

Chapter 4

Health Status of American Indians

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Health Status of American Indians

INTRODUCTION

Information on the health status of American Indians is presented in this chapter. The focus is on health problems of Indians in areas served by the Indian Health Service (IHS), and not on Indians in urban or other nonservice areas. The health status of all Indians in IHS areas is presented, followed by analyses of health conditions in each of the 12 IHS service areas. Mortality rates are the primary source of health status information, but patient care data from IHS and other sources are also used to provide information on morbidity (illness) and access to health services.

Sources and Limitations of Data

Sources

Except where otherwise indicated, the data used in this chapter were obtained from IHS, the National Center for Health Statistics (NCHS), and the U.S. Bureau of the Census.

Population Data.—As discussed in chapter 3, the Indian Health Service obtains Indian population statistics from the U.S. Census, which is conducted every 10 years. Using these data, IHS projects its estimated Indian population for the coming decade. Then, every year between censuses, IHS reestimates the Indian population by using Indian birth and death data obtained annually from the National Center for Health Statistics. IHS provided OTA with population estimates using NCHS birth and death data through calendar year 1982; these population estimates were used to calculate mortality (death) and health care utilization rates.

Mortality (Death) and Morbidity (Illness and Injury) Data.—A computer tape with information about Indian deaths during the period 1980-82 was provided by IHS to OTA; OTA's analysis of this information is explained in appendix D.

Information concerning morbidity (illness and injury) was derived from two IHS data sources: 1) the Inpatient Care System (IPC), which con-

tains IHS direct care and contract care general hospital discharge data; and 2) the Ambulatory Patient Care System (APC), which contains information on the number of outpatient visits at IHS facilities by various patient characteristics (age, sex, diagnosis, community of residence, etc.). IHS provided OTA with computer tapes pertaining to its IPC and APC systems; its internal documents and outpatient care on hospital utilization by area (166,176); and printouts of the 15 leading diagnoses for outpatient visits by reservation State, county, IHS area, and IHS service unit.

Limitations

These data sets and resulting analyses have several limitations that affect the validity of the information on Indian health status presented in this chapter.

Population Estimates.—While the data collected by the U.S. Bureau of the Census and NCHS have limitations generally (e.g., see ch. 3 for limitations of the census data), data concerning Indians are believed to be particularly problematic, especially in areas of the country where Indians have integrated into other populations. In addition, there are limitations to IHS's calculation of its service population. The service population is determined by counting those American Indians, Eskimos, and Aleuts (as identified in the census) who reside in the geographic areas, defined by county, in which IHS has responsibilities ("on or near" reservations and in contract health service delivery areas [CHSDAs]). Figure 1-7 in chapter 1 shows the location of IHS facilities; in general, the eligible population is estimated from census counts of Indians residing in counties surrounding these facilities. IHS estimates that about 60 percent of the Indian population was eligible for services in 1984 (see tables 4-1 and 4-2), but the people IHS counts as eligible may or may not use IHS services or even be eligible for such services. Thus, IHS does not have a firm idea

Table 4-1.—Estimated Total U.S. Indian Population and IHS Service and Nonservice Population, by State 1980

State	Estimated total Indian population 1980 Census data	Reservation States			Nonreservation State
		Total Indian population	IHS service population	Nonservice population	
Alabama	7,724	7,724	2,696	5,028	
Alaska	71,329	71,329	71,329		
Arizona	169,869	169,869	169,869		
Arkansas	9,937				9,937
California	216,070	216,070	73,262	142,808	
Colorado	20,206	20,206	2,989	17,217	
Connecticut	4,728	4,728	830	3,898	
Delaware	1,377				1,377
District of Columbia	1,034				1,034
Florida	20,095	20,095	5,956	14,139	
Georgia	7,922				7,922
Hawaii	4,000				4,000
Idaho	11,453	11,453	7,598	3,855	
Illinois	17,657				17,657
Indiana	8,315				8,315
Iowa	6,083	6,083	2,052	4,031	
Kansas	16,688	16,688	3,261	13,427	
Kentucky	3,790				3,790
Louisiana	13,095	13,095	1,164	11,931	
Maine	4,515	4,515	3,004	1,511	
Maryland	8,556				8,556
Massachusetts	8,428				8,428
Michigan	42,453	42,453	8,944	33,509	
Minnesota	39,402	39,402	19,074	20,328	
Mississippi	6,729	6,729	4,563	2,166	
Missouri	12,948				12,948
Montana	41,695	41,695	34,639	7,056	
Nebraska	10,340	10,340	4,347	5,993	
Nevada	14,674	14,674	14,674		
New Hampshire	1,432				1,432
New Jersey	9,165				9,165
New Mexico	116,150	116,150	113,569	2,581	
New York	40,876	40,876	10,266	30,610	
North Carolina	69,575	69,575	6,045	63,530	
North Dakota	22,976	22,976	18,554	4,422	
Ohio	13,513				13,513
Oklahoma	186,268	186,268	186,268		
Oregon	29,609	29,609	28,039	1,570	
Pennsylvania	10,040	10,040	72	9,968	
Rhode Island	3,170	3,170	1,226	1,944	
South Carolina	6,089				6,089
South Dakota	50,139	50,139	45,854	4,285	
Tennessee	5,372				5,372
Texas	41,970	41,970	763	41,207	
Utah	21,468	21,468	10,229	11,239	
Vermont	1,015				1,015
Virginia	9,760				9,760
Washington	66,423	66,423	61,217	5,206	
West Virginia	1,642				1,642
Wisconsin	32,148	32,148	18,982	13,166	
Wyoming	8,256	8,256	5,467	2,789	
All States	1,548,168	1,416,216	936,802	479,414	131,952

SOURCE: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Population Statistics Staff, internal document, Rockville, MD, Feb 20, 1985

Table 4-2.— Estimated Indian and Alaska Service Population by Area, 1980-90^a

Area	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Aberdeen	63,253	64,990	66,805	68,688	70,648	72,679	74,781	76,961	79,220	81,541	83,944
Alaska	64,047	65,743	67,521	69,383	71,329	73,351	75,461	77,647	79,917	82,267	84,702
Albuquerque	46,610	47,695	48,825	49,997	51,211	52,471	53,771	55,117	56,506	57,936	59,412
Bemidji	42,686	43,664	44,711	45,821	47,000	48,245	49,550	50,929	52,363	53,881	55,453
Billings	35,708	36,735	37,813	38,935	40,106	41,326	42,594	43,906	45,272	46,682	48,142
California	65,757	67,048	68,460	69,989	71,642	73,414	75,306	77,309	79,439	81,687	84,048
Nashville	26,731	27,181	28,136	30,644	35,822	36,413	37,025	37,663	38,332	39,021	39,736
Navajo	145,162	149,208	153,360	157,627	162,005	166,493	171,097	175,809	180,635	185,571	190,621
Oklahoma City	172,636	176,527	180,664	185,811	190,451	195,346	200,488	205,871	211,510	217,402	223,536
Phoenix	74,020	76,309	78,206	80,203	82,309	84,516	86,826	89,244	91,755	94,378	97,104
Portland	75,769	77,385	79,086	87,881	96,427	98,996	101,275	103,637	106,082	108,610	111,211
Tucson	16,230	16,590	16,980	17,400	17,852	18,332	18,843	19,386	19,958	20,561	21,194
All areas	828,609	849,075	870,567	902,399	936,802	961,582	987,017	1,013,479	1,040,989	1,069,537	1,099,103

^aEstimates were based on data on U.S. Census counts for 1980 and Indian births and deaths through calendar year 1982. Prior and subsequent estimates for 1980-1990 are based on Indian birth and death data as available to IHS from NCHS.

SOURCE: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Population Statistics Staff, internal document, Rockville, MD, Feb 1, 1985.

of how many Indians are in its potential service population.

These limitations affect conclusions about health status, because the estimate of the service population is used as the denominator in calculating mortality and morbidity rates. If a population is undercounted while deaths in that population are counted accurately, the health of the population will appear to be worse than it actually is. Conversely, if the population is counted accurately, but the number of deaths is undercounted, the health of the population will appear to be better than it really is. The latter situation applies to information on Indians in California, where IHS estimates that the eligible service population was approximately **73,000** in **1984**. However, NCHS data contained information on only 471 Indian deaths in that population in those 3 years, resulting in a mortality rate of less than **300** per 100,000 population, a rate lower than that of the wealthiest communities in the United States.

Other limitations of the population estimates provided by IHS occurs because of the way IHS calculates the age and sex characteristics of its service populations. These are based on census counts for reservation States, not the counties within the States covered by IHS service areas (193). These may or may not differ. The effect, however, is that age and sex distributions for entire reservation States are used to calculate age- and sex-specific mortality and morbidity rates for service areas, introducing unknown error.

In addition, IHS does not currently adjust for changes in the age and sex distribution of its in-

tercensus estimates (191). Rather, age and sex distributions from the most recent census are applied to population estimates for intercensal years. If the estimated age and sex distribution in a particular area changed significantly in the years after the census, health indicator rates for that area that were supposedly age-adjusted or sex-specific would not be accurate. However, OTA's analysis is based on data from 1980 to 1982, so the errors introduced by using the 1980 census age and sex distributions are minimal. (At the time this report was being published, IHS was considering revising its population forecasting techniques to provide more precise age and sex distribution estimates.)

Depending on the extent of discrepancies between population counts and estimates, IHS may also recalculate estimates for previous decades. The IHS service population enumerated in 1980 was approximately 13 percent higher than that estimated by IHS for 1979, which was projected from the 1970 census. The 1980 census was probably more reliable with respect to Indian data than the 1970 census (see ch. 3). After the 1980 census, IHS recalculated its population estimates for 1971 to 1979 in order to show a more gradual *transition* to the population enumerated during the 1980 census (see table 4-3). OTA took account of the revised population estimates to calculate death and hospital discharge rates for periods prior to 1980.

Mortality Data.—A great deal of the discussion in this chapter relies on mortality information as an index of health status, but the source of such

Table 4-3.—Estimated Indian and Alaska Service Population by Area, 1970 -80,^a Including Revised 1971-79 Estimates

Area	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Aberdeen area	44,290	45,870	47,443	49,020	50,595	52,814	54,385	55,968	57,546	61,607	63,253
Alaska,	50,654	51,916	53,179	54,440	55,700	57,198	58,454	59,710	60,964	62,223	64,047
Albuquerque	33,109	34,573	36,035	37,496	38,960	40,426	41,886	43,350	44,811	45,360	46,610
Bemidji	21,674	23,050	24,423	25,799	27,165	32,457	34,115	35,780	37,444	39,963	42,686
Billings	27,127	27,859	28,589	29,274	30,951	31,734	32,496	33,262	34,024	34,932	35,708
California	—	—	—	—	—	—	—	—	57,803	61,324	65,757
Nashville	8,539	8,824	9,559	9,866	11,947	12,314	12,672	13,037	22,729	25,910	26,731
Navajo,	91,553	96,476	101,396	106,317	111,237	116,161	121,078	126,000	130,919	138,531	145,162
Oklahoma City.. . . .	98,976	106,416	113,548	120,691	128,000	135,168	142,290	149,444	156,587	165,448	172,636
Phoenix	49,241	51,652	54,057	56,467	58,875	61,296	63,695	66,108	68,649	71,565	74,020
Portland	25,081	26,803	28,528	30,248	31,974	34,908	36,586	38,367	40,140	68,041	75,769
Tucson	9,752	10,401	11,047	11,696	12,343	12,992	13,639	14,287	14,935	15,582	16,230
All areas	459,996	483,840	507,804	531,314	557,747	587,468	611,296	635,313	726,551	790,486	828,609

^aEstimates are based on U.S. CENSUS counts for 1970 and 1980, and NCHS information on Indian births and deaths, 1970-80

^bDid not become IHS service area until 1978

SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Population Statistics Staff, Internal document, Rockville, MD, Feb. 1, 1985

data has several limitations, only some of which are specific to data about Indians. The most important Indian-specific limitation is that in many areas Indians may be identified as belonging to a non-Indian ethnic group. As mentioned above, this is highly likely in California, where many Indians have Hispanic surnames; it also maybe true for nonreservation Indians everywhere (e.g., Oklahoma, urban areas). Another limitation is that the mortality tapes that NCHS provides to IHS contain information only about the underlying (chief) cause of death, and not on other contributing causes of death. This is a problem in investigating the contribution of illnesses such as alcoholism and drug abuse to mortality rates.

