

**INDIAN HEALTH SERVICE  
REGIONAL DIFFERENCES IN INDIAN HEALTH  
2002-2003 EDITION**

**Department of Health and Human Services**

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## PREFACE

*Since 1955, the Indian Health Service (IHS) has had the responsibility for upholding the Federal Government's obligations to promote healthy American Indian and Alaska Native people, communities, and cultures, while honoring and protecting each Tribe's inherent sovereign rights. The IHS mission is to raise the physical, mental, social, and spiritual health of American Indians and Alaska Natives to the highest level.*

*“Regional Differences in Indian Health” provides narrative, tables, and charts that describe IHS programs and the health status of American Indians and Alaska Natives. The Report presents a structural overview of the Agency, along with demographic data on American Indians and Alaska Natives and patient care delivery services. Current regional differences are detailed and comparisons made to the U.S. population at large, where appropriate.*

*The IHS remains committed to our goal of assuring that comprehensive, culturally acceptable personal and public health services are available and accessible to American Indian and Alaska Native people. The data contained within this Report advances our ongoing efforts to achieve this vital health care goal.*

  
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## OVERVIEW

The Indian Health Service (IHS), an agency within the Department of Health and Human Services (HHS), is responsible for providing federal health services to American Indian and Alaska Native (AI/AN) people. The provision of health services to federally recognized Indians grew out of a special relationship between the federal government and Indian Tribes. This government-to-government relationship is based on Article I, Section 8, of the United States Constitution, and has been given form and substance by numerous treaties, laws, Supreme Court decisions, and Executive Orders.

The Indian Health program became a primary responsibility of the HHS under P.L. 83-568, the Transfer Act, on August 5, 1954. This Act provides “that all functions, responsibilities, authorities, and duties . . . relating to the maintenance and operation of hospital and health facilities for Indians, and the conservation of Indian health . . . shall be administered by the Surgeon General of the United States Public Health Service.”

The IHS is the federal health care provider and health advocate for AI/AN people and its goal is to assure that comprehensive, culturally-acceptable personal and public health services are available and accessible to AI/AN people. The mission of the IHS, in partnership with AI/AN people, is to raise their physical, mental, social, and spiritual health to the highest level. It is also the responsibility of the IHS to work with the people involved in the health delivery programs so they may be cognizant of entitlements of AI/AN people, as American citizens, to all federal, state, and local health programs, in addition to IHS and Tribal services. The IHS also acts as the principal federal health advocate for AI/AN people in the building of health coalitions, networks, and partnerships with Tribal nations and other government agencies as well as with non-federal organizations, e.g., academic medical centers and private foundations.

The IHS has carried out its responsibilities through developing and operating a health services delivery system designed to provide a broad-spectrum program of preventive, curative, rehabilitative, and environmental services. This system integrates health services delivered directly through IHS facilities, purchased by IHS through contractual arrangements with providers in the private sector, and delivered through Tribally operated programs and urban Indian health programs.

The 1975 Indian Self-Determination Act, P.L. 93-638 as amended, builds upon IHS policy by giving Tribes the option of staffing and managing IHS programs in their communities, and provides for funding for improvement of Tribal capability to contract under the Act. The 1976 Indian Health Care Improvement Act, P. L. 94-437 as amended, was intended to elevate the health status of AI/AN people to a level equal to that of the general population through a program of authorized higher resource levels in the IHS budget. Appropriated resources were used to expand health services, build and renovate medical facilities, and step up the construction of safe drinking water and sanitary disposal facilities. It also established programs designed to increase the number of Indian health professionals for Indian needs and to improve health care access for Indian people living in urban areas.

The operation of the IHS health services delivery system is managed through local administrative units called service units. A service unit is the primary level of health organization for a geographic area served by the IHS program, just as a county or city health department in a state health department.

A few service units cover a number of small reservations; some large reservations are divided into a number of service units. The service units are grouped into larger cultural-demographic-geographic management jurisdictions administered by Area Offices.

## INTRODUCTION

*Regional Differences in Indian Health* provides basic statistical information to the IHS and its programs, Tribes, other federal and state government agencies, as well as other customers interested in the IHS. This publication uses narrative, charts, and tables to describe the IHS program and the health status of AI/AN people residing in the IHS service area. The IHS service area consists of counties on and near federal Indian reservations. The Indians residing in the service area comprise about 56 percent of all AI/AN people residing in the U.S. Information pertaining to the IHS organizational structure, AI/AN demography, and patient care is included. Current regional differences are presented, and comparisons to the general population are made when appropriate. Historical trend information can be found in the IHS companion publication *Trends in Indian Health*.

### Scope and Organization of this Report

Narrative, charts, and tables are grouped into five major categories:

IHS STRUCTURE	PG.19
POPULATION STATISTICS	PG.26
NATALITY AND INFANT/MATERNAL MORTALITY STATISTICS	PG.31
GENERAL MORTALITY/MULTIPLE CAUSE STATISTICS	PG.49
PATIENT CARE STATISTICS	PG.82

The tables provide detailed data, while the charts further depict significant relationships. Throughout this report each table and its corresponding chart appear next to each other. However, some self-explanatory charts do not have a corresponding table. In other instances, a table may have more than one chart associated with it.



