

## SOURCES OF DATA

## Death and fetal-death statistics

Mortality statistics for 1963 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 1973-75 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 46 States now furnishing demographic data.

1971	1976—Con.
Florida	Minnesota
	Nevada
1972	Texas
Maine	West Virginia
Missouri	
New Hampshire	1977
Rhode Island	Alaska
Vermont	Idaho
	Massachusetts
1973	New York City
Colorado	Ohio
Michigan	Puerto Rico
New York (except New York City)	1978
	Indiana
1974	Utah
Illinois	Washington
Iowa	
Kansas	1979
Montana	Connecticut
Nebraska	Hawaii
Oregon	Mississippi
South Carolina	New Jersey
	Pennsylvania
1975	Wyoming
Louisiana	
Maryland	1980
North Carolina	Arkansas
Oklahoma	New Mexico
Tennessee	South Dakota
Virginia	
Wisconsin	1982
	North Dakota
1976	
Alabama	
Kentucky	

For the remaining four States, the District of Columbia, the Virgin Islands, and Guam, mortality statistics for 1963 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 trans-

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mitted to NCHS is shown below for the 16 States now furnishing such data

1974	1980—Con.
Iowa Michigan	Massachusetts Mississippi New Hampshire Pennsylvania South Carolina
1975	1981
Louisiana Nebraska North Carolina Virginia Wisconsin	Maine
1980	1983
Colorado Kansas	Minnesota

For 1983 and previous years except 1972, NCHS coded the medical information from copies of the original certificates received from the registration offices for all deaths occurring in those States that were not furnishing NCHS with medical data coded according to NCHS specifications. For 1981 and 1982, 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; 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, NCHS coded the medical information.

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 is described below in the section "Estimates of errors arising from 50-percent sample for 1972."

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.

### 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 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 District of Columbia for all years; registration cities in nonregistration 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 I, pages 2-19*.

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FIGURE 7-A.

PHYSICIAN, MEDICAL EXAMINER OR CORONER  
U.S. STANDARD  
**CERTIFICATE OF DEATH**  
Form Approved  
OMB No. 68R 1901

TYPE OR PRINT NAME  
PERMANENT FOR INSTRUCTIONS SEE HANDBOOK

DECEASED NAME FIRST MIDDLE LAST SEX STATE

1 RACE 2 AGE 3 COUNTY OF DEATH

4 CITY TOWN OR LOCATION OF DEATH 5 HOSPITAL OR OTHER INSTITUTION NAME 6 NUMBER 7

8 STATE OF BIRTH 9 CITIZEN OF WHAT COUNTRY 10 MARRIED NEVER MARRIED WIDOWED DIVORCED 11 SURVIVING SPOUSE 12 WAS DECEASED WHILE IN U.S. ARMED FORCES

13 SOCIAL SECURITY NUMBER 14 USUAL OCCUPATION 15 KIND OF BUSINESS OR INDUSTRY

16 RESIDENCE STATE 17 COUNTY 18 CITY TOWN OR LOCATION 19 STREET AND NUMBER 20 INS. DISTRICT

21 FATHER NAME 22 MOTHER MAIDEN NAME

23 INFORMANT NAME 24 MAILING ADDRESS 25 STREET OR R.F.D. NO. 26 CITY OR TOWN 27 STATE

28 BURIAL CREMATION REMOVAL OTHER 29 CEMETERY OR CREMATORY NAME 30 LOCATION

31 FUNERAL SERVICE LICENSED PERSON OR ASSISTANT 32 NAME OF FACILITY 33 ADDRESS OF FACILITY

34 To be Completed by Medical Examiner or Coroner

35 To be Completed by Medical Examiner or Coroner

36 NAME AND ADDRESS OF CERTIFYING PHYSICIAN, MEDICAL EXAMINER OR CORONER

37 IMMEDIATE CAUSE

38 PART I DUE TO OR AS A CONSEQUENCE OF

39 PART II OTHER SIGNIFICANT CAUSE

40 ACQUISITION OF HOW INJURY OCCURRED

41 PLACE OF INJURY

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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 statistics 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 unless 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 "nonresidents of the United States" assigned to place of death.

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FIGURE 7-B.