Perhaps the most serious limitation of using mortality data is that such information may not identify the actual causes of death. For example, using the autopsy as a measure of accuracy of the death certificate in a Connecticut sample, Kircher and his colleagues found major disagreement on the major ICD-9 (International Classification of Diseases, 9th Edition) classifications (e.g., diseases of the heart) for causes of death in 29 percent of deaths, and disagreement on the specific cause in another 26 percent of deaths (63). Circulatory disorders, ill-defined conditions, and respiratory diseases were the most overdiagnosed; specific traumatic conditions (suicide, homicide, or accident) and gastrointestinal disorders were the most underdiagnosed. Similar findings have been reported in other studies (199).

Patient Care Information.—In both IHS's and NCHS's hospital discharge and ambulatory patient care information systems, data are collected for each hospital discharge and for each outpatient visit (encounter), not for each patient. Therefore, a number of hospital discharge records and, more likely, outpatient visit records, could be for a single patient. Medical records are, of course, kept for all patients in each facility they visit, but these records are not linked in an electronically accessible data system.

Comparisons of the prevalence and incidence of illnesses between IHS and U.S. all races populations are difficult to make because of differences between IHS's data system and those of the National Center for Health Statistics. For outpatient information, NCHS collects data from office-based physicians (200). The IHS health care system relies heavily on nonphysicians (see ch. 4), so comparisons between IHS and U.S. all races outpatient care are not exact. Further, IHS uses a different outpatient diagnostic coding system and aggregates data from this system in a non-standard way (168). Also current IHS reporting systems exclude diagnostic data from several important sources of health services delivery. These include contract outpatient providers, most tribally managed facilities, and urban providers. Systematic data on the prevalence of mental health problems and the utilization of mental health services are lacking for both Indians and U.S. all races populations.

Some difficulties also arise from IHS's use of the concept "clinical impression." Clinical impression refers to the diagnosis first suspected by the examining physician at the initial visit; it may not be the final diagnosis. This has several implications for morbidity analyses based on APC data. For example, IHS had used APC records to derive incidence of diseases considered "notifiable" by the U.S. Centers for Disease Control (e.g., measles, syphilis) and other communicable diseases recognized as important sources of morbidity in Indian communities (e. g., otitis media). These data made it appear as if Indians were suffering from notifiable and communicable diseases at a much greater rate than the U.S. all races population, when in fact such incidence rates included mistaken, perhaps overcautious, diagnoses. For example, a validity check of a count of several hundred clinical impressions of measles turned up only one actual case. For this reason, IHS no longer publishes such information, although it can still be obtained from APC records (58).

Comparisons With IHS Publications.— For certain statistical calculations (e. g., mortality rates reported in the *Chart Series Book* published in 1984 and **1985**) the IHS uses census counts of the total American Indian and Alaska Native population residing in all reservation States, and the total number of Indian deaths in those States, to calculate national Indian death rates. In these cases, the nonservice population (those who do not reside in the geographic areas in which IHS has responsibilities), are included in IHS's calculations. IHS uses this method in order to be able to compare current Indian health status with In-

dian health status in **1955 (26)**, when IHS became responsible for providing Indian health care but IHS service areas as they are now known had not been organized. However, the number of reservation States and the Indian population base has changed considerably since 1955, so even these comparisons should be made extremely cautiously. At the time this report was being prepared, IHS was conducting a congressionally requested study of health parity which will include reports on Indian mortality in individual IHS service areas, including age-adjusted mortality rates. OTA's analysis has generally focused on IHS's service population. Consequently, OTA's rates may differ from some of IHS's published rates. These differences are identified in the following analyses. In the 3-year period centered in **1981**, there were an estimated 15,321 deaths among IHS's service population, and another 4,408 deaths in the nonservice population.

Comparisons Over Time. —A report published in 1979 included mortality rates for IHS areas for the 3-year periods centered in 1973 and **1976 (157)**, but these were not adjusted for age and so were not comparable to rates for the U.S. all races. They are used in OTA's analysis to make rough estimates of changes in health status over the decade for which data on IHS areas are available. These estimates should be interpreted cautiously because of changes over time in a number of other factors: the IHS population base (as a result of, for example, "termination" and subsequent re-recognition of tribes as federally recognized); changes in census methods; and changes in IHS service area boundaries.

OVERVIEW OF HEALTH STATUS

Overall Indian health status relative to the health of "U.S. all races" combined can be presented in several ways: the age distribution of deaths, differing causes of death, and differing patterns of health care utilization. In this section these health indicators are averaged for Indians in all IHS service areas, and comparisons across IHS services areas are made. Then, the health sta-

tus of Indians in each IHS area is analyzed. These analyses indicate that while there has been steady improvement, in almost every IHS area and on almost every health indicator, Indian health remains poorer than that of the U.S. population in general. Further, there appear to be significant differences in health care utilization, which may be indicators of unmet need.

Age Distribution of Deaths

Perhaps the most significant indicator of Indian health status is that Indians do not live as long as other U.S. populations. In the early 1950s, 56 percent of Indian deaths occurred in individuals younger than age 45 (155). By 1982, that had only improved to 37 percent of Indian deaths occurring to those younger than 45, compared with only 12 percent of U.S. all races deaths occurring in that age group (see figure 4-1). Indians' higher birth rate (see ch. 3) contributes to a younger population (see figure 4-2) and thus more deaths among younger Indians. However, the more problematic health status of younger Indians is reflected by the fact that Indian mortality rate (deaths relative to population) exceed the rates for the U.S. all races in every age group below age 75; the difference is especially pronounced in the years 1.5 through 44 (see table 4-4 and figure 4-3).

In the 3-year period centered in 1981, 345,430 years of potential life were lost by Indians who died before their 65th birthdays. Per 100,000 population, the Indian rate of potential years of life lost was approximately two times that of the U.S. all races rate.

Rates and Causes of Death

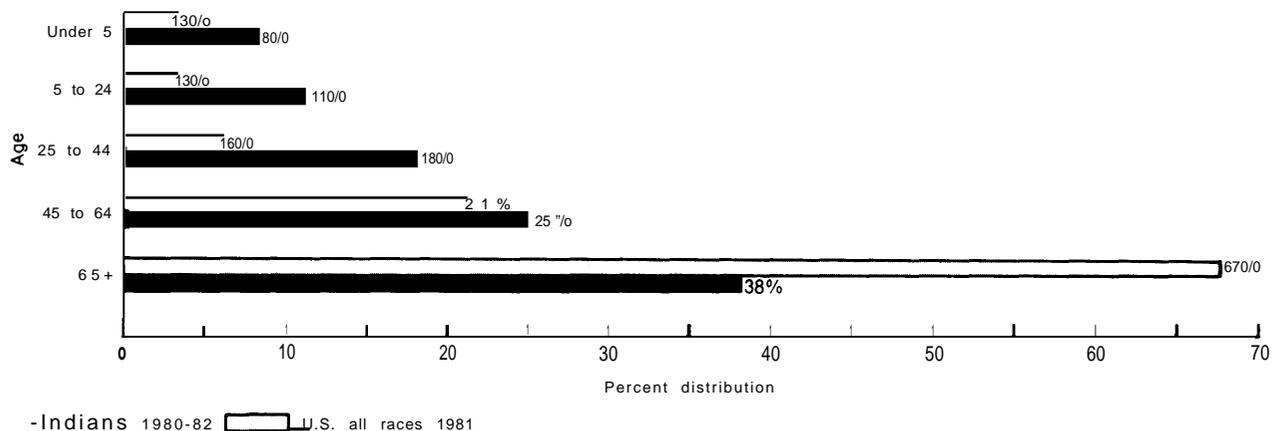
In 1980 to 1982, the average age-adjusted mortality rate for all IHS service areas excluding Cali-

ifornia was 778.3 per 100,000, a rate 1.4 times that of U.S. all races. Rates ranged from 1,261.3 in Aberdeen to 530.6 in the Oklahoma City area. (Existing data on the health status of Indians in California is too incomplete to use, so death rates attributed to this group are not included.) These figures differ markedly from those published by the Indian Health Service in 1985, because, as discussed above, IHS typically averages all reported Indian deaths in all parts of all reservation States, whether the IHS has service delivery responsibilities throughout the State or not. For the 1980-82 period, IHS's method resulted in an average age-adjusted overall mortality rate for Indians of **568.9**, essentially equal to that of the U.S. all races (see table 4-s).

Leading Causes of Death

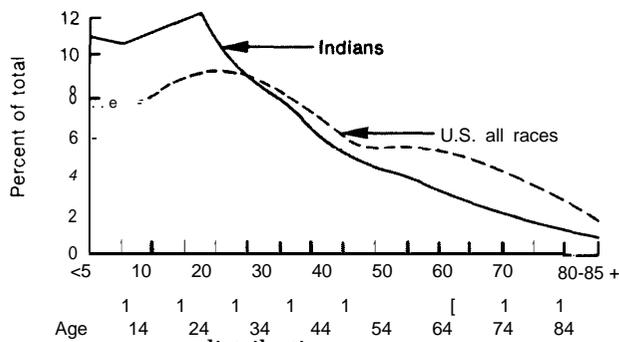
In the 3-year period centered in 1981, the 15 leading causes of death for Indians in IHS areas were heart disease, accidents, cancer, liver disease and cirrhosis, cerebrovascular disease, pneumonia, diabetes, suicide, homicide, conditions originating in the perinatal period (the period right around birth), nephritis, nephrotic syndrome and nephrosis, congenital anomalies (birth defects), chronic pulmonary diseases, septicemia, and tuberculosis (see table 4-6). While there are substantial differences among IHS areas in mortality and health care utilization rates, the pattern of disease

Figure 4-1.—Percent Distribution Deaths by Age Indians 1980-82 and U.S. All Races 1981



SOURCE US Department of Health and Human Services, Public Health Service, Health Resource and Services Administration, Indian Health Service, Program Statistics Branch, "Chart Series Book," Rockville, MD, April 1985

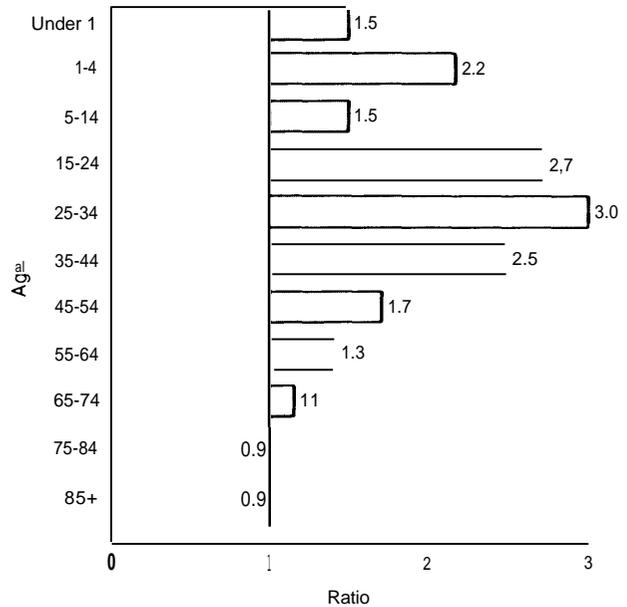
Figure 4.2.—Population by Age, Indians in Reservation States^a and U.S. All Races 1980



^aUsed by IHS to infer age distribution of Indians in IHS service areas
 SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, "Chart Series Book," Rockville, MD, April 1985

and death is essentially consistent across IHS areas (see table 4-7). (For the number of deaths, age-specific and age-adjusted mortality rates, and ratios to U.S. all races rates for 72 selected causes of death in all areas excluding California, see app. B.) As shown in tables 4-8 and 4-9, the leading causes of death among Indians have changed somewhat over the past 30 years. Since 1951 there has been significant improvement in infectious diseases only to have the so-called "social" or behavioral causes of mortality (accidents, suicide, homicide) become prominent.