## SUMMARY OF DATA

### Indian Health Service Organizational Structure

The IHS is comprised of twelve regional administrative units called Area Offices:

Aberdeen	Bemidji	Nashville	Phoenix
Alaska	Billings	Navajo	Portland
Albuquerque	California	Oklahoma	Tucson

As of October 1, 2004, the Area Offices consisted of 164 basic administrative units called service units. Of the 164 service units, 97 were operated by Tribes. The number of service units ranged from two in Tucson to 34 in Nashville.

The IHS operated 33 hospitals, 52 health centers, two school health centers, and 38 health stations. Tribes have two different vehicles for exercising their self determination—they can choose to take over the operation of an IHS facility through a P.L. 93-638 self-determination contract (Title I) or a P.L. 93-638 self-governance compact, as amended (Title V). A distinction is made in this publication regarding these two Tribal modes of operation, i.e., Title I and Title V. Tribes operated 15 hospitals (Title I, three hospitals and Title V, 12 hospitals), 216 health centers (Title I, 113 and Title V, 103), nine school health centers (Title I, seven and Title V, two), 97 health stations (Title I, 62 and Title V, 35), and 162 Alaska village clinics (Title I, eight, Title V, 147, and other, seven). Both California and Portland had no hospitals while Aberdeen and Phoenix had eight hospitals each. Navajo and Tucson had the fewest health centers with six and Oklahoma the most with 53.

### Population Statistics

In fiscal year (FY) 2004, the IHS user population was over 1.4 million. The IHS user population is defined as the number of Indian registrants, residing within a service delivery area with at least one face-to-face, direct or contract, inpatient stay, ambulatory care visit, or dental visit during the prior three fiscal years. The service delivery area for the user population is called a “Contract Health Service Delivery Area”, and only users who live inside one can be counted as a user. Tucson (24,009) and Nashville (47,218) had the smallest user populations while Navajo (236,829) and Oklahoma (299,622) had the largest user populations.

The AI/AN population is younger, less educated and poorer than the U.S. all-races population. For the IHS user population in FY 2004, 9.3 percent of the persons were under age 5 compared to 6.8 percent for the U.S. all-races population (Census 2000). There was considerable variation by Area with Nashville at 7.7 percent and Phoenix at 10.9 percent.

According to the 2000 Census, 70.9 percent of AI/AN (alone) (ages 25 and older) residing in the IHS service areas are high school graduates or higher compared to 80.4 percent for the U.S. all-races population. For the Navajo Area, the percentage was less than 60.0 (based on state-level AI/AN (alone) data). The 2000 Census also indicated that the median household income in 1999 for AI/AN (alone) residing in the IHS service areas was \$32,461, while for the U.S. all-races it was \$50,046, which is 54 percent higher than AI/AN (alone) people residing in the IHS service areas. Albuquerque had the lowest median household income at \$22,295 and California the highest at \$35,611 (based on state-level AI/AN (alone) data).

### Nativity and Infant/Maternal Mortality Statistics

The birth rate for AI/AN people residing in the IHS service area was 22.2 (rate per 1,000 population) in 1999-2001. It is 1.5 times the 2000 birth rate of 14.7 for the U.S. all-races population. For the period 1999-2001, there were 18 maternal deaths in the IHS service area population. Portland had five deaths, followed by the Oklahoma and Navajo areas each with four deaths. There were six areas with no maternal deaths.

The infant mortality rate for AI/AN people residing in the IHS service area was 8.8 per 1,000 live births in 1999-2001 compared to 6.9 for the U.S. all-races population in 2000. The AI/AN rate is 28 percent higher than the U.S. all-races rate. The infant mortality rate varied considerably among the IHS Areas, ranging from 6.8 in Albuquerque to 13.4 in Aberdeen. These data are adjusted for misreporting of AI/AN race on the death certificate.<sup>1</sup>

### General Mortality Statistics

In 1999-2001, the age-adjusted death rate (all causes) for AI/AN people residing in the IHS service area was 1,059.0 per 100,000 population compared to 872.0 for the U.S. all-races population in 2000. The AI/AN rate is 21 percent greater than the U.S. all-races rate. The Aberdeen (1,470.8), Bemidji (1,449.0) and Billings (1,445.1) service areas had the highest rates. The rate is adjusted for misreporting of AI/AN race on the state death certificate.

The top two leading causes of death for the IHS service area population in 1999-2001 were diseases of the heart and malignant neoplasm, the same as the U.S. all-races in 2000. However, five IHS Areas (Alaska, Albuquerque, Navajo, Phoenix, and Tucson) had unintentional injuries as one of two top two leading causes. The leading causes of death were determined without any adjustment for age which is the customary method. However, it should be noted that the age composition of a population does influence its mortality pattern and therefore could have an effect on the leading causes of death ranking.

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<sup>1</sup> Indian Health Service, Department of Health and Human Service. Adjusting for Misreporting on Indian Race on the State Death Certificate. November 1996.