Form Approved  
OMB No. 68R 1901

U.S. STANDARD  
**REPORT OF FETAL DEATH**

STATE, COUNTY AND CENSUS TRACT NUMBER

TYPE OF PRINT IN PERMANENT FILE SEE HANDBOOK FOR INSTRUCTIONS	1a HOSPITAL NAME (If home birth, give address)										1b CITY, TOWN OR LOCATION OF DELIVERY										1c COUNTY OF DELIVERY																																							
	2a DATE OF DELIVERY (Month, Day, Year)										2b HOUR OF DELIVERY										2c SEX OF FETUS										2d WEIGHT OF FETUS																													
MOTHER	3a MOTHER—MADEN NAME (First, Middle, Last)										3b AGE AT TIME OF DELIVERY (Years, Months, Days)										3c RESIDENCE STATE										3d COUNTY																													
	4a CITY, TOWN OR LOCATION										4b STREET AND NUMBER										4c ZIP CODE (If not known, leave blank)										4d PREGNANCY HISTORY (Indicate if this is a multiple pregnancy)																													
MOTHER	5a MACE (Yes, White, Black, Other, Unknown)										5b EDUCATION (Years of Schooling)										5c DATE LAST MENSTRUATED (Month, Year)										5d IS MOTHER MARRIED (Yes, No)										5e LIVE BIRTHS (Number, Date of Birth)										5f OTHER TERMINATIONS (Number, Date)									
	6a MONTH OF PREGNANCY WHEN CARE BEGAN										6b PREGNANT SINCE (To a number)										6c THIS BIRTH (Order)										6d FETUS NOTED BY (Date, Location)										6e DATE OF LAST LIVE BIRTH (Month, Year)										6f DATE OF LAST OTHER TERMINATION (Month, Year)									
FATHER	7a FATHER'S NAME (First, Middle, Last)										7b AGE AT TIME OF DELIVERY (Years, Months, Days)										7c RACE (White, Black, Other, Unknown)										7d EDUCATION (Years of Schooling)										7e OCCUPATION (If known)																			
	8a										8b										8c										8d										8e																			
CAUSE OF FETAL DEATH	9a PART I (Immediate Cause)										9b PART II (Underlying Cause)										9c PART III (Contributing Cause)										9d PART IV (Other Information)																													
	10a										10b										10c										10d																													
FETAL FEATURES	11a										11b										11c										11d																													
	12a										12b										12c										12d																													
13a										13b										13c										13d																														
14a										14b										14c										14d																														
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23a										23b										23c										23d																														
24a										24b										24c										24d																														

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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 1983 this difference amounted to 2,989 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 nonresidents 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 events in urban areas were overstated by the NCHS classification 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.

The improvement is attributed to an item added in 1956 to the U.S. Standard Certificates of Birth and of Death, 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.

### 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>3</sup> For 1952-53, geographic codes were modified to reflect results of the 1950 census. For 1950-51, codes are based on results of the 1970 census.

*Standard metropolitan statistical areas*—The standard metropolitan statistical areas (SMSA's) used in this report are those established by the U.S. Office of Management and Budget from final 1950 census population counts<sup>4</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 urbanized 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>5</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>6</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 in 1953 are classified according to the population enumerated in the 1950 Census of Population. Data are available for individual cities and other urban places of 10,000 or more population. Data for the remaining areas not separately identified are shown in the tables under the heading "balance of area" or "balance of county." For the years 1970-81, classification of areas was determined by the population enumerated in the 1970 Census of Population. Beginning in 1982, as a result of changes

in the enumerated population between 1970 and 1980, some urban places identified in previous reports are no longer included, and a number of other urban places have been added.

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

- Each town in New England, New York, and Wisconsin and each township in Michigan, 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 1,000 persons or more per square mile.
- Each county in States other than those indicated above that had no incorporated municipality within its boundary and had a density of 1,000 persons or more per square mile. (Arlington County, Virginia, is the only county classified as urban under this rule.)
- Each place in Hawaii with 10,000 or more population, as there are no incorporated cities in the State.

