enumerated in the respective censuses, by age, race, and sex.<sup>23,24</sup> The reports for 1980 include ranges of estimates of net census undercount based on alternative methodological assumptions for age, race, and sex subgroups of the national population.

These evaluative studies indicate that there is differential coverage in the census among the population subgroups; that is, some age, race, and sex groups are more completely enumerated than others. To the extent that these estimates are valid, that the net undercounts are substantial, and that they vary among subgroups and geographic areas, net census undercounts can have consequences for vital statistics measures.<sup>24</sup>

The impact of net census undercounts on vital statistics measures can affect: (1) effects on levels of the observed rates, (2) differences among groups, and (3) levels and group differences shown by summary measures, such as age-adjusted rates and life expectancy.

**Age-adjusted death rates**

Age-adjusted death rates shown in this report are computed by using the distribution in 10-year age intervals of the enumerated population of the United States in 1940 as the standard population. Each figure represents the rate that would have existed if the age-specific rates of the particular year prevailed in a population whose age distribution was the same as that of the United States in 1940. The rates for the total population and for each race-sex group were adjusted using the same standard population. It is important not to compare age-adjusted death rates with crude rates. The standard 1940 population, on the basis of one million total population, is as follows:

Age	Number
All ages .....	1,000,000
Under 1 year.....	15,343
1-4 years.....	64,718
5-14 years.....	170,355
15-24 years.....	181,677
25-34 years.....	162,066
35-44 years.....	139,237
45-54 years.....	117,811
55-64 years.....	80,294
65-74 years.....	48,426
75-84 years.....	17,303
85 years and over.....	2,770

**Life tables**

U.S. abridged life tables are constructed by reference to a standard table.<sup>25</sup> Life tables for the decennial period 1969-71 are used as the standard life tables in constructing

the 1970-81 abridged life tables; life table values for 1970-73 appearing in this publication have been revised. Abridged life tables appearing in *Vital Statistics of the United States* for 1970-73 were constructed using the 1959-61 decennial life tables as the standard tables, as the 1969-71 decennial life tables were not yet available. In addition, life table values for 1951-59, 1961-69, and 1971-79 appearing in this publication are based on revised intercensal estimates of the populations for those years. As such, these life table values may differ from the life table values for those years published in previous volumes.

There has been an increasing interest in data on average length of life ( $e_0$ ) for single calendar years before the initiation of the annual abridged life table series for selected race-sex groups in 1945. The figures in table 6-5 for the race and sex groups for the following years were estimated to meet these needs.<sup>26</sup>

Years	Race and sex groups
1900-45.....	Total
1900-47.....	Male
1900-47.....	Female
1900-50.....	White
1900-44.....	White, male
1900-44.....	White, female
1900-50.....	All other
1900-44.....	All other, male
1900-44.....	All other, female

The geographic areas covered in life tables before 1929-31 were limited to the death-registration States. Life tables for 1919-21 were constructed using mortality data from the 1920 death-registration States—34 States and the District of Columbia. For 1900-1902 and 1909-11, life tables were constructed using mortality data from the 1900 death-registration States—10 States and the District of Columbia. The tables for the period 1929-31 through 1958 cover the conterminous United States. U.S. life tables also include data for Alaska beginning in 1959 and for Hawaii beginning in 1960. Decennial life table values for the period 1959-61 were derived from data that include both Alaska and Hawaii for each year.

**Random variation in numbers of deaths, death rates, and mortality rates and ratios**

*Deaths and population-based rates*—Except for 1972, the numbers of deaths reported for a community represent complete counts of such events. As such, they are not subject to sampling error, although they are subject to errors in the registration process. However, when the figures are used for analytical purposes, such as the comparison of rates over a time period or for different areas, the number of events that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances.<sup>27</sup> The probable range of values may be estimated from the actual figures according to certain statistical assumptions.

In general, distributions of vital events may be assumed to follow the binomial distribution. Estimates of standard error and tests of significance under this assumption are described in most standard statistics texts. When the number of events is large, the standard error, expressed as a percent of the number or rate, is usually small.

When the number of events is small (perhaps less than 100) and the probability of such an event is small, considerable caution must be observed in interpreting the conditions described by the figures. This is particularly true for infant mortality rates, cause-specific death rates, and death rates for counties. Events of a rare nature may be assumed to follow a Poisson probability distribution. For this distribution, a simple approximation may be used to estimate the error as follows.

If  $N$  is the number of registered deaths in the population and  $R$  is the corresponding rate, the chances are 19 in 20 that

$$1. \quad N - 2\sqrt{N} \text{ and } N + 2\sqrt{N}$$

covers the "true" number of events.

$$2. \quad R - 2\frac{R}{\sqrt{N}} \text{ and } R + 2\frac{R}{\sqrt{N}}$$

covers the "true" rate.

If the rate  $R$  corresponding to  $N$  events is compared with the rate  $S$  corresponding to  $M$  events, the difference between the two rates may be regarded as statistically significant, if it exceeds

$$2\sqrt{\frac{R^2}{N} + \frac{S^2}{M}}$$

For example, if the observed death rate for Community A were 10.0 per 1,000 population and if this rate were based on 20 recorded deaths, then the chances are 19 in 20 that the "true" death rate for that community lies between 5.5 and 14.5 per 1,000 population. If the death rate for Community A of 10.0 per 1,000 population were being compared with a rate of 20.0 per 1,000 population for Community B, which is based on 10 recorded deaths, then the difference between the rates for the two communities is 10.0. This difference is less than twice the standard error of the difference

$$2\sqrt{\frac{(10.0)^2}{20} + \frac{(20.0)^2}{10}}$$

of the two rates, which is computed to be 13.4. From this, it is concluded that the difference between the rates for the two communities is not statistically significant.

SYMBOLS USED IN TABLES

Data not available-----	---
Category not applicable-----	...
Quantity zero-----	.
Quantity more than 0 but less than 0.05-----	0.0
Figure does not meet standards of reliability or precision-----	*

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