*General Mortality Statistics (continued)*

For most of the specific causes of death identified in this publication, the 1999-2001 AI/AN age-adjusted death rate (with data that have also been adjusted for misreporting of AI/AN race on death certificates) was greater than the 2000 U.S. all-races rate. There was also considerable variation in the rates among the IHS Areas. Some of the Area rates should be interpreted with caution, because of the small number of deaths involved. The following list is a comparison of the AI/AN age-adjusted rate (using data that are also adjusted for misreporting of AI/AN race on the state death certificate) to the U.S. rate where there are substantial differences.

- 1) tuberculosis  
*533 percent greater*
- 2) alcoholism  
*526 percent greater*
- 3) diabetes mellitus  
*208 percent greater*
- 4) unintentional injuries  
*150 percent greater*
- 5) homicide  
*87 percent greater*
- 6) suicide  
*60 percent greater*
- 7) pneumonia and influenza  
*42 percent greater*
- 8) firearm injury  
*26 percent greater*
- 9) cerebrovascular diseases  
*5 percent greater*
- 10) diseases of the heart  
*5 percent less*
- 11) malignant neoplasms  
*8 percent less*
- 12) human immunodeficiency virus (HIV) infection  
*38 percent less*

### Multiple Cause Analysis

Among AI/AN males and females over the age of 35, the rate of death where diabetes is mentioned as a cause anywhere on the death record (multiple cause) was over two times higher than the rate of death based on the underlying cause of death.

Death rates based on a multiple cause of death analysis:

- Among AI/AN Males 35-74 years of age, the death rate for heart disease in the entire IHS service area, as well as the Aberdeen, Bemidji, Billings, and Portland areas significantly exceeded the U.S. rate. The Aberdeen and Billings areas also significantly exceeded the U.S. death rate for cerebrovascular disease as well.
- Among AI/AN females 35-74 years of age, the Aberdeen, Bemidji, Billings, Nashville, Phoenix, and Portland areas significantly exceeded the U.S. heart disease death rate, as did the entire IHS service area. The entire IHS service area, as well as the Aberdeen, Bemidji, California, Phoenix, and Portland areas, also exceeded the U.S. rate for cerebrovascular disease.
- Among AI/AN 35-74 years of age, the Aberdeen, Bemidji, Billings and Portland areas significantly exceeded the U.S. death rate for heart disease listed in the death record with no mention of diabetes. However, in this age group, the entire IHS service area, as well as all individual IHS areas (except Alaska), significantly exceeded the U.S. death rate for heart disease and diabetes listed together in the death record.
- Among AI/AN 75 years old or more, none of the areas significantly exceeded the U.S. rates for heart disease with no mention of diabetes, while the Aberdeen, Bemidji, California, Nashville, Oklahoma, and Portland areas, as well as the entire IHS service area, significantly exceeded the U.S. rate for heart disease and diabetes combined.



### Patient Care Statistics

In FY 2004, there were over 77,000 admissions to IHS and Tribal direct and contract general hospitals. The number of admissions ranged from 808 in California to 20,105 in Navajo. Obstetric deliveries and complications of pregnancy accounted for the overall leading cause of hospitalization in IHS and Tribal direct and contract general hospitals. However, on an area-by-area basis, obstetric deliveries and complications of pregnancy led hospital admissions in Alaska, Navajo, and Oklahoma; diseases of the digestive system led in Albuquerque, Nashville, and Portland. IHS and Tribal direct and contract facilities reported ambulatory medical visits in excess of 10 million for FY 2004. Tucson reported the fewest ambulatory medical visits with 102,266 and Oklahoma had the most with 1,848,408. The supplementary classification—an ambulatory visit that does not directly deal with an injury or disease, but rather includes such preventative care as well-child visits, vaccinations, physical examinations, tests only (lab, x-ray, screening), hospital, medical, or surgical follow-up, and prescription refills—led as the number-one cause of ambulatory medical visits for all IHS Areas. Prescription refills are thought to be a major contributor to the number of such visits relative to all others. In order to provide a true “top five” in terms of categories of diseases, additional such categories were added beyond five in order to balance the disproportionate number of supplementary classifications relative to all other categories.

In FY 2004, 79.2 percent of AI/AN children 3-27 months and residing in the IHS service area received all required immunizations. In the general population in CY 2003, 80.9 percent of children aged 19 to 27 months received all required immunizations. In AI/AN children 3-27 months and residing in the IHS service area, the Oklahoma Area had the lowest IHS rate at 62.4 percent, while the Navajo Area had the highest rate, 90.2 percent.

In FY 2004, over 15 million dental services were reported to be provided at IHS and Tribal direct and contract facilities. Two IHS Areas provided 54 percent of these reported dental services, Bemidji (3,952,251) and Portland (4,562,504).

## SOURCES AND LIMITATIONS OF DATA

### Population Statistics

Registered AI/AN patients with at least one direct or contract inpatient stay, outpatient visit, or dental visit during the last three years are defined as users. IHS user population estimates are drawn from data in the IHS Patient Registration System. First implemented in 1984, the Patient Registration System functioned adequately for many years; but, in recent years, system changes resulted in registration record errors. New system-wide improvements were implemented. From August through December 2001 local facilities re-sent complete and up-to-date information for all patients who had ever received direct or contract health services from IHS or Tribally-operated programs to a central data repository. Data matching software was then applied to the information, allowing for the identification and removal of duplicate records. Thanks to the dedicated efforts of area statistical officers and information technologists alike, this publication contains some of the most accurate user population estimates ever produced.