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 1983, 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 1963, 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 1963 the number of death records for which race was unknown, not stated, or not classifiable was 2,729, or less than 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, 6.0 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) were published 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 analyzing mortality by marital status have been published, the

special study based on 1959–61 data.<sup>9</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 1,961,007 resident deaths 15 years of age and over in 1983, 8,442 certificates (0.4 percent) 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 1–26). 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 46 States in the Vital Statistics Cooperative Program, NCHS accepts the State definition, classification, or codes for hospitals, medical centers, or other institutions. For the remaining four 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 42 States (including New York City) that have item 7d or its equivalent on their death certificates:

Alaska	Louisiana	Ohio
Arizona	Maine	Oregon
Arkansas	Michigan	Pennsylvania
Colorado	Mississippi	Rhode Island
Connecticut	Missouri	South Carolina
Florida	Montana	South Dakota
Georgia	Nebraska	Tennessee
Hawaii	Nevada	Utah
Idaho	New Hampshire	Vermont
Illinois	New Jersey	Virginia
Indiana	New Mexico	Washington
Iowa	New York	West Virginia
Kansas	North Carolina	Wisconsin
Kentucky	North Dakota	Wyoming

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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 1983, 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 1956. For 1972-83, all registration areas requested information on the death certificate as to whether autopsies were performed. For 1983, autopsies were reported on 266,362 death certificates, 13.2 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 six of the cause-of-death categories shown in table 1-27, autopsies were reported as performed for 50 percent or more of all deaths (Whooping cough, Meningococcal infection, Pregnancy with abortive outcome, Other complications of pregnancy, childbirth, and the puerperium, Homicide and legal intervention, and All other external causes).

There were five other categories for which 40 percent or more of the death certificates reported autopsies. Autopsies were reported for only 6.3 percent of the Major cardiovascular diseases. Among all causes other than major cardiovascular diseases, autopsies were reported for 17.6 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>10</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>10</sup> In addition to specifying that the Classification be used, WHO also recommends how the data should be tabulated in order to promote international comparability. The recommended system for tabulating data in the Ninth Revision allows countries to construct their own mortality and morbidity tabulation lists from the rubrics of the WHO Basic Tabulation List as long as rubrics from the WHO mortality and morbidity lists, respectively, are included. This tabulation system for the Ninth Revision is more flexible than that of the Eighth Revision in which specific lists were recommended for tabulating mortality and morbidity data.

The Basic Tabulation List (BTL) recommended 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 in this volume. 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 of Death. These lists were designed to be as comparable as possible with 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 two-digit titles can be obtained either directly or by combining titles in the List. The three-digit level of the BTL is modified more extensively. Where more detail was desired, categories not shown in the three-digit rubrics were added to the List of 282 Selected Causes of Death. Where less detail was needed, the 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>10</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>11</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.

*Significant coding changes during the Ninth Revision*—Coding changes have been introduced since the implementation of ICD–9 in the United States, effective with mortality data for 1979. Among the more important changes are the following. For 1981, a change was made in the coding of Acquired Immunity Deficiency Syndrome (AIDS), described below. For 1982, a change was made in the procedures for coding poliomyelitis; in the definition of child (which affects the classification of deaths to a number of categories, including child battering and other maltreatment); and in guidelines for coding deaths to the category Child battering and other maltreatment (ICD No. E967). Detailed discussion of these changes may be found in the technical appendixes of the respective volumes.

*Coding in 1983*—The National Center for Health Statistics prepares for its cause-of-death coding clerks instruction manuals that contain decisions and interpretations that apply each year.<sup>12–16</sup> 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. *Part 2e, Non-Indexed Terms, Standard Abbreviations, and State Geographic Codes Used in Mortality Data Classification, 1983 (Including WHO Amendments to ICD–9)*<sup>16</sup> was added to the vital statistics instruction manual series in 1983. The major reason for development of Part 2e was to provide a published source of code assignments for terms not indexed in Volume 2 of ICD–9. The rules for coding the 1983 mortality data essentially remained the same as the previous year except for the coding of Acquired Immunity Deficiency Syndrome (AIDS).

*AIDS*—In early 1983, during the processing of the 1981, 1982, and 1983 mortality files, the code assignment for the Acquired Immunity Deficiency Syndrome (AIDS) was changed from ICD No. 279.3 to ICD No. 279.1, both subcategories of Disorders involving the immune mechanism (ICD No. 279). This change was made in accordance with the World Health Organization's recommendatio...