Figure 4-3.—Age-Specific Mortality Rates Ratio of Indians in IHS Service Areas 1980-82 to U.S. All Races 1981



SOURCE U.S. Department of Health and Human Services, Indian Health Service, Office of Administration and Management, 1985

Diseases of the heart have been the leading cause of death for U.S. all races for some time. They are now the leading cause of death for Indians in IHS service areas, although there are still

Table 4-4.—Age-Specific and Age-Adjusted Mortality Rates of Indians in IHS Areas (excluding California), 1980-82, U.S. All Races, White and All Other Races, 1981 (rate per 100,000 population)

Age	IHS service area Indians 1980-82		United States-1981 mortality rates			Ratio of rates Indians to U.S. all races
	Number of deaths ^a	Mortality rate	All races	White	All other	
<1	1,021	1,834.8	1,207.3	1,062.0	1,786.5	1.5
1 to 4	249	129.5	60.2	54.3	87.3	2.2
5 to 14	228	43.1	29.4	28.0	35.6	1.5
15 to 24	1,522	285.5	107.1	104.6	120.0	2.7
25 to 34	1,459	397.1	132.1	116.2	226.2	3.0
35 to 44	1,312	555.4	221.3	192.5	508.2	2.5
45 to 54	1,625	950.5	573.5	524.9	921.0	1.7
55 to 64	2,082	1,694.8	1,322.1	1,255.7	1,890.8	1.3
65 to 74	2,422	3,081.5	2,922.3	2,855.9	3,531.9	1.1
75 to 84	2,097	6,097.0	6,429.9	6,423.4	6,478.6	0.9
>85	1,310	13,325.2	15,379.7	15,628.0	12,547.9	0.9
Age-adjusted rate		778.3	568.2	544.6	732.6	1.4

NOTE Excludes 14 deaths for which age at death was unknown

SOURCES Indian data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985 U.S. data: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report—Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp., June 22, 1984

Table 4-5.—Age-Adjusted Death Rates for U.S. All Races 1981, Indians in Reservation States, and Indians in IHS Service Areas (excluding California) 1980-82, in Order by Rate (rate per 100,000 population)

	Age-adjusted mortality rate
U.S. all races 1981	568.2
IHS published rate—Indians in 28 reservation States	568.9
IHS areas—total	778.3
Aberdeen	1,261.3
Billings	1,260.3
Tucson	1,011.1
Bemidji	943.5
Phoenix	918.2
Alaska	918.1
Nashville	765.4
Portland	749.8
Albuquerque	703.1
Navajo	656.3
Oklahoma City	530.6

SOURCES: **U.S. all races:** U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report of Final Mortality Statistics, 1981," *Monthly Vita/Statistics Report* 33(3):supp., June 22, 1984. **IHS published data:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, *Indian Health Service Chart Series Book April 1985* (Rockville, MD: IHS, 1985). **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

almost as many deaths from accidents. On average, the Indian death rate from diseases of the heart is slightly lower than the rate for U.S. all races combined (and for U.S. whites). However, as shown in table 4-10, relative to U.S. all races, mortality from heart disease is greater among younger Indians than among younger people of other U.S. populations, and there is considerable variation among IHS areas in mortality due to heart disease. The death rate from heart disease is considerably lower than the U.S. all races rate in most areas, but the heart disease death rate exceeds that of U.S. all races in four IHS areas: Aberdeen, Bemidji, Billings, and Nashville (see figure 4-4). The reasons for these differences are unclear; heart disease is a matter of increasing concern to providers of Indian health care in all IHS areas (111).

The accident mortality rate for Indians in IHS service areas is on average 3.4 times the U.S. all races rate. In seven IHS areas, accidents are still the leading cause of death, and there was no IHS area that did not have a mortality rate from accidents at least 2.2 times the U.S. all races rate

(figure 4-5). In general, accidents and other external causes are the leading cause of death among U.S. youth (92); among Indians, the accidental death toll among the young is far worse than among other U.S. populations (table 4-11). The excess Indian risk of death from accidents has many causes, but those related to motor vehicles predominate. Long distances between destinations, poor roads, overcrowded and unsafe vehicles, and driving under the influence of alcohol are among the major causes of motor vehicle deaths among Indians.

Cancer (malignant neoplasms) is the third leading cause of death among the IHS's service population, having accounted for 1,713, or 11.2 percent, of Indian deaths in 1980 to 1982. Although on average the cancer mortality rate among Indians is lower than that of U.S. all races, there is considerable variability among IHS areas, and the Indian cancer mortality rate exceeds that of U.S. all races in five IHS areas: Aberdeen, Alaska, Bemidji, Billings, and Nashville (figure 4-6). Substantial cancer death rates for particular organ systems in specific IHS areas, such as mortality from cancer of the digestive system in both the Aberdeen and Alaska areas, are masked by aggregating cancer rates. The tendency of American Indians to have higher than average death rates from cancer was noted tentatively in the journal of the National Cancer Institute (NCI), but the small numbers of Indians in NCI's epidemiologic survey kept them from being able to demonstrate statistically significant differences from other populations (223).

Alcohol abuse is implicated in Indian death and illnesses from many causes; e.g., accidents, suicide, homicide, diabetes, congenital anomalies in infants, pneumonia, heart disease, and cancer. It has also been implicated in 50 percent of adult crime on Indian reservations (204,205,206,207). The prevalence of alcohol abuse can be inferred from the extremely high liver disease and cirrhosis death rates in almost all IHS areas. In 1980 to 1982, there were 801 deaths which listed liver disease and cirrhosis as the underlying (chief) cause, for an age-adjusted death rate of 48.1 per 100,000, exceeding the U.S. all races rate by 4.2 times. In one area the ratio to U.S. all races was almost 10:1, and there was no IHS area in which the In-

Table 4-6.—American Indian Deaths and Age-Adjusted Death Rates All IHS Areas (excluding California) for 15 Leading Causes 1980-82 Compared to Age-Adjusted Death Rates for U.S. All Races 1981

IHS code ^a Rank ^b Cause name	American Indian		U.S. all races	Ratio	
	Number of deaths	Age-adjusted rate ^c	Age-adjusted rate	American Indian to U.S. all races	
Both sexes combined:					
310 1.	Diseases of the heart	3,058	166.7	195.0	0.9
790 2.	Accidents/adverse effects.	2,946	136.3	39.8	3.4
150 3.	Malignant neoplasms.	1,713	98.4	131.6	0.7
620 4.	Liver disease/cirrhosis	801	48.1	11.4	4.2
430 5.	Cerebrovascular diseases	664	33.8	38.1	0.9
510 6.	Pneumonia/influenza	580	26.6	12.3	2.2
260 7.	Diabetes mellitus	470	27.8	9.8	2.8
830 8.	Homicide	458	21.2	10.4	2.0
820 9.	Suicide	447	19.4	11.5	1.7
740 10.	Conditions arising in perinatal period	331	9.8	9.2	1.1
640 11.	Nephritis, et al.	229	12.4	4.5	2.8
730 12.	Congenital anomalies	205	6.5	5.8	1.1
540 13.	Chronic pulmonary diseases	177	9.6	16.3	0.6
090 14.	Septicemia.	122	6.5	2.9	2.2
030 15.	Tuberculosis	77	4.2	0.6	7.0
	All others	3,043	151.0	69.0	2.2
ALL	All causes	15,321	778.3	568.2	1.4
Female^d:					
310 1.	Diseases of the heart	1,234	121.5	135.1	0.9
150 2.	Malignant neoplasm.	827	89.4	108.6	0.8
790 3.	Accidents/adverse effects.	781	69.0	20.4	3.4
620 4.	Liver disease/cirrhosis	351	40.1	7.4	5.4
430 5.	Cerebrovascular diseases	334	31.3	35.4	0.9
260 6.	Diabetes mellitus	261	28.8	9.6	3.0
510 7.	Pneumonia/influenza	241	21.0	9.2	2.3
740 8.	Conditions arising in perinatal period	127	7.5	8.2	0.9
640 9.	Nephritis, et al.	125	12.8	3.6	3.6
830 10.	Homicide	125	11.7	4.3	2.7
730 11.	Congenital anomalies	102	6.5	5.5	1.2
820 12.	Suicide	66	5.4	5.7	1.0
090 13.	Septicemia.	65	6.5	2.4	2.7
540 14.	Chronic pulmonary diseases	54	5.6	9.5	0.6
480 15.	Atherosclerosis.	43	3.5	4.6	0.8
	All others.	1,258	118.1	50.9	2.3
ALL	All causes	5,994	578.7	420.4	1.4
Male:^e					
790 1.	Accidents/adverse effects	2,165	207.8	60.2	3.5
310 2.	Diseases of the heart	1,824	219.0	271.2	0.8
150 3.	Malignant neoplasms.	886	109.1	163.7	0.7
620 4.	Liver disease/cirrhosis	450	57.0	16.0	3.6
820 5.	Suicide	381	34.0	18.0	1.9
510 6.	Pneumonia/influenza	339	33.2	16.6	2.0
830 7.	Homicide	333	31.1	16.7	1.9
430 8.	Cerebrovascular diseases.	330	37.0	41.7	0.9
260 9.	Diabetes mellitus	209	26.7	10.0	2.7
740 10.	Conditions arising in perinatal period	204	12.0	10.3	1.2
540 11.	Chronic pulmonary diseases	123	14.2	26.2	0.5
640 12.	Nephritis, et al	104	12.0	5.6	2.1
730 13.	Congenital anomalies	103	6.5	6.1	1.1
840 14.	All other external causes	97	10.0	2.2	4.5
090 15.	Septicemia	57	6.5	3.4	1.9
	All others	1,722	182.7	85.4	2.1
ALL	All causes	9,327	998.8	753.3	1.3

^aComparable to ICD-9 codes, available from IHS^bRanked by number of deaths^cNote that age and sex distributions are calculated for reservation States and may or may not reflect age and sex distribution in IHS areas.