The IHS user population estimates shown in this publication should be contrasted with the IHS service population (eligible population) estimates, which are shown in the *Trends in Indian Health* publication. The service population estimates are based on official U.S. Census Bureau county data, representing self-identified AI/AN people who may or may not use IHS services. IHS service populations between census years (e.g., 1990 and 2000) are estimated using a smoothing technique in order to show a gradual transition between census years. This normally results in upward revisions to service population figures projected prior to a census, since each Census tends to do a better job in enumerating AI/AN people. IHS service populations beyond the latest census year (2000) are projected through linear regression techniques, using the most current ten years of AI/AN birth and death data provided by the NCHS, Centers for Disease Control and Prevention (CDC).

IHS user population figures are used for calculating IHS patient care rates. However, since state birth and death certificates do not provide information on use of IHS services, IHS service population figures are used in calculating AI/AN vital event rates for the IHS service areas.

The social and economic data contained in this publication are from the 2000 census and reflect the characteristics of persons self-identifying as AI/AN (alone).



## IHS Service Population

### Definition

The IHS service population is based on the 2000 census bridged-race file (developed by the Census Bureau and the NCHS, CDC). It consists of AI/AN and serves as a measure of those eligible for IHS services. Those AI/AN eligible are estimated by counting AI/AN who reside in geographic areas in which IHS has responsibilities (“on or near” reservations) and is comprised of approximately 56 percent of all AI/AN residing in the U.S. These people **may** or **may not** use IHS health services. (Migration is not a factor when developing the IHS service population).

### Description of Service Population Calculation

DPS produces service populations for IHS Areas, service units, and counties.

IHS service population figures are based on the 2000 census with bridged-race file county data. The Census Bureau enumerates those individuals who identify themselves as AI/AN. The IHS service population consists of those enumerated AI/ANs who reside in the geographic areas in which IHS has responsibilities (“on or near” reservations, i.e., contract health service delivery areas (CHSDAs)).

The 2000 Census allowed respondents to report more than one race category to describe themselves and household members. This was a result of the revised Office of Management and Budget (OMB) guidelines issued on October 30, 1997. All other censuses prior to 2000 had offered the respondent with the option for self-identification of a single race with which the respondent most closely identified. As a result of the aforementioned OMB revised standards a methodology was developed to “bridge” the 2000 Census with previous decennial censuses. This impacted the manner in which the total AI/AN population was counted.

The Census Bureau and NCHS are credited for developing the bridging methodology to address the inconsistencies for identifying race between the 2000 Census and the previous censuses. The 2000 Census with bridged-race categories re-categorizes more than one race responses to a single race response. The bridged 2000 Census single race corresponds with the single race categories used on the birth and death certificates.

*Source: National Center for Health Statistics. Estimates of the July 1, 2000-July 1, 2004, United States resident population from the Vintage 2004 postcensal series by year, county, age, sex, race, and Hispanic origin, prepared under a collaborative arrangement with the U.S. Census Bureau. Available on the Internet at: <http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm>. September 8, 2005*

Using the 2000 Census with bridged-race categories increased the AI/AN population denominators resulting in slightly decreased IHS mortality rates. The 2000 Census with bridged-race categories population for all AI/AN in the U.S. is 3.3 million. This falls between the population of all AI/AN in the U.S. of 2.5 million who identified themselves as an AI/AN race (alone) and the population of all AI/AN in the U.S. of 4.2 million who identified themselves as an AI/AN and a combination of at least one other race (combination).

IHS service populations beyond the latest census (2000) are projected through linear regression techniques using the latest ten years of AI/AN birth and death data provided by the NCHS. The estimated natural change for a county (number of births minus number of deaths) is applied accumulatively to the latest census enumeration for the county for each year beyond the census. DPS produces a new set of IHS service population projections each year.

The IHS service populations are produced for the IHS area, service unit, and county levels. If a county is split between and/or among service units and/or IHS service areas, DPS allocates the county population to the affected service units and/or service areas. These population allocations are based on percentage splits developed and agreed by the affected IHS areas. A letter of agreement describing the formal arrangement (including a valid authorization by all authorities for the population allocation) is sent to DPS and kept on file. These percentage splits are calculated using sub-county census data and census maps.

DPS also generates AI/AN population estimates and projections, utilizing an identical methodology, for non-service IHS counties. Therefore, DPS produces census-based AI/AN population figures for every U.S. county and all 50 states.





## Changes in Methodologies

DPS used updated methodologies to produce age-adjusted mortality rates. These applied methodologies coincide with methodologies used by the NCHS, CDC and the U.S. Census Bureau. Using these updated methodologies enabled AI/AN mortality rates to be compared to U.S. all-races mortality rates produced by the aforementioned agencies.