Prior to early 1983, AIDS had been assigned to Unspecified immunity deficiency (ICD No. 279.3). (It was not included as an entry in the index to ICD-9.) As a result of the change, all AIDS deaths from the 1983 mortality file were assigned to ICD No. 279.1. For 1982, approximately 25 percent were assigned to ICD No. 279.1 and 75 percent to ICD No. 279.3. For 1981, approximately 10 percent were assigned to ICD No. 279.1 and 90 percent to ICD No. 279.3.

**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>17</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 rubrics for Symptoms, signs, and ill-defined conditions (ICD-9 Nos. 780-799). 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. In 1983, 1.5 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 0.2 percent to 6.8 percent.

**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 1983, the content of these tables was identical to that in the 1982 tables.<sup>14</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 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>10</sup>

Under the Eighth Revision, maternal deaths were assigned to category title "Complications of pregnancy, childbirth, and the puerperium" (ICDA-8 Nos. 630-678). Although 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-12-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.

Maternal mortality rates are computed on the basis of the number of live births. The maternal mortality rate indicates the likelihood that a pregnant woman will die from maternal causes. The number of live births used in the denominator is an approximation of the population of pregnant women who are at risk of a maternal death.

### Infant deaths

An infant death is defined as a 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 that occur during the first 27 days of life, and postneonatal deaths are those that 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, and 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.

Infant mortality rates shown in section 2 and section 6 are the most commonly used index for measuring the risk of dying during the first year of life; they are calculated by dividing the number of infant deaths in a calendar year by the number of live births registered for the same period and are presented as rates per 1,000 or per 100,000 live births. Infant mortality rates use the number of live births in the denominator to approximate the population at risk of dying before the first birthday. This measure is an approximation of the risk of dying in infancy because some of the live births will not have been exposed to a full year's risk of dying and some of the infants that die during a year will have been born in the previous year. The error introduced in the infant mortality rate by this inexactness is usually small, especially when the birth rate is relatively constant from year to year.<sup>15,19</sup> Other sources of error in the infant

mortality rate have been attributed to differences in applying the definitions for infant death and fetal death when registering the event.<sup>20,21</sup>

In contrast to infant mortality rates based on live births, infant death rates shown in section 1 are based on the estimated population under 1 year of age. Infant death rates, which appear in tabulations of age-specific death rates, are calculated by dividing the number of infant deaths in a calendar year by the estimated midyear population of persons under 1 year of age and are presented as rates per 100,000 population in this age group. Patterns and trends in the infant death rate may differ somewhat from those of the more commonly used "infant mortality rate" mainly because of differences in the nature of the denominator and in the time reference period. Whereas the population denominator for the infant death rate is estimated using data on births, infant deaths, and migration for the 12-month period of July through June, the denominator for the infant mortality rate is a count of births occurring during the 12 months of January through December. The difference in the time reference period can result in different trends between the two indices during periods when birth rates are moving up or down markedly.

In addition, the infant death rate is also subject to greater imprecision than is the infant mortality rate because of problems of enumerating and estimating the population under 1 year of age.<sup>20</sup>

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 "Effect of list revisions.")

*Infant and neonatal mortality for Wyoming, 1951*—The 1951 data on infant and neonatal mortality shown in tables 2-5 and 2-9 for Wyoming are incorrect because of NCHS processing errors. The correct numbers for Wyoming are 124 infant deaths and 76 neonatal deaths, the corresponding infant mortality rates are 11.2 and 7.0 deaths under 1 year of age per 1,000 live births.

### 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>22</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>23</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 1965. In 1975 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>24</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>25</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 reporting 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.

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 1983 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 1983, 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 (including New York City), 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 results in undercounts of fetal deaths of less than 28 weeks gestation.

**Arkansas**—Arkansas has been using two reporting forms for fetal deaths. A confidential Spontaneous Abortion form and a Fetal Death Certificate. Beginning with data year 1951, 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. Although the National Center for Health Statistics receives their certificates of fetal death, it does not receive their confidential abortion reports. Accordingly, counts of fetal deaths of gestational age 20 to 27 weeks declined sharply from 100 in 1950 to 39 in 1951 to 7 in 1952 and increased to 24 in 1953. 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 1951, 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. Data for 1978–83 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."