SOURCES U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp. June 22, 1984, Indians in IHS areas: U.S. Department of Health and Human Services Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Table 4-7.— Fifteen Leading Causes of Death and Age-Adjusted Death Rates^a Ranked^b for U.S. All Races 1981 and IHS Areas 1980.82 (rate per 100,000 population)

Cause	All IHS areas (excluding u s)													
	u s (rank) (rate)	California (rank) (rate)	Aberdeen (rank) (rate)	Alaska (rank) (rate)	Albuquerque (rank) (rate)	Bemidji (rank) (rate)	Billings (rank) (rate)	California (rank) (rate)	Nashville (rank) (rate)	Navajo (rank) (rate)	Oklahoma (rank) (rate)	Phoenix (rank) (rate)	Portland (rank) (rate)	Tucson (rank) (rate)
Diseases of the heart	1 1950	1 1667	1 2890	2 1651	2 801	1 3280	2 2826	1 —	1 2249	2 773	1 1464	2 1778	2 1703	2 1716
Malignant Neoplasms	2 1316	3 985	3 1542	3 1382	3 820	3 1504	3 156.8	3 —	2 1260	3 766	2 857	4 760	4 739	4 719
Cerebrovascular disease	3 381	5 338	7 499	4 457	8 236	4 536	6 446	4 —	4 522	6 17.1	4 297	9 342	5 398	10 26.7
Accidents/adverse conditions	4 398	2 1363	2 1823	1 2105	1 1244	2 1307	1 2361	2 —	3 909	1 1657	3 669	1 1500	1 1256	1 1438
Chronic pulmonary disease	5 163	13 96	12 167	10 142	— ^d	9 20.4	11 276	10 —	— ^d	15 46	11 73	14 83	11 126	— ^d
Pneumonia/influenza	6 123	6 266	5 481	5 354	7 235	6 267	8 353	9 —	6 259	4 286	7 137	5 413	8 220	7 330
Diabetes Mellitus	7 98	7 278	10 446	— ^d	6 359	7 307	9 384	7 —	5 399	11 141	5 269	7 454	7 247	6 54.2
Liver disease/cwrhosis	8 114	4 48.1	4 98.9	9 271	4 470	5 363	4 1122	5 —	7 308	5 214	6 254	3 873	3 717	3 813
Atherosclerosis	9 52	—	— ^d	15 3.9	14 36	11 112	— ^d	13 —	— ^d	— ^d	15 32	— ^d	— ^d	— ^d
Suicide	10 115	9 195	8 374	8 214	5 293	8 181	7 334	8 —	9 174	9 123	12 69	8 282	6 211	5 422
Homicide and legal Intervention	11 104	8 212	6 452	6 255	9 154	10 11.9	5 364	6 —	8 225	7 150	8 126	6 355	10 172	9 238
Conditions arising in perinatal period	9 ^c	9.8	179	7 153	12 4.8	12 62	10 123	12 —	10 138	12 5.2	9 9.2	—	9 11.9	— ^d
Nephritis et al	13 45	11 124	11 234	13 90	11 151	15 99	12 142	11 —	12 54	10 131	10 77	10 216	12 118	12 236
Congenital anomalies	14 58	12 65	13 64	11 68	10 78	13 57	15 45	— ^d	— ^d	11 52	8 84	13 47	12 7.7	14 63
Septicemia	15 29	14 6.5	— ^d	— ^d	13 95	14 85	13 49	—	13 42	13 50	14 4.4	13 83	14 60	8 276
Tuberculosis	— ^d 06	15 4.2	14 9.4	12 101	—	—	— ^d	14 —	— ^d	— ^d	— ^d	— ^d	— ^d	13 159
All others	—	—	—	—	—	—	—	—	—	—	—	—	—	—
All causes	638	1508	2379	1899	2011	952	2210	—	1063	1951	762	1899	1335	2892
	5682	7783	12613	9181	7031	9435	12603	—	7654	6563	5306	9182	7498	10111

^aBoth sexes Combined Rates and rank may differ substantially by sex see text Sep. aOD B for deaths and rates for 72 causes

^bRanked by number of deaths in order to be consistent with NCHS methods Order by age-adjusted mortality rates may be different

^cValid rates not available see text for fuller explanation

^dNot among 15 leading causes of death

SOURCES U.S. all races: Department of Health and Human Services, Public Health Service, National Center for Health Statistics, *Monthly Vital Statistics Report* 33(3) supp June 22 1984, IHS Areas: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service. computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Table 4-8.—Leading Causes of Indian Deaths 1951-53 and U.S. All Races 1952

Cause	Percent of all causes
Indians 1951 -52.&	
Heart diseases	14.2
Accidents	14.1
Influenza and pneumonia	10.5
Tuberculosis, all forms	8.1
Certain diseases of early infancy	7.1
Malignant neoplasms	5.9
Gastritis, duodenitis, enteritis, and colitis	5.9
Vascular lesions affecting central nervous system	4.3
Congenital malformations	1.6
Homicide and legal execution	1.6
All races 1952:	
Heart diseases	37.1
Malignant neoplasms	14.9
Vascular lesions affecting central nervous system	11.1
Accidents	6.4
Certain diseases of early infancy	4.3
Influenza and pneumonia	3.1
General arteriosclerosis	2.1
Diabetes mellitus	1.7
Tuberculosis, all forms	1.6
Congenital malformations	1.3

^aBased on mortality data for population of 460,000 Indians in 23 reservation States
 SOURCE U S Department of Health, Education, and Welfare, *Health Services for American Indians* (Washington, DC U S DHEW, 1957)

dian rate was below the U.S. all races rate (see figure 4-7). Despite a long-standing recognition that alcohol abuse is the major health problem of American Indians (156), there is still no agreement on either the causes or treatment for this problem among Indians (66,72).

Cerebrovascular diseases (diseases of the circulatory system affecting the brain) are the fifth leading cause of death among IHS area Indians on average. Like the death rate from diseases of the heart, the mortality rate from cerebrovascular disease is on average lower among Indians than among U.S. all races. It substantially exceeds the U.S. all races rate in the same IHS service areas as for heart disease (Aberdeen, Bemidji, Billings, Nashville), plus Alaska (see figure 4-8).

In the 1950s pneumonia and influenza combined were the third leading cause of Indian deaths; in the 3-year period centered in 1981, pneumonia and influenza had declined to the sixth leading cause of Indian death. However, the age-adjusted rate of 26.6 Indian deaths per 100,000 population compares unfavorably to the U.S. all races rate for 1981 of 12.2. Pneumonia is largely

Table 4.9.—Crude Death Rates for 3 Year Periods Centered in 1973, 1976, and 1981 for Indians in 11 IHS Areas,^a 15 Leading Causes of Death (rate per 100,000 population, not adjusted for age)

IHS code	Cause	1972-74 rate	1975-77 rate	1980-82 rate
790	Accidents/adverse conditions	186.1	158.6	125.5
800	Motor vehicles.	104.2	91.1	71.1
810	All other accidents	82.0	67.5	54.4
310	Diseases of the heart.	141.8	126.6	130.3
150	Malignant neoplasms	70.6	67.8	73.0
620	Liver disease/cirrhosis	46.2	44.3	34.2
430	Cerebrovascular disease	42.5	35.8	28.3
510	Pneumonia/influenza	43.0	35.9	24.7
260	Diabetes mellitus	22.2	19.9	20.0
830	Homicide	22.6	21.3	19.5
820	Suicide	22.0	23.7	19.0
740	Conditions arising in perinatal period	22.8	21.2	14.1
640	Nephritis, et al	6.2	5.3	9.8
730	Congenital anomalies	10.0	9.9	8.7
90	Septicemia	5.7	6.1	5.2
30	Tuberculosis	8.9	7.0	3.3
480	Atherosclerosis	7.3	7.0	3.2
	All other causes	180.3	154.7	134.0
All	All causes	838.2	745.1	652.8

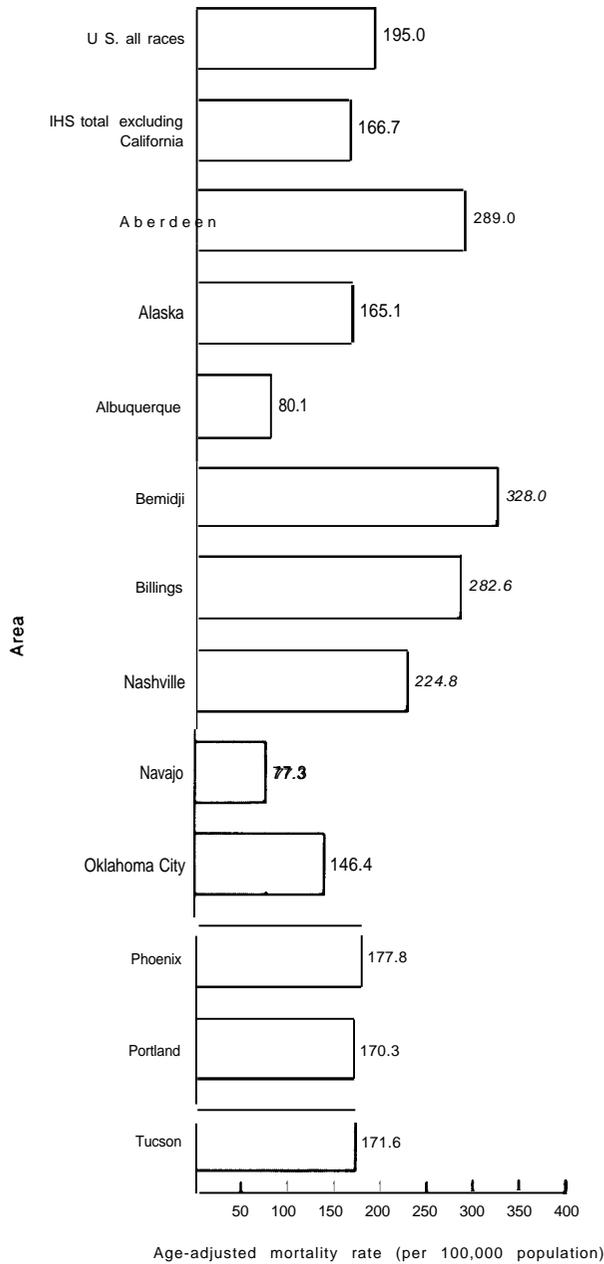
^aExcludes California which did not become an IHS Service area until 1978
 SOURCES 1972-74 and 1975-77 deaths: U S Department of Health, Education, and Welfare, Public Health Service, Health Services Administration, Indian Health Service, *Selected Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DH EW Pub No (HSA) 79-1005 (Rockville, MD:HSA, 1979) 1972.74 and 1975.77 population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Population Statistics Staff, Internal document, Rockville, MD, Feb 1, 1985 1980-82 data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape provided to the Office of Technology Assessment, Washington, DC, 1985

Table 4.10.—Mortality Rates From Diseases of the Heart by Age: Indians in 11 IHS Areas 1980-82 and U.S. All Races 1981 (rate per 100,000 population)

Age group	Indians in IHS areas (excluding California)	U.S. all races	Ratio IHS to U.S. all races
	1980-82	1981	
0 to 4	14.5	106.1	0.1
5 to 14	0.9	0.9	1.0
15 to 24	5.3	2.6	2.0
25 to 34	15.2	8.4	1.8
35 to 44	55.9	43.2	1.3
45 to 54	172.6	177.7	1.0
55 to 64	454.2	481.5	0.9
65 to 74	1,024.2	1,175.8	0.9
75 to 84	2,064.3	2,850.3	0.7
>85.	4,363.8	7,459.0	0.6

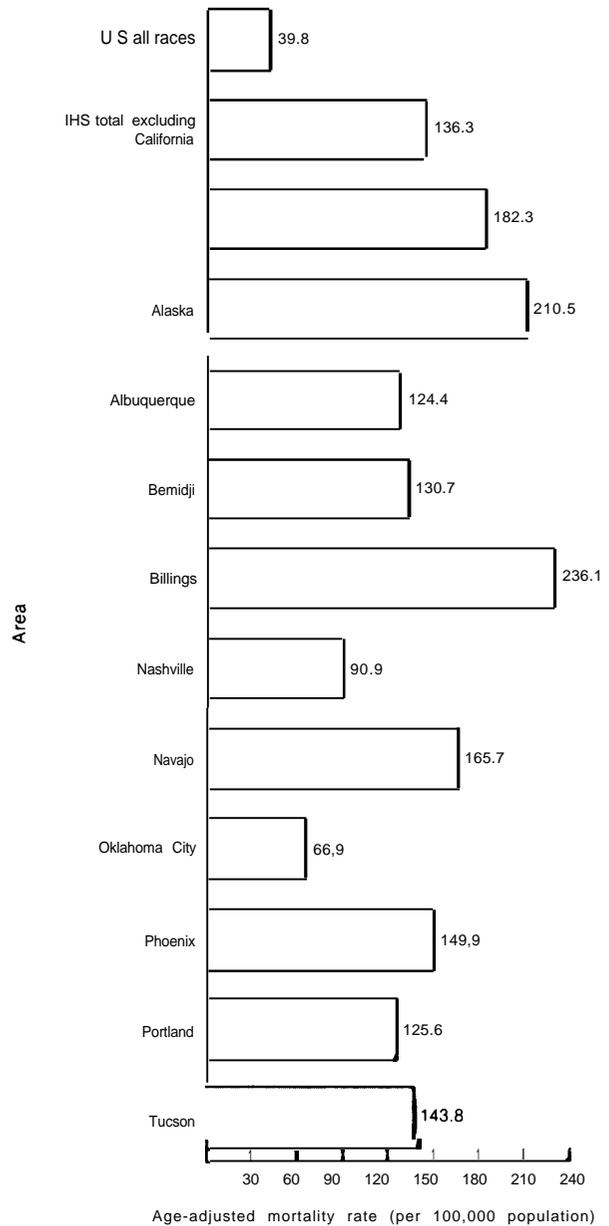
SOURCES Indian data: U S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985 U.S. all races data: U S Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report of Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp, June 22, 1984