Age-adjusted mortality rates for *Regional Differences in Indian Health* developed for data years 1999-2001 are **NOT** comparable to previously published mortality rates calculated for data years 1996-1998. This is due to several changes in the methodology used to calculate the age-adjusted mortality rate produced by the DPS.

Under **no** circumstances should data published in this issue of *Regional Differences in Indian Health* be compared to any data published in prior *Regional Differences in Indian Health* publications. This holds true for other previous IHS publications including *Trends in Indian Health* the *Focus Reports*, the *Life Expectancy Report* and all YPLL data provided by the DPS. (The forthcoming *Trends in Indian Health* will recalculate trend data that are comparable by using the updated methodologies).

The three major updated methodologies applied by DPS include:

### *ICD-9 Conversion to ICD-10*

Beginning with the 1999 mortality data a new classification system was implemented to categorize causes of death. The International Classification of Diseases, Version 10 (ICD-10) was used by the states and NCHS to code all causes of death for years 1999 and onward. The ICD-10 classification system consists of a new nomenclature scheme with new and revised categories for some causes of death. Comparability ratios are applied when appropriate, i.e., to adjust data analyzed using the past classification system (ICD-9). Such revisions are noted on the data when applicable. (“Regional Differences in Indian Health” does not apply comparability ratios as these ratios are applied to data prior to 1999. This publication refers to data years 1999-2001 which eliminated the necessity to use these adjustment factors).

### *2000 U.S. Census Populations with Bridged Race Categories (2000 Census Bridged File)*

The 2000 U.S. Census Population with Bridged-Race Categories (2000 Census Bridged File) for AI/ANs was used by IHS to calculate mortality and natality age-adjusted rates. The 2000 Census allowed respondents to report more than one race category to describe their race. The birth and death certificates (vital events) used by the states for years 1999-2001 allow only a single race category to be reported. Vital event totals are used in the numerator and the 2000 Census bridged population is used in the denominator to produce the birth or death rate that occurs in the population of interest. The denominator data are based on the 2000 Census bridge file, which re-categorizes responses to a single race where more than one race was reported. This corresponds to the single race categories used on birth and death certificates.

### *Age Adjustment Based on the 2000 Standard Population*

The HHS recommended that all HHS agencies use the 2000 Census standard population to age-adjust mortality rates. IHS calculates age-adjusted rates based on the 2000 standard population to comply to this HHS recommendation.

### Vital Event Statistics

AI/AN vital event statistics are derived from data provided annually to the IHS by NCHS. Vital event statistics for the U.S. population were derived from data reported in various NCHS publications<sup>2,3,4</sup>, as well as from some unpublished data from NCHS. NCHS obtains birth and death records for all U.S. residents from state health departments, based on information reported on official state birth and death certificates. The records NCHS provides to IHS contain the same basic demographic items as the vital event records maintained by NCHS for all U.S. residents, but with names, addresses, and record identification numbers deleted. It should be noted that Tribal identity is not recorded on these records.

The natality and mortality data are only as accurate as the reporting by the states to NCHS. NCHS does perform numerous edit checks, applies verification methods, and imputes values for non-responses.<sup>5</sup>

Misreporting of AI/AN race on state death certificates occurs, especially in areas distant from traditional AI/AN reservations. In order to determine the degree and scope of the misreporting, IHS conducted a study utilizing the National Death Index (NDI) maintained by the NCHS. The study involved matching IHS patient records of those patients who could have died during 1986 through 1988 with all death records of U.S. residents for 1986 through 1988 as contained on the NDI. The results were published in a document entitled, *Adjusting for Miscoding of Indian Race on State Death Certificates*, November 1996. The study revealed that on 10.9 percent of the matched IHS-NDI records, the race reported for the decedent was other than AI/AN. The percentage of records with inconsistent classification of race ranged from 1.2 percent in the Navajo Area to 28.0 and 30.4 percent in the Oklahoma and California Areas, respectively.

The results of the NDI study provide sufficient numbers to calculate adjustments for each IHS Area, IHS overall, and selected age groups. In addition to these adjustments based on the study findings, IHS assumed the following: (a) the results from 1986-88 apply to other years; (b) IHS age-group adjustments applied also to each Area; and (c) the Area adjustments applied to the causes of death used in this publication, i.e. if an Area's total deaths needed to be increased by ten percent, then the deaths for each cause of death would also increase by this same rate. These assumptions cannot be statistically supported by the results of the study. However, it was necessary to adjust all the death rates in this publication to provide a meaningful and comprehensive look at health status.

These NDI adjustments were used for the first time in the 1997 edition of this publication. Both unadjusted and adjusted information is shown, as applicable. The adjustments were applied to the results obtained from using an unadjusted death file.

IHS has more specific adjustment factors for the age group less than one year. These are derived from the linked birth/infant death data sets produced by the NCHS. In this edition unadjusted and adjusted infant mortality rates will be shown. These adjustments based on the linked data sets take precedent over the NDI adjustments for the under one-year age group, described above.

<sup>2</sup> Fay MP, Feuer EJ. Confidence intervals for directly adjusted rates: a method based on the gamma distribution. *Stat Med* 16:791-801, 1997

<sup>3</sup> Anderson RN. United States life tables, 1998. *National Vital Statistics Reports*; vol 48 no. 18. Hyattsville, Maryland: National Center for Health Statistics. 2001.