**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 because 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

All areas reported LMP in 1983 except Delaware, New Mexico, Puerto Rico, and South Dakota.

**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), 27 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 7 areas indicate weight can be given either in pounds and ounces or in grams. 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 compari-

son 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 areas use the two standard items pertaining to the number of "other terminations" before and after 20 weeks gestation; 4 report "other terminations" of 20 weeks or more, 14 do not differentiate "other terminations" by gestational age; 6 areas use other criteria for differentiating spontaneous and induced terminations, and 1 area reports "other terminations" before and after 16 weeks gestation. Total-birth order for all areas is calculated from the sum of available infor-

mation. 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. States excluded from this table are as follows: California, Connecticut, Maryland, Michigan, Montana, New York (including New York City), Ohio, Texas, and Vermont. 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 that 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 with 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.

**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. The allocation of not-stated gestational age and sex for fetal deaths is made individually for each State, for metropolitan and nonmetropolitan areas, and separately for the United States as a whole. Accordingly, the sum of perinatal deaths for the areas according to Definition I may not equal the total number of perinatal deaths for the United States.

## 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 1983 the mortality data for these items were obtained from two sources: (1) Microfilm images of the original certificates furnished by 4 States, the District of Columbia, and the Virgin Islands, and photocopies from Guam, and (2) records on data tape furnished by the remaining 46 States, New York City, and Puerto Rico. For the four 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 70–80 records per month is used to monitor quality of coding.

All of the areas had achieved the specified tolerance error before 1983, accordingly, for these areas the demographic items on about 70–80 records per area per month were independently verified by NCHS. These areas include New York City, Puerto Rico, and the 46 States that furnished data on computer tape to NCHS. The estimated average error rate for all demographic items in the entire 1983 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 16 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 70–80 records per month is used to monitor quality of medical coding. For these 16 States, the average coding error rate in 1983 was just over 3 percent.

For the remaining 39 registration areas—34 States, the District of Columbia, New York City, Puerto Rico, the Virgin Islands, and Guam—NCHS coded the medical items for 100 percent of the death records. 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 "Automated selection of underlying cause of death").

*Demographic items on the report of fetal death*—For 1983, 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>26</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, 1972, Volume II, Mortality, Part A*.

## COMPUTATION OF RATES AND OTHER MEASURES

### Population bases

The population bases from which death rates shown in this report are computed are prepared by the U.S. Bureau

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Table A. Sources for resident population and population including Armed Forces abroad: Birth- and death-registration States, 1900-1932, and United States, 1900-1983

Year	Source
1983 -----	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 965, Mar. 1985
1982 -----	U.S. Bureau of the Census, <i>Current Population Reports</i> , Series P-25, No. 949, May 1984
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

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 use 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 1900-53 are shown in table 7-1. In addition, the population including Armed Forces abroad is shown for the United States. Table A shows the sources for these populations.

*Population estimates for 1951-53*—The population of the United States estimated by age, race, and sex for 1953 is shown in table 7-2, and the population for each State by broad age groups follows in table 7-3. Comparable data for 1951 and 1952 were shown in tables 7-2 and 7-3 of *Vital Statistics of the United States*, Volume II, for those years. Population data by race are consistent with the modified (see below) 1950 population by race.

*Population for 1950*—The population of the United States by age, race, and sex and the population for each State by age are shown in tables 7-2 and 7-3, respectively, of *Vital Statistics of the United States, 1950*, Volume II. The figures by race have been modified as described below.

The racial counts in the 1950 census are affected by changes in reporting practices, particularly of the Hispanic population, and in coding and classifying. One particular change created a major inconsistency between the 1950 census data and historical data series, including censuses and vital statistics. About 40 percent of the Hispanic population counted in 1950 over 5.5 million persons did not

mark one of the specified races listed on the census questionnaire but instead marked the "Other" category.

In the 1950 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 racial question. These persons remained in the "Other" racial category in 1950 census data, in previous censuses and in vital statistics, such responses had almost always been coded into the "White" category.