Figure 4-4.—Age-Adjusted Death Rates for Diseases of the Heart, American Indians in 11 IHS Areas (excluding California) 1980-82



SOURCE: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

Figure 4-5.—Age-Adjusted Death Rates for Accidents and Adverse Conditions, American Indians in 11 IHS Areas (excluding California) 1980-82



SOURCE: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

Table 4-11.—Mortality Due to Accidents by Age Indians in IHS Areas (excluding California) 1980-82 and U.S. All Races 1981 (rate per 100,000 population)

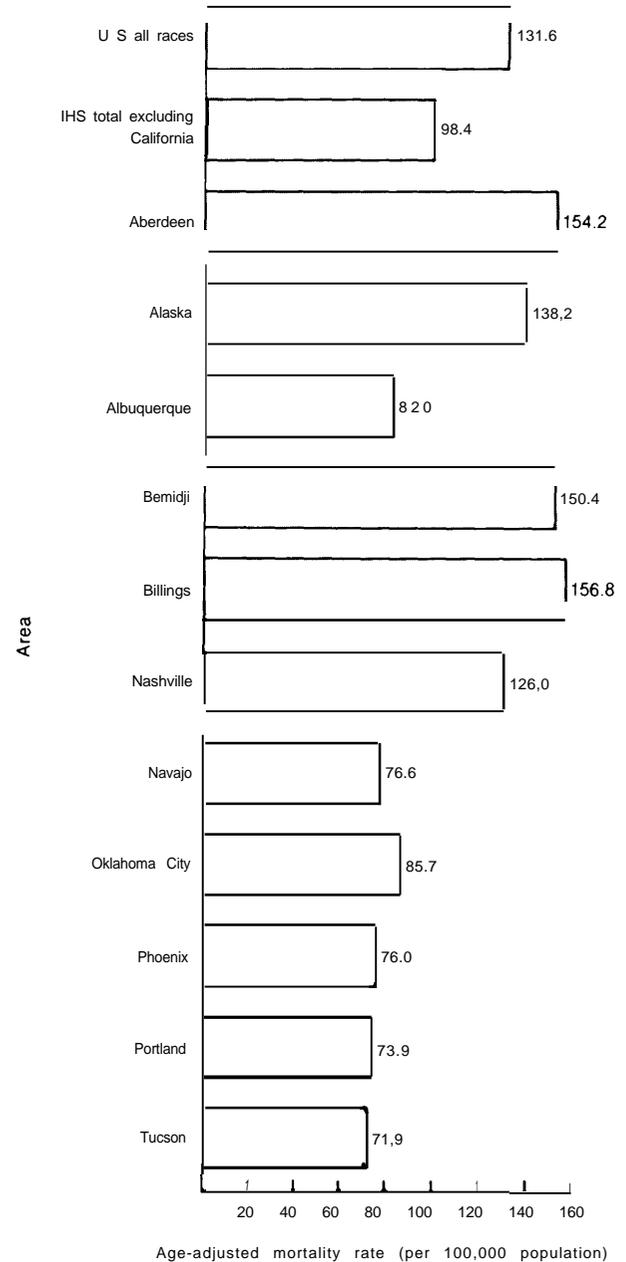
Age group	IHS area Indians	U.S. all races	Ratio IHS area Indians to U.S. all races
<1	27.0	27.3	1.0
1 to 4	88.0	23.6	3.7
5 to 14	26.1	14.2	1.8
15 to 24	164.2	56.0	2.9
25 to 34	182.0	45.1	4.0
35 to 44	159.2	35.7	4.5
45 to 54	159.7	37.7	4.2
55 to 64	170.1	40.4	4.2
65 to 74	170.5	54.3	3.1
75 to 84	209.3	108.2	1.9
>85	356.0	273.3	1.3
Age-adjusted rate	136.2	39.8	3.4

SOURCES Indian data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985. U.S. all races data: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report of Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp., June 22, 1984.

responsible for the high Indian death rate in this category. In the 3-year period centered in 1981, all IHS areas had pneumonia mortality rates higher than the U.S. all races rate (see figure 4-9). The pneumonia mortality rate for Indians exceeded the U.S. all races rate in all age groups, but particularly among the very young and those between 25 and 55 (table 4-12). This widespread problem with pneumonia mortality indicates that a variety of causes may be responsible (e.g., inadequate access to care (see below), alcohol abuse (100)).

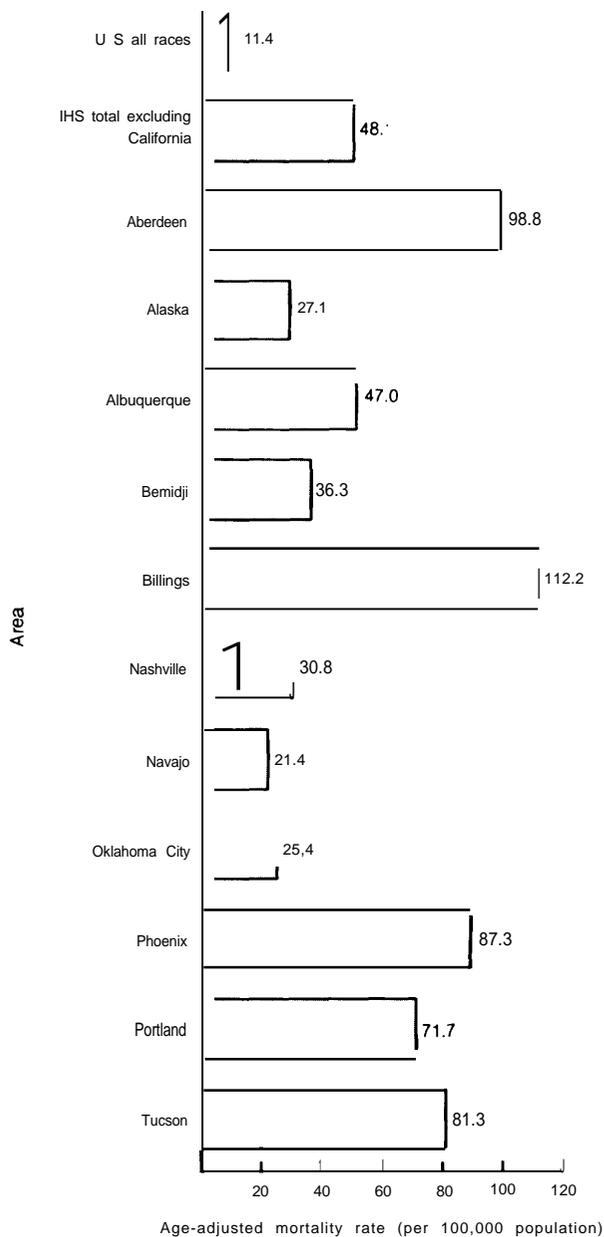
Diabetes mellitus is the seventh leading cause of death among the IHS service population and has been identified as a growing problem. Despite a drop in crude death rates from diabetes between 1972 and 1982, the age-adjusted death rate in IHS areas exceeds that of U.S. all races in every area but Alaska, where diabetes is not even among the 15 leading causes of death (see figure 4-10). The overall diabetes death rate in IHS areas exceeded the U.S. all races rate by 2.8 times, exceeding it by 5.2 times in the Aberdeen area.

Figure 4-6.—Age-Adjusted Death Rates for Malignant Neoplasms (Cancer), American Indians in 11 IHS Areas (excluding California) 1980-82



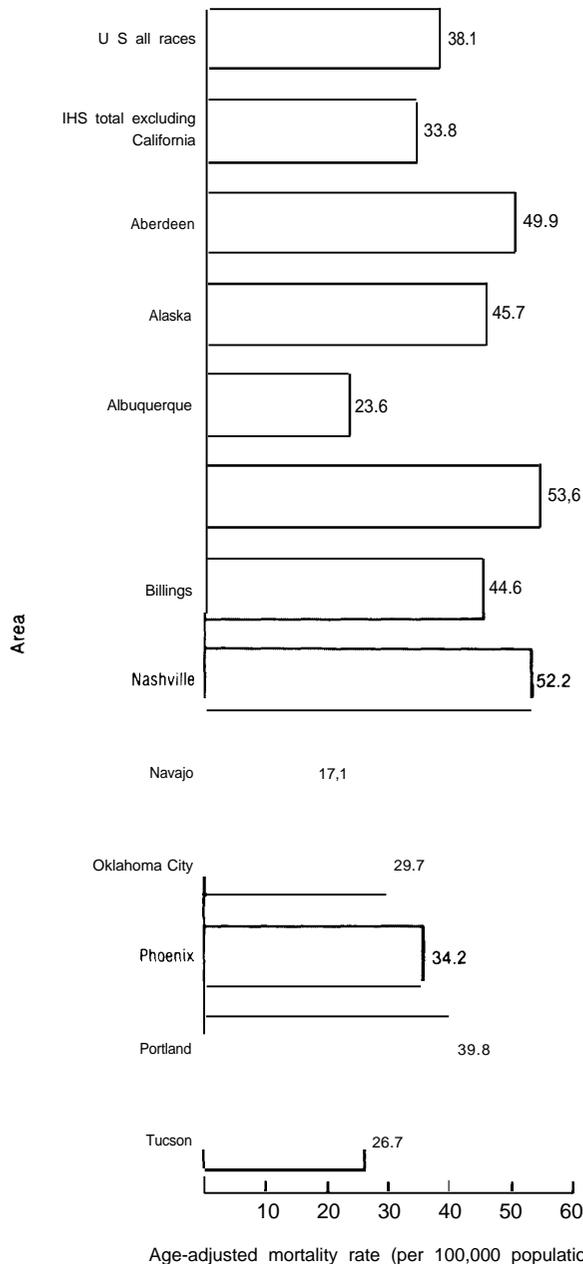
SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

Figure 4-7.—Age-Adjusted Death Rates for Liver Disease and Cirrhosis, American Indians in 11 IHS Areas (excluding California) 1980-82



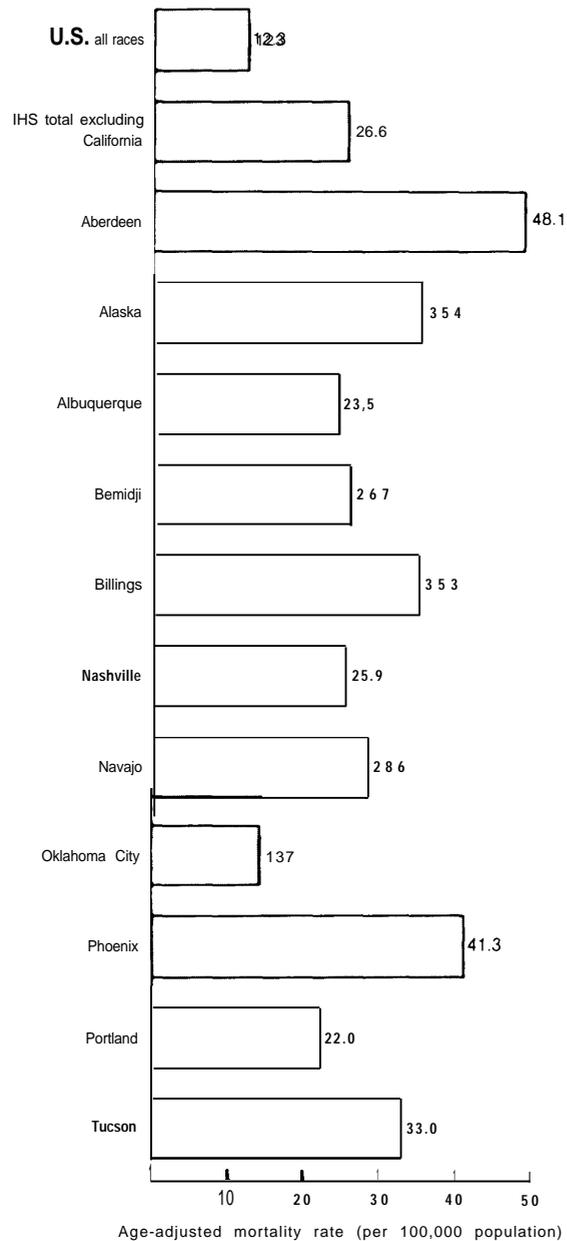
SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Figure 4-8.—Age-Adjusted Death Rates for Cerebrovascular Disease, American Indians in 11 IHS Areas (excluding California) 1980-82