<sup>4</sup> Minino AM, Arias E, Kochanek KD, Murphy SL, Smith BL. Deaths: Final Data for 2000. *National vital statistics reports*; vol 50 no 15 Hyattsville, Maryland: National Center for Health Statistics. 2002.

<sup>5</sup> Martin JA, Hamilton BE, Ventura SJ, Menacker F, Park MM. Births: Final data for 2000. *National vital statistics reports*; vol 50 no 5. Hyattsville, Maryland: National Center for Health Statistics. 2002.



Natality statistics are based on the total file of birth records occurring in the U.S. each year. Mortality statistics are based on the total file of registered deaths occurring in the U.S. each year. Tabulations of vital events for IHS Areas are by place of residence.

The AI/AN vital event statistics in this publication pertain only to AI/AN people residing in the counties that make up the IHS service area, in contrast to earlier editions of the *Trends in Indian Health* publication which showed vital event statistics for all AI/AN people residing in the Reservation States. Calculations done on a Reservation State basis include all counties within the State, even those outside the IHS service area. Reservation State vital event rates tend to be lower in value (i.e., lower birth rates, lower death rates) than IHS service area rates. Since prior to 1972, only Reservation State data were available; these data were used to show trends going back to 1955, the inception of the IHS. However, now that sufficient vital event data are available for the IHS service area to show meaningful trends, the *Trends in Indian Health* publication, beginning with the 1992 edition, shows vital event statistics for the IHS service population. IHS service area data are more indicative of the health status of the AI/AN people that IHS serves.

The AI/AN population is considerably younger than the U.S. all-races population. Death rates presented in this publication have been age-adjusted to the 2000 standard population, where applicable, so that appropriate comparisons can be made between these population groups. One exception is the information presented for leading causes of death. In order to determine the leading causes of death for a population group, it is necessary to rank causes of death without any adjustment for age. However, it should be kept in mind that the ranking of causes of death for a population group is affected by its age composition.

All age-adjusted death rates calculated using a small number of deaths should be interpreted with caution as the observed rate may be quite different from the true underlying rate. This occasionally occurred when an Area rate was calculated for a specific cause of death, e.g., tuberculosis. Any rate based upon fewer than 20 deaths may not be reliable as the sample will be too small.

Prior to this publication, alcoholism deaths used ICD-9 codes for years prior to 1999. All ICD-9 codes used in IHS publications are consistent with codes used by NCHS. For years 1999 onward, causes of death from alcohol-induced mortality include the following ICD-10 codes:

- F10—(mental and behavioral disorders due to the use of alcohol)
- G31.2—(degeneration of the nervous system due to alcohol)
- G62.1—(alcoholic polyneuropathy)
- I42.6—(alcoholic cardiomyopathy)
- K29.2—(alcoholic gastritis)
- K70—(alcoholic liver disease)
- R78.0—(finding of alcohol in blood)
- X45—(accidental poisoning by and exposure to alcohol)
- X65—(intentional self-poisoning by and exposure to alcohol), and
- Y15—(poisoning by and exposure to alcohol, undetermined intent)

The NCHS definition of alcohol-related deaths includes all of these ICD-10 codes groups and is now used in all IHS publications and will also be published in *Trends in Indian Health*.

### Multiple Cause Analysis

This edition of *Regional Differences in Indian Health* is introducing multiple cause analysis for the AI/AN in the IHS service areas.

Most analyses of mortality are based on assigning a single underlying cause to each death using the information provided on the death certificate. This underlying cause of death is assigned first by the certifier of death, usually a physician, and later potentially corrected by software at the state health department and the National Center for Health Statistics (NCHS). However, the electronic death record captures up to 20 causes of death noted on the death certificate. Approximately three causes of death are listed on the average death certificate both in the U.S. as a whole and for AI/AN. Persons with chronic disease often die of multiple causes, thus the use of statistics based on the underlying cause can be deceptive. Diabetes, for example, is often listed on the death certificate but not classified as the underlying cause of death, contributing to a possible underestimation of deaths due to diabetes in vital statistics. Another way of analyzing mortality data is to use the multiple cause of death file provided by the NCHS and examine deaths where a particular cause is mentioned one or more times anywhere in the electronic death record. The requirements for tracking Healthy People 2010 objectives do not allow for the traditional analysis based on the underlying cause of death when calculating rates of diabetes mortality; a multiple cause analysis is required. For other chronic diseases it is useful to compare rates based on the underlying and multiple cause analyses.

In this report for the first time, death rates and frequencies of heart disease based on the underlying cause of death are compared with rates and frequencies based on the listing of heart disease one or more times in the electronic death record within the multiple cause of death file. The same is done for cerebrovascular disease and diabetes. These rates are broken down by sex and IHS Area for diabetes. The heart disease and cerebrovascular disease rates are calculated by age (35-74 vs. 75 or more), sex, and IHS Area. Within the appropriate ranges of the age (ages 35 or more, ages 35-74, or ages 75 or more), these rates are adjusted to the corresponding 2000 U.S. standard population in 10 year intervals. Using a multiple cause of death analysis, age-adjusted death rates in each combination of diabetes and heart disease are presented by IHS area and age (35-74 vs. 75 or more). These combinations include heart disease listed in the death record without mention of diabetes, diabetes listed in the death record without mention of heart disease, and heart disease and diabetes listed together in the death record. Multiple cause of death analysis makes no reference to which cause of death was identified as the underlying cause.