In order to maintain comparability, the "Other" racial category in the 1950 census was reallocated to be consistent with previous procedures. Persons who marked the "Other" racial category and reported any Spanish origin on the Spanish origin question (5,540,645 persons) were distributed to white and black races in proportion to the distribution of persons of Hispanic origin who actually reported their race as "White" or "Black." This was done for each age-sex group.

As a result of this procedure, 5,705,155 persons (95 percent) were added to the white population and 135,493 persons (2 percent) to the black population. Persons who marked the "Other" racial category and reported that they were not of Spanish origin (916,336 persons) were distributed as follows: 20 percent in each age-sex group were added to the "Asian and Pacific Islander" category (183,265 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 rates for this report.

*Population estimates for 1971-79*—Death rates in this volume for 1971-79 used revised population estimates that are consistent with the 1950 census levels. The 1950 census

enumerated approximately 5.5 million more persons than had previously been estimated for April 1, 1980.<sup>27</sup> These revised estimates for the United States by age, race, and sex are published by the U.S. Bureau of the Census in *Current Population Reports*, Series P-25, Number 917. Unpublished revised estimates for States were obtained from the U.S. Bureau of the Census. For Puerto Rico, the Virgin Islands, and Guam, revised estimates are published in *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 the Census, *Current Population Reports*, Series P-25, Number 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 ratios, are computed on the basis of the number of live births. Fetal death and perinatal mortality rates are computed on the basis of the number of live births and fetal deaths. Counts of live births are published annually in *Vital Statistics of the United States*, Volume I, Natality.

*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

Just as the underenumeration of deaths and the misreporting of demographic characteristics on the death certificate can introduce error into the annual rates, errors in the latest decennial census such as undercount or overcount can also adversely affect mortality statistics. This is because annual population estimates for the postcensal interval, which are used in the denominator for calculating death rates, are computed using the decennial census count as a base.<sup>25</sup> Net census undercount is determined by miscounting and misreporting of demographic characteristics such as age. Age-specific death rates are affected by both the net census undercount and the misreporting of age on the death certificate.<sup>29</sup> To the extent that the net undercount is substantial and that it varies among subgroups and geographic areas, it may have important consequences for vital statistics measures.

Although death rates based on a population adjusted for net census undercount may be more accurate than rates based on an unadjusted population, rates in this volume are not adjusted, rather, they are computed using population

estimates that preserve the age pattern of the net census undercount across the postcensal interval. Thus, it is important to consider the possible impact of net census undercount on death rates.

The U.S. Bureau of the Census has conducted extensive research on completeness of coverage of the U.S. population (including underenumeration and misstatement of age, race, and sex) in the last four decennial censuses—1950, 1960, 1970, and 1980. From this work have come estimates of the national population that was not counted by age, race, and sex.<sup>25,30,31</sup> The reports for 1980 include estimates of net census undercount using alternative methodological assumptions for age, race, and sex subgroups of the national population.<sup>25,32</sup>

These studies indicate that, although coverage was improved over previous censuses, there was differential coverage in the 1980 census among the population subgroups; that is, some age, race, and sex groups were more completely counted than others.

Net census undercounts can affect (1) levels of the observed vital rates, (2) differences among groups, and (3) levels and group differences shown by summary measures such as age-adjusted death rates and life expectancy.

*Levels and differentials*—If adjustments were made for net census undercount, the size of denominators of the death rates generally would increase and the rates, therefore, would decrease. Assuming net census undercounts remained consistent by age after the 1980 census, the estimated rates for 1983 can be computed by multiplying the reported rates by ratios of the census-level population to the population adjusted for the estimated net census undercount (table 7-4). A ratio of less than 1.0 indicates a net census undercount and, when applied, results in a corresponding decrease in the death rate. A ratio greater than 1.0—indicating a net census overcount—multiplied by the reported rate results in an increase in the death rate.

Coverage ratios for all ages show that, in general, females were more completely enumerated than males and the white population more completely than the population of all other races. The black population was counted less completely than the total population of all other races.

For the total population, underenumeration varied by age group, with the greatest undercount found for persons aged 80-84, and 85 years and over. All other age groups were overcounted or undercounted by less than three percent.