SOURCE U.S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Figure 4-9.—Age-Adjusted Death Rates for Pneumonia, American Indians in 11 IHS Areas (excluding California) 1980-82



SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment Washington, DC 1985

While homicide and suicide are the 11th and 10th leading causes of death for U.S. all races, on average they are the 8th and 9th leading causes of death, respectively, among IHS service area Indians. There was no IHS area with a homicide mortality rate less than that of U.S. all races (figure 4-11), and there was no Indian age group with a homicide mortality rate less than that of U.S. all races. (The rate for blacks, which is the highest of all U.S. populations, exceeds that for Indians, at a ratio of 2:1 for males.) On average the Indian homicide rate in IHS areas was twice that for U.S. all races, with ratios as high as **6.3:1** among Aberdeen area females (see figure 4-12).

Although the crude death rate from Indian suicide has apparently declined since the 3-year period centered in **1973**, the age-adjusted rate still exceeded the U.S. all races rate by a ratio of 1.7:1. Suicide tends to claim the lives of young Indians; as shown in table **4-13**, the Indian age-specific death rates for suicide exceeded those of U.S. all races for all age groups up to age **44**, with a **3.2:1** ratio in the 15 to 24 age group. Hypotheses about the causes of suicide vary. Despair and low self-esteem resulting from lack of social and economic opportunities and persistent poverty (109), tribal norms operating against achievement and success and against interference in another's personal life (11), acculturation pressures associated with economic development (110), and other factors have been posited as causes of self-inflicted injury in Indians.

Death rates in IHS service areas from conditions originating in the perinatal period (the period immediately around the time of birth) have declined since **1972**, but they are still the 10th leading cause of death among Indians, compared to being the 12th leading cause of death for U.S. all races. The importance of these causes, and congenital anomalies, another leading cause of infant death, to Indian infant mortality in general is discussed below under "Infant mortality."

Table 4-12.—Mortality Rates for Pneumonia by Age U.S. All Races and Indians in IHS Areas (excluding California) 1980-82 and U.S. All Races 1981 (rate per 100,000 population)

Age group	IHS area Indians	U.S. all races	Ratio IHS area Indians to U.S. all races
<1	71.9	22.2	3.2
1 to 4	6.7	1.7	3.9
5 to 14	1.5	0.4	3.7
15 to 24	1.9	0.7	2.7
25 to 34	5.0	1.4	3.6
35 to 44	9.7	3.2	3.0
45 to 54	22.2	7.2	3.1
55 to 64	37.4	17.7	2.1
65 to 74	96.7	50.0	1.9
75 to 84	383.8	197.6	1.9
>85	1,566.6	787.6	2.0
Age-adjusted rate	25.6	13.9	1.8

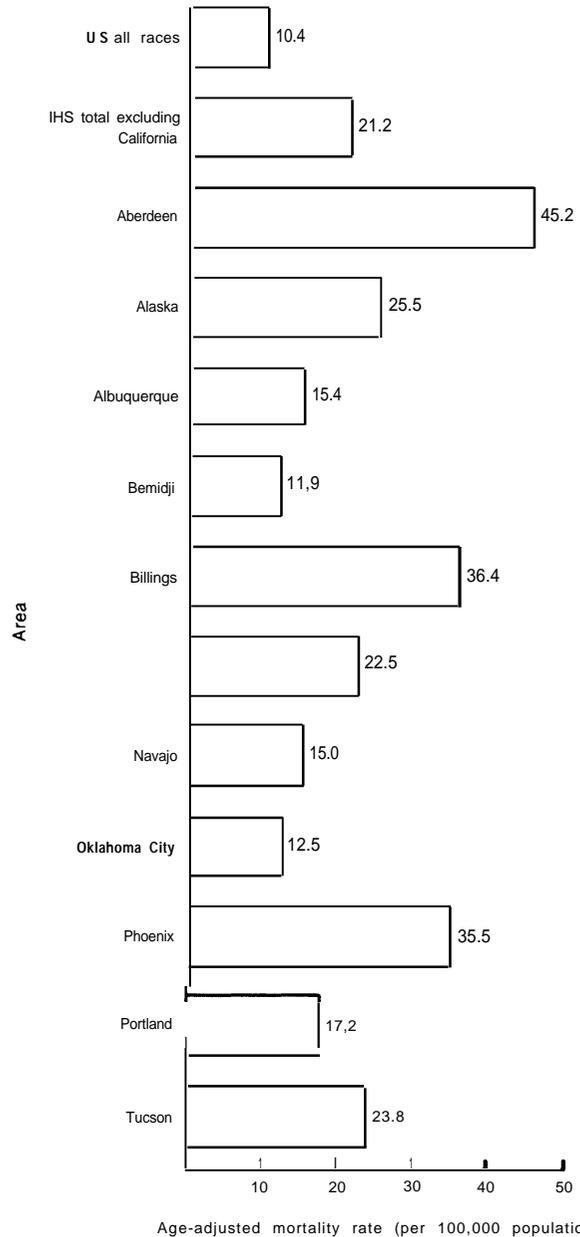
SOURCES **Indian data:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985. **U.S. all races data:** U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report of Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3):supp., June 22, 1984.

As discussed above, diabetes is perceived to be a growing problem among Indians in almost all areas. Kidney failure is a common sequelae of diabetes, and IHS area Indian deaths from renal failure exceeded the U.S. all races rate by **2.8** (figure 4-13). The larger category of kidney problems (nephritis, nephrotic syndrome, and nephrosis) was the 11th leading cause of death for Indians in IHS areas in 1980 to 1982, showing an apparent 50 percent rise since the 3-year period centered in 1973.

Deaths due to chronic pulmonary diseases, the 13th leading cause of death among IHS service area Indians, were below the U.S. all races rate on average, although they exceeded the U.S. all races rate in three IHS areas: Aberdeen, Bemidji and Billings (figure 4-14).

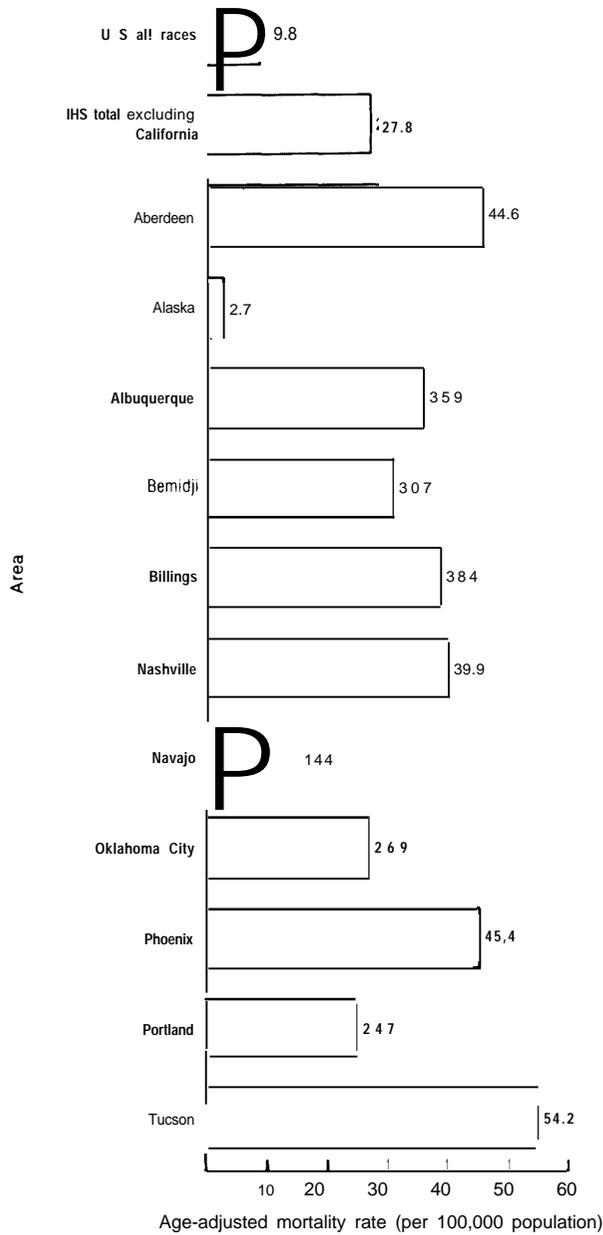
Mortality from septicemia (systemic infection) was the 14th leading cause of death among Indians, accounting for 122 deaths. Overall this rate was more than twice that of the U.S. all races rate; small numbers in individual areas make comparisons difficult.

Figure 4-10.—Age-Adjusted Death Rates for Diabetes Mellitus, American Indians in 11 IHS Areas (excluding California) 1980-82



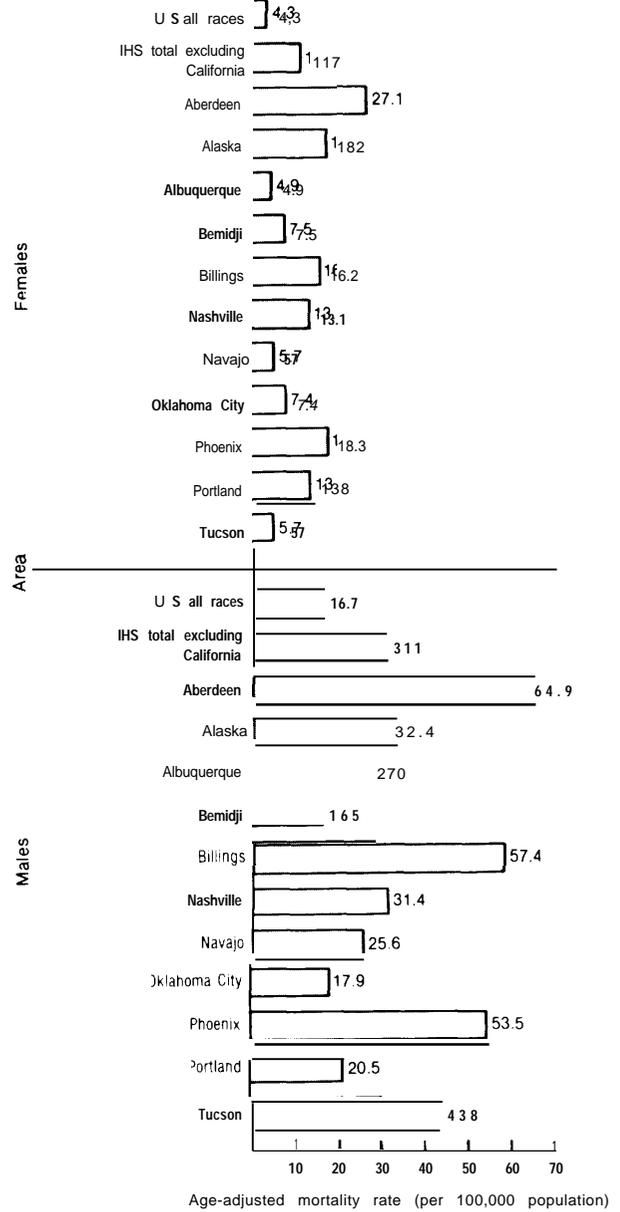
SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