These data should be interpreted with some caution. Analyses based on the underlying cause of death can be biased by preferences to list one particular cause on the death certificate as the underlying cause instead of another cause on death certificate (e.g., coronary heart disease vs. diabetes). Both underlying and multiple cause of death analyses do not objectively quantify the occurrence of a particular cause at time of death. Instead, these analyses are limited by the certifier's awareness of the presence of a particular cause and his or her judgment about its role in causation. Differences in competence and completeness of death certification may also vary by circumstances and region. Thus, the prevalence and full contribution of conditions



like diabetes and coronary heart disease at time of death can not be completely determined by analyses of death certificates. In addition, the rates presented in this analysis are often based on a small number of deaths. Only statistically significant differences ( $p < 0.05$ ) are featured in the narrative of this analysis. Region-specific rates that are significantly ( $p < 0.05$ ) higher than the corresponding rates among U.S. all races are designated with an asterisk in all tables. Statistical significance was evaluated using 95% confidence intervals based on the gamma distribution.<sup>6</sup>

### Patient Care Statistics

Patient care statistics are derived principally from the IHS National Patient Information Reporting System (NPIRS), the national data repository for IHS statistical health care data on patient registration and visit encounters occurring at either IHS facilities or contracting facilities that provide care. It collects data on persons who are members of federally recognized tribes that access IHS services. Other sources are listed below.

*Monthly Inpatient Services Report*—a patient census report prepared by each IHS hospital indicating the number of discharges and days by type of service (e.g., adult, pediatric, obstetric, newborn), used for direct inpatient workload statistics. Also referred to as the “202” after the name of the form on which it is processed.

*Inpatient Care Data*—The IHS NPIRS serves as an agency-wide statistical information system and warehouse of Indian health and health system data. This data repository is the source of IHS hospital inpatient data pertaining to various patient characteristics (age, sex, principal diagnoses, other diagnoses, community of residence, etc.), collected daily, one record per discharge.

*Ambulatory Patient Care Data*—The NPIRS repository is also the source of data pertaining to the number of ambulatory medical visits at IHS facilities by various patient characteristics (age, sex, clinical impression, community of residence, etc.). The data are collected daily, one record per ambulatory medical visit.

*Contract Care Data*—NPIRS website reports have provided ambulatory and inpatient contract care data collected through the Contract Health System

*Immunization Data*—information obtained by IHS/CDC jointly appointed immunization tracking staff.

*Dental Data*—The NPIRS repository is also the source for dental services data, monitored by IHS Headquarters dental personnel.

*Tuberculosis Data*—based on cases reported to State TB control units at the state health department level.

The data from these systems are subject to recording, inputting, and transmitting errors. However, the IHS DPS in consultation with the Office of Information Technology NPIRS Repository Staff closely monitor the electronic transmissions and content of the repository and its attendant reports ensuring data quality.

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<sup>6</sup> Arias E. United States life tables, 2001. National vital statistics reports; vol 52 no 14. Hyattsville, Maryland: National Center for Health Statistics. 2004.

## GLOSSARY

**Age-Adjustment (direct method)**—The application of age-specific rates in a population of interest to a standardized age distribution in order to eliminate differences in observed rates that result from age differences in population composition. This adjustment is usually done when comparing two or more populations at one point in time or one population at two or more points in time.<sup>7</sup>

**Area**—A defined geographic region for Indian Health Service (IHS) administrative purposes. Each Area Office administers several service units

**Average Daily Patient Load**—The average number of patients occupying beds in a hospital on a daily basis. It is calculated by dividing total inpatient days for the year by 365.

**Birthweight**—Weight of fetus or infant at time of delivery (recorded in pounds and ounces, or grams).

**Cause of Death**—For the purpose of national mortality statistics, every death is attributed to one underlying condition, based on information reported on the death certificate and using the international rules for selecting the underlying cause of death from the conditions stated on the death certificate. The underlying cause is defined by the World Health Organization (WHO) as the disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence, which produced the fatal injury. Generally, more medical information is reported on death certificates than is directly reflected in the underlying cause of death. The conditions that are not selected as underlying cause of death constitute the non-underlying cause of death, also known as multiple cause of death. Cause of death is coded according to the appropriate revision of the International Classification of Diseases (ICD). Effective with deaths occurring in 1999, the United States began using the Tenth Revision of the ICD (ICD-10); during the period 1979-98, causes of death were coded and classified according to the Ninth Revision (ICD-9). Each of these revisions has produced discontinuities in cause-of-death trends. These discontinuities are measured using comparability ratios.<sup>8</sup>

**Census Definitions**—Definitions for census information including: unemployment, median household income, and poverty can be found on the census website: <http://www.census.gov>

**Comparability Ratios**—Adjustment factors designed to measure the effects of a new revision of the ICD on the comparability with the previous revision of mortality statistics cause of death.<sup>8</sup>

**Contract Care**—Services not available directly from IHS or Tribes that are purchased under contract from community hospitals and practitioners.