Among the age-sex-race groups, coverage was lowest for black males aged 35-39, 40-44, and 45-49 years. Underenumeration for these groups averaged 17.3 percent. In contrast, white females in these age groups were essentially completely enumerated. For black females and white males in these same age groups, the undercount ranged from 2 to 6 percent. For the under-1-year age group the white population was overenumerated by about 2 percent, whereas infants of other races were underenumerated by about 8 percent.

If vital statistics measures were calculated with adjust-

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ments for net census undercounts for each population subgroup, the resulting rates would be differentially reduced from their original levels; that is, rates for those groups with the greatest estimated undercounts would show the greatest relative reductions due to these adjustments. Similar effects would be evident in the opposite direction for groups with overcounts. As a consequence, the ratio of mortality between the rates for males and females, and between the rates for the white population and the population of other races, or the black population, usually would be reduced.

Similarly, the differences between the death rates among subgroups of the population by cause of death would be affected by adjustments for net census undercounts. For example, for the age group 35–39 years in 1953, the ratio of the death rate for Homicide and legal intervention for black males to that for white males is 7.0, whereas the ratio of the death rates adjusted for net census undercount in 1953 is 5.9, a reduction of about 16 percent. For Ischemic heart disease for males aged 40–44 years, the ratio of the death rate for the population of all other races to that for the white population is 1.2 using the unadjusted rates, but it is 1.1 when adjusted for estimated underenumeration.

**Summary measures**—The effect of net census undercount on age-adjusted death rates depends on the underenumeration of each age group and on the distribution of deaths by age. In 1953, the age-adjusted death rate for All causes would decrease from 551.0 to 546.0 per 100,000 population if the age-specific death rates were corrected for net census undercount.

For Diseases of the heart, the age-adjusted death rate for white males would decrease from 255 to 255 per 100,000 population, a decline of 1.2 percent. For black males the change, from an unadjusted rate of 305 to an adjusted rate of 296, would amount to 3.9 percent.

If death rates by age were adjusted, then the corresponding life expectancy at birth computed from these rates would change. The importance of adjustments varies by age, that is, when calculating life expectancy, the impact of an undercount (or overcount) is greatest at the younger ages. In general, the effect of correcting the death rates is to increase the estimate of life expectancy at birth. Differential underenumeration among race-sex groups would lead to greater changes in life expectancy for some groups than for others. For white females who were completely enumerated in 1950, revised estimates of life expectancy would remain roughly constant; those for black males would show the greatest increase.

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	64,715
5–14 years	170,355
15–24 years	161,677
25–34 years	162,066
35–44 years	139,237
45–54 years	117,811
55–64 years	80,294
65–74 years	45,426
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>33</sup> Life tables for the decennial period 1979–81 are used as the standard life tables in constructing the 1980–83 abridged life tables. With the availability of the 1979–81 standard life tables, revised life table values were computed for 1980–82, these appear for the first time in this volume. Life table values appearing in *Vital Statistics of the United States* for 1980–82 were constructed using the 1969–71 decennial life tables.

Life tables for the decennial period 1969–71 are used as the standard life tables in constructing the 1970–79 abridged life tables. Life table values for 1970–73 were first revised in *Vital Statistics of the United States, 1977*; before 1977, life table values for 1970–73 were constructed using the 1959–61 decennial life tables. 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>34</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

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The geographic areas covered in life tables before 1929-31 were limited to the death-registration areas. Life tables for 1900-1902 and 1909-11 were constructed using mortality data from the 1900 death-registration States—10 States and the District of Columbia—and for 1919-21 from the 1920 death-registration States—34 States and the District of Columbia. The tables for 1929-31 through 1955 cover the conterminous United States. Decennial life table values for the 3-year period 1959-61 were derived from data that include both Alaska and Hawaii for each year (table 6-4). Data for each year shown in table 6-5 include Alaska beginning in 1959 and Hawaii beginning in 1960. It is not believed that the inclusion of these two States materially affects life table values.

### 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>35</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 a confidence interval, as follows:

If  $N$  is the number of registered deaths in the popula-

tion 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 zero but less than 0.05 ----	0.0
Quantity more than zero but less than 500 where numbers are rounded to thousands ----	Z
Figure does not meet standards of reliability or precision -----	*

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