Figure 4-11.—Age-Adjusted Death Rates for Homicide, American Indians in 11 IHS Areas (excluding California) 1980-82



SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Figure 4-12.—Age-Adjusted Death Rates for Homicide, American Indians Male and Female, in 11 IHS Areas (excluding California) 1980-82



SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Table 4-13.—Suicides and Suicide Rates by Age Indians in IHS Areas 1980-82 and U.S. All Rates 1981 (rate per 100,000 population)

Age group	IHS		U.S. all races rate	Ratio IHS service areas to U.S. all
	Number	Rate		
0 to 4	—	—	—	—
5 to 14	4	0.78	0.5	1.5
15 to 24	218	39.2	12.3	3.2
25 to 34	136	37.3	16.3	2.3
35 to 44	57	23.7	15.9	1.5
45 to 54	25	14.0	16.1	0.9
55 to 64	12	8.9	16.4	0.5
65 to 74	7	8.9	16.2	0.5
75 to 84	1	2.9	18.6	0.2
>85	—	—	17.7	—

SOURCES: Indian data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985. U.S. all races data: U S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report of Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp, June 22, 1984

The declining incidence of tuberculosis is among the most notable improvements in Indian health. In the early 1950s tuberculosis was the fourth leading cause of death among Indians across the United States, accounting for 8.1 percent of Indian deaths. In the 3-year period centered in 1981, tuberculosis was the 15th leading cause of Indian deaths, accounting for 0.5 percent of deaths. The age distribution of most deaths from tuberculosis also identifies it as a declining problem among Indians. A total of 77 Indians were identified as having died of tuberculosis in the 3-year period centered in 1981; almost 90 percent of them were age 45 or above.

Infant Mortality

In the early 1950s, what were then called "diseases of early infancy" (now called certain conditions arising in the perinatal period) were the fifth leading cause of death among Indians and other U.S. populations alike, although these diseases accounted for a greater proportion of Indian deaths (7.1 percent) than U.S. all races deaths (4.3 percent). Congenital malformations (now called congenital anomalies) were the 9th leading cause of death among Indians in the early 1950s, and the 10th among U.S. all races. Since the early 1950s, infant mortality has declined significantly among all U.S. populations, but, reflecting the IHS emphasis on maternal and child health, at a greater rate among Indians (188,191). However, as with most other causes of death, infant mortality rates still exceed that of U.S. all races on

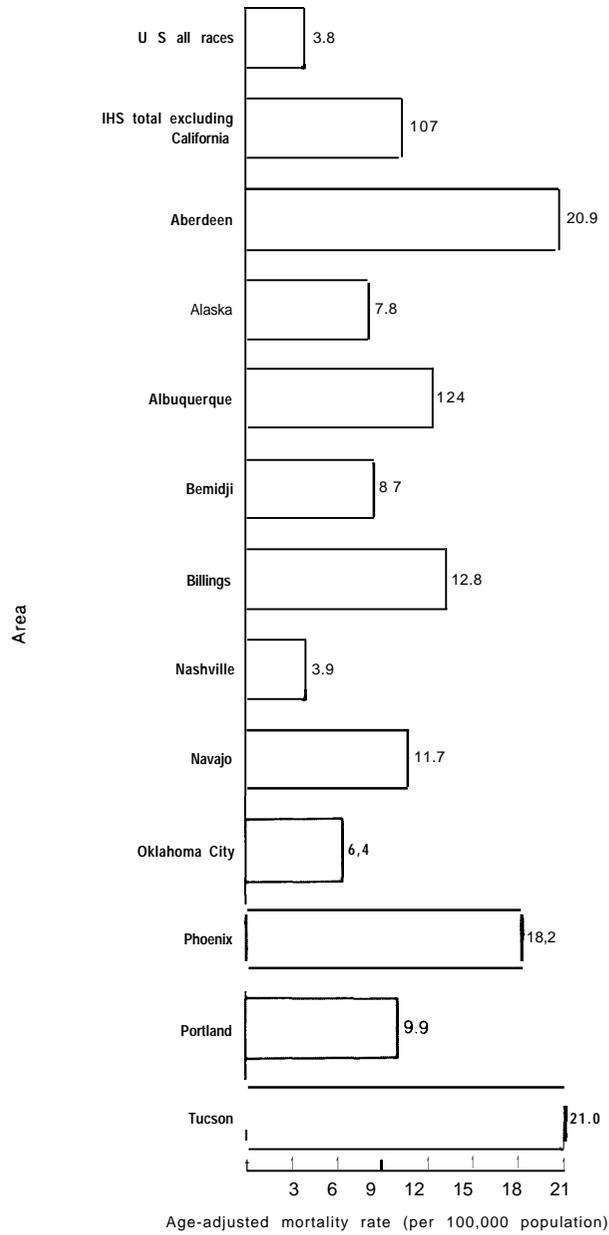
average, a situation due primarily to the persistence of high mortality rates among postneonates (i.e., infants between 28 days and 1 year). Death rates of Indian postneonates exceeded that of U.S. all races in all areas but Oklahoma City (figure 4-15). Most of these deaths were attributed to sudden infant death syndrome, the cause of which is unknown, but which in general has been reported to occur among low birth weight infants born to young mothers who smoke (185). OTA was not able to investigate fully those relationships from available data. About one-quarter of Indian infants are born to females 19 or younger, compared to a rate of about 1.5 percent of births to U.S. all races teenage females (175a,191). On average, the percent of low birth weight infants among Indians (6.1 percent in 1980 to 1982 (175a,191) is about equal to the percent for U.S. all races (6.3 percent in 1981), but this figure is considered high among industrialized nations. Most of these low birth weight infants are born to older Indian women, unlike the U.S. all races experience, in which a higher proportion of low birth weight infants are born to teenagers.

On average the death rate among Indian neonates (from 0 to 27 days old) was lower than that of U.S. all races; only two areas (Aberdeen and Alaska) exceeded the U.S. all races rate (figure 4-15),

Indians in Urban Areas

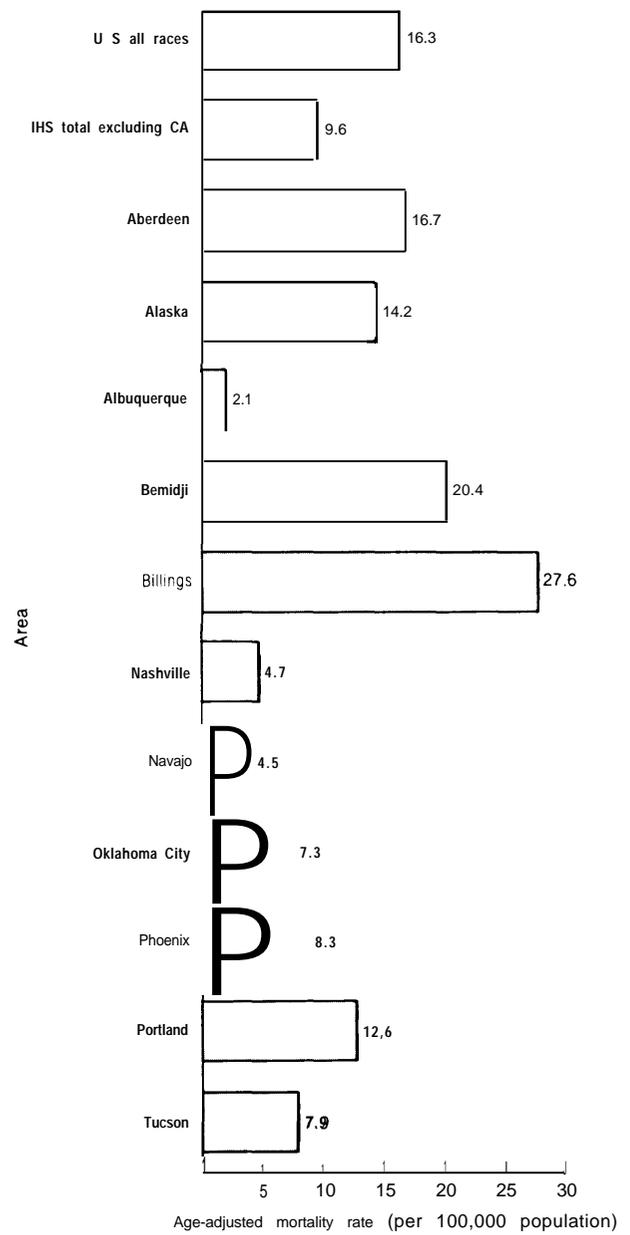
There is very little information on the health status of urban Indians, despite the fact that they

Figure 4-1 3.—Age-Adjusted Death Rates for Renal Failure American Indians Both Sexes, in 11 IHS Areas (excluding California) 1980-82



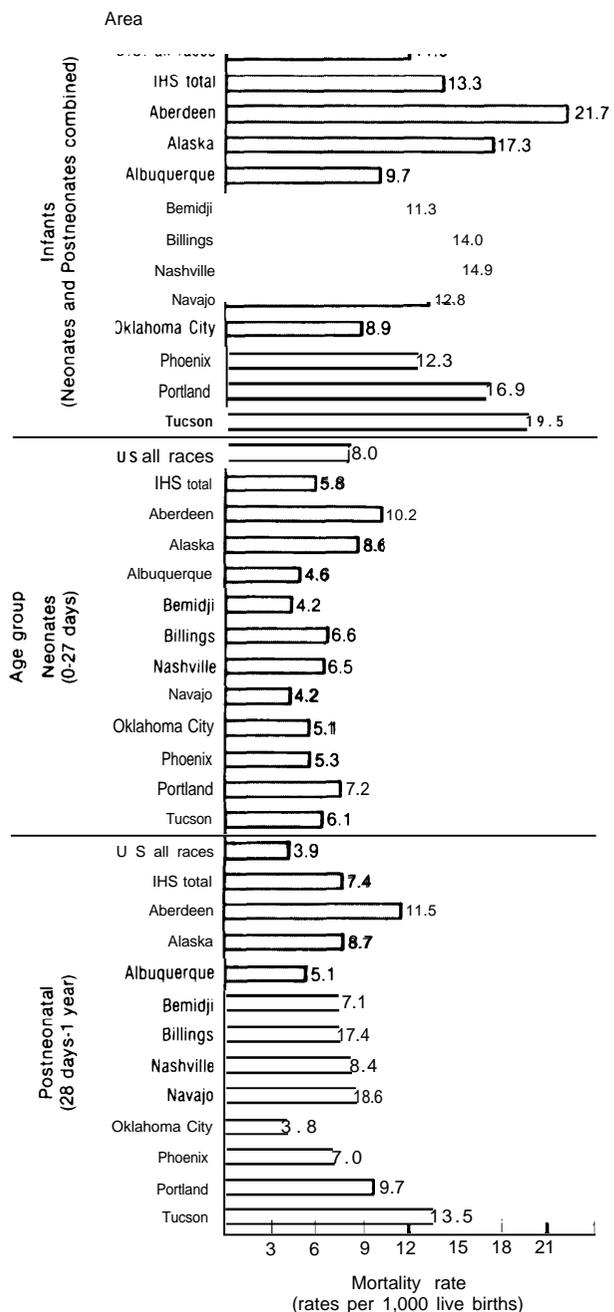
SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC 1985

Figure 4-14.—Age-Adjusted Death Rates for Chronic Pulmonary Diseases American Indians Both Sexes, in 11 IHS Areas (excluding California) 1980-82



SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

Figure 4-15.—Infant Mortality Rates: American Indians in IHS Areas 1980-82 and U.S. All Races, 1981



SOURCES: Indian data: U.S. Department of Health and Human Services, Public Health Service, Health Resource and Services Administration, Indian Health Service, Computer tape supplied to the OTA, 1985. U.S. All Races data: U.S. Department of Health and Human Services, Public Health Service, Health Resource and Services Administration, Indian Health Service, Chart Series, 1985

are estimated to constitute about 50 percent of the total Indian population. IHS does not collect diagnostic patient care information from urban programs, and does not analyze or publish vital statistics or population characteristics for urban Indians except when these data are included with national level data on the reservation States.