**Health Center**—A facility, physically separated from a hospital, with a full range of ambulatory services including at least primary care physicians, nursing, pharmacy, laboratory, and x-ray, which are available at least forty hours a week for ambulatory care.

**Health Station**—A facility, physically separated from a hospital or health center where primary care physician services are available on a regularly scheduled basis but for less than forty hours a week.

**High Birthweight**—Birthweight of 4,000 grams or more.

**Infant Mortality**—The death of a live-born child before his or her first birthday. Deaths in the first year of life may be further classified according to age as neonatal and postneonatal. Neonatal deaths are those that occur before the 28th day of life; postneonatal deaths are those that occur between 28 and 365 days of age.

**Infant Mortality Rate**—A rate based on period files calculated by dividing the number of infant deaths during a calendar year by the number of live births reported in the same year. It is expressed as the number of infant deaths per 1,000 live births.<sup>9</sup>

**International Classification of Diseases**—The Ninth Revision (ICD-9) codes are used for years prior to 1999. The Tenth Revision (ICD-10) codes are used for data years 1999 onward.

<sup>7</sup> <http://www.cdc.gov/nchs/datawh/nchsdefs/ageadjustment.htm#aarates>

<sup>8</sup> <http://www.cdc.gov/nchs/datawh/nchsdefs/cod.htm>

<sup>9</sup> <http://www.cdc.gov/nchs/datawh/nchsdefs/infantdeath.htm>



**Life Expectancy**—Life expectancy is the average number of years of life remaining to a person at a particular age and is based on a given set of age-specific death rates, generally the mortality conditions existing in the period mentioned. Life expectancy may be determined by race, sex, or other characteristics using age-specific death rates for the population with that characteristic.<sup>10</sup>

**Live Birth**—In the WHO’s definition, also adopted by the United Nations and the NCHS, a live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life such as heartbeat, umbilical cord pulsation, or definite movement of voluntary muscles, whether the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered live born.<sup>11</sup>

**Low Birthweight**—Birthweight of less than five pounds, eight ounces or 2,500 grams.

**Maternal Death**—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. Maternal death is one 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-10 codes A34, O00-O95.9, O98-O99.9).<sup>12</sup>

**Multiple Cause of Death Analysis**—A method of analyzing mortality data by using the death file provided by the NCHS to examine deaths where a particular cause is mentioned one or more times anywhere in the electronic death record.

**Neonatal Mortality Rate**—The number of deaths under 28 days of age per 1,000 live births.

**Occurrence**—Place where the event occurred.

**Postneonatal Mortality Rate**—The number of deaths that occur from 28 days to 365 days after birth per 1,000 live births.

**Race**—Federal Register Notice (October 30, 1997), Revision to the Standards for the Classification of Federal Data on Race and Ethnicity.

The revised standards have five minimum categories for data on race: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White. There will be two categories for data on ethnicity: “Hispanic or Latino: and “Not Hispanic or Latino.”

Persons are offered the option to select one or more races.

<http://www.whitehouse.gov/omb/fedreg1997standards.html>

**Reservation State**—A State in which IHS has responsibilities for providing health care to American Indians or Alaska Natives.

**Residence**—Usual place of residence of person to whom an event occurred. For births and deaths, residence is defined as the mother’s place of residence.

**Service Area**—The geographic areas in which IHS has responsibilities—“on or near” reservations, i.e., contract health service delivery areas.

**Service Population**—AI/AN people identified to be eligible for IHS services.

**Service Unit**—The local administrative unit of IHS.

**User Population**—AI/AN people who have used IHS services at least once during the last three-year period according to their community of residence.

**Years of Potential Life Lost (YPLL)**—A mortality indicator that measures the burden of premature deaths, calculated by subtracting the age at death from age 65 and summing the result over all deaths.

<sup>10</sup> <http://www.cdc.gov/nchs/dataawh/nchsdefs/lifeexpectancy.htm>

<sup>11</sup> <http://www.cdc.gov/nchs/dataawh/nchsdefs/livebirth.htm>

<sup>12</sup> <http://www.cdc.gov/nchs/dataawh/nchsdefs/rates.htm#maternaldeath>

### **Sources of Copies and Additional Information**

Additional AI/AN health status information can be obtained from the IHS Division of Program Statistics. Specific responsibilities are as follows:

#### **GENERAL INFORMATION**

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#### **DEMOGRAPHIC STATISTICS**

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#### **PATIENT CARE STATISTICS**

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Copies of this and other statistical publications may be obtained from Division of Program Statistics at:

Indian Health Service  
Office of Public Health Support  
Division of Program Statistics  
801 Thompson Building  
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Phone: 301-443-1180

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This publication, other IHS statistical publications, and links to IHS data files are available on the Division of Program Statistics Web Site at:

*[http://www.ihs.gov/NonMedical/Programs/IHS\\_Stats/](http://www.ihs.gov/NonMedical/Programs/IHS_Stats/)*