Vital statistics information on Indians residing in Standard Metropolitan Statistical Areas (SMSAs) was provided to OTA as part of 1980 to 1982 mortality information. Thus, OTA was able to generate some death rate information on urban Indians. However, because of the lack of age-specific population information, OTA was not able to generate age-adjusted rates; therefore the urban rates may only be comparable to crude rates for other Indians or to crude rates of particular urban areas; they are not comparable to U.S. all races age-adjusted rates, the standard of comparison generally used in this report. On average, however, Indians in SMSAs show essentially the same pattern of causes of death that is shown in IHS service areas. The leading causes of death were: 1) diseases of the heart; 2) accidents and adverse effects; particularly motor vehicle accidents; 3) cancer; 4) liver disease and cirrhosis; 5) cerebrovascular diseases; 6) homicide; 7) diabetes mellitus; 8) suicide; 9) pneumonia and influenza; and 10) conditions arising in the perinatal period. The existence of these and other problems similar to those of reservation Indians is supported by findings of studies by IHS (170), urban programs (5), and others (211).

Illness and Use of Services

There have been no large-scale epidemiological studies of overall Indian health. Therefore, conclusions about the prevalence and incidence of illness in IHS areas are subject to limitations of data on outpatient and inpatient care. These data must be used cautiously because they may be a more accurate reflection of the availability of services than the incidence and prevalence of illness. OTA found substantial differences between the use of medical services in IHS areas and what might be expected based on other sources of information, particularly patterns of mortality.

Use of Hospital Care and Patterns of Mortality

Given the poor health status reflected in Indian mortality statistics, it is striking that the overall 1984 hospital discharge rate in IHS areas (1,210 per 10,000 population) was lower than that in U.S. non-Federal short-stay hospitals (1,585 discharges per 10,000 population) (see table 4-14). In general, using data from U.S. non-Federal short-stay hospitals as a benchmark, IHS total hospitalization rates (excluding two tribally run hospitals) were lower than would be expected from mortality rates for accidents and violence, circulatory system diseases, malignant neoplasms, alcohol-related conditions, diabetes, and congenital anomalies. While Indian death rates from accidents, suicide, homicide, and other external causes substantially exceeded U.S. mortality rates in the 3-year period centered in 1981, the IHS hospitalization rates for injuries and poisonings in 1981 only slightly exceeded the U.S. rates.

Part of the reason for low hospitalization rates for certain diagnoses can be explained by the relative youth of the Indian population. For exam-

ple, diseases of the circulatory system are the leading cause of hospitalization in U.S. non-Federal short-stay hospitals, but are the eighth leading cause of hospitalization in IHS direct and contract general hospitals (hospitals to which IHS service-eligible patients are sent when care is not available in IHS-run facilities). This can be partially explained by the fact that individuals age 65 and over account for 11.3 percent of the U.S. all races population and 60 percent of discharges for circulatory system diseases in U.S. non-Federal short-stay hospitals (203). In IHS hospitals, Indians 65 and over account for 5.3 percent of the IHS service population and 41 percent of such discharges.

But the relative youth of the Indian population cannot explain all the variation among health status indicators; the disparity between services provided and need is also apparent from a comparison of health care utilization and mortality rates by age. As shown in table 4-15, the ratio of IHS to U.S. non-Federal short-stay hospital inpatient discharges is lower than the ratio of Indian to U.S. all races mortality rates in all age groups 16 and above. Thus, there is a discrepancy between

Table 4-14.—Hospital Discharge Rates for Leading Causes: Indian Health Service Direct and Contract General Hospitals and U.S. Short-Stay Non-Federal Hospitals (rates per 10,000 population)

Diagnostic category	Fiscal year 1984	Calendar year 1984
	Indian and Alaska native ^a	U.S. all races in U.S. short-stay Non-Federal hospitals
Complications of pregnancy, childbirth, and puerperium,	282	149
Normal deliveries	65	67
Injuries and poisonings	151	148
Respiratory system diseases	114	143
Digestive system diseases	112	184
Genitourinary system diseases	65	133
Supplementary conditions	64	117
Circulatory system diseases	63	239
Mental disorders	57	72
Symptoms, signs, and ill-defined conditions	57	22
Nervous system and sense organs diseases	50	71
All others	130	240
All categories	1,210	1,585

^aIncludes only those persons seen at IHS hospitals or paid for by IHS at contract hospitals; does not include tribal hospital workloads or hospitalizations not paid for by IHS

SOURCES IHS data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Patient Care Statistics Staff, Internal document, Rockville, MD Feb 11 1985
U.S. data: U S Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "1984 Summary National Hospital Discharge Survey, *Advance Data from Vital and Health Statistics*, No 112 DHHS Pub No (PHS) 85-1250 (Hyattsville, MD: PHS, Sept 27, 1985), and unpublished data.

Table 4-15.—Age Distribution of Inpatient Discharges IHS Service Areas 1984 and U.S. All Races 1984 Compared to Age Distribution in the Population and Age-Specific Mortality Rates

Age group	Percent distribution of inpatient discharges (by age group)			Percent in age group ^a			Ratio age-specific mortality rate Indians ^b to U.S. all races ^c
	IHS 11 areas 1984	U.S. all races 1984	Ratio Indians to U.S. all races	Us. Indians ^d all races	Ratio Indians to U.S. all races		
All ages	100.0%	100.0%		100.00/0	100.00/0		
<15	19.4	8.6	2.3	32.5	22.7	1.4	1.5
15 to 44	54.0	39.1	1.4	49.2	46.5	1.1	3.6
45 to 64	15.8	22.1	0.7	13.1	19.7	0.7	1.2
>65	10.9	30.2	0.4	5.3	11.3	0.5	0.9

^aAs of 1980 US Census

^bThree year period centered in 1981

^cIndians in reservation States; separate calculations are not made for service area Indians.

^dCalendar year 1981

SOURCES IHS Inpatient data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, Patient Care Statistics Staff, "Utilization of Indian Health Service and Contract Hospitals, Fiscal Year 1984," internal document, Rockville, MD, no date. U.S. all races inpatient data: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "1984 Summary: National Hospital Discharge Survey," *Advance Data from Vital and Health Statistics*, No. 112, DHHS Pub. No. (PHS)85-1250 (Hyattsville, MD: PHS, Sept. 27, 1985). Age group data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Indian Health Service Chart Series Book April 1985* (Rockville, MD IHS, 1985).

apparent need and the use of health care. Inconsistencies can more accurately be traced to variations in services available to Indians. The Portland area, for example, has no IHS hospitals and must purchase hospital care through the contract care program, and contract care has been limited in the past years to emergency and urgent cases. In the Portland area, the number of hospital discharges in 1984 (176 discharges) was almost identical to the number in 1979 (166 discharges), despite a 50-percent increase in the service population. As a result, the Portland area hospital discharge rate for most of the diagnostic categories was below what would have been expected from mortality data. The Bemidji and Nashville program areas also follow this pattern. The considerable variation in hospital discharge rates by cause among IHS areas is shown in table 4-16.

Outpatient Care

Data generated from IHS outpatient clinics can serve as a general guide to Indian health problems, subject to limitations discussed earlier. Leading diagnostic indicators are consistent with medical literature, reports from Indians, and other data (e.g., birth rates). Otitis media is a common reason for seeking outpatient care, as is diabetes, injuries, and well child and prenatal care (see tables 4-17 and 4-18). As discussed above, comparisons with U.S. all races figures are difficult to make because of differences between IHS's and

NCHS's coding procedures. Other ailments affecting Indians in individual areas are discussed below. While Indians' use of outpatient services is high, it does not appear to be as great as the need when compared with mortality rates by age (tables 4-19 and 4-20).

Dental Needs

An IHS survey of its dental patients in 1983 to 1984 found that differences between Indian and U.S. all races dental health were "staggering" (47,160,176). For example, 81 percent of IHS's 5 to 19 year old dental patients had caries (cavities) compared to 63 percent of 5 to 17 year olds in a national survey. Based on its patient experience, IHS's dental program estimates that 60 percent of IHS's service population require an average of 11.8 "units" of dental care (e.g., examination, periodontal care, extraction) each. In 1984, this amounted to a total of 6,632,558 units of care required, but only about 30 percent of these units were able to be provided by IHS direct and contract dental staff leaving a 70 percent deficiency (180). OTA's calculations for individual areas indicate a range of deficiencies, to as high as an 80 percent unmet need for dental services in the Tucson service area (table 4-21),

Mental Health Needs

Utilization of mental health (and alcoholism) care is perhaps most dissonant with the estimated

Table 4-16.—Estimated Hospital Discharge Rates, U.S. Non-Federal Short-Stay Hospitals, Calendar Year 1984 and IHS Hospitals^a Federal Fiscal Year 1984 in Order by U.S. Hospital Discharge Rate (rate per 10,000 population)

Principal diagnosis	ICD-9-CM code										Tucson			
	U.S.	IHS	Aberdeen	Alaska ^d	Albuquerque	Bemidji	Billings	Nashville ^c	Navajo ^d	Oklahoma ^e		Phoenix	Portland	
Circulatory system disease	390-459	238.6	62.7	121.0	74.7	53.3	59.8	124.2	39.9	42.3	80.2	72.4	35.2	28.6
Complications of pregnancy including normal	630-676	205.1	34.0	407.0	354.9	252.3	70.9	31.1	90.8	390.9	318.7	343.3	56.8	183.2
Complications		38.2	25.0	324.0	260.4	58.0	50.9	2.8	52.7	326.0	293.7	287.4	51.2	146.8
Normal		67.2	62.0	192.0	140.5	150.4	31.7	156.0	38.1	64.9	15.0	55.9	35.6	36.4
Digestive system diseases	520-579	83.6	14.4	5.9	1.9	7.0	0.9	2.5	0.3	2.8	3.6	12.0	1.3	9.0
Alcoholic liver diseases	571.0-571.3	1.6												
Injuries and poisonings	800-999	148.1	54.6	297.0	243.2	161.5	63.0	23.2	57.8	42.8	74.6	286.7	62.8	115.4
Diseases of the respiratory system	460-519	143.5	11.0	252.0	155.9	115.6	54.0	187.5	71.7	100.3	71.9	200.1	50.3	95.8
Pneumonia	480-486	35.7	53.0	120.7	54.0	54.3	21.3	93.3	18.9	50.2	24.4	91.7	19.4	56.6
Asthma	493	19.8	15.5	1.9	15.0	11.9	11.0	61.7	10.2	9.2	13.8	31.5	4.4	4.5
Genitourinary system disease	580-629	132.9	6.4	4.0	79.3	67.6	18.9	23.5	37.7	70.0	115.7	23.9	26.9	26.9
Neoplasms	140-239	109.9	26.5	1.8	58.3	33.0	12.6	96.6	6.4	82.5	29.7	25.1	10.1	5.0
Malignant	140-208	87.8	18.6	31.0	44.1	24.6	10.8	88.9	5.8	55.6	18.1	16.9	6.1	4.5
Diseases of the musculoskeletal system	710-739	61.0	32.8	18.0	79.8	34.6	14.4	65.8	13.7	11.4	29.0	54.2	18.6	24.1
Mental disorders	290-319	12.0	57.0	17.0	96.6	104.5	23.6	118.2	45.4	8.3	21.0	59.0	17.5	38.1
Alcohol dependence syndrome	303	6.7	23.3	1.1	45.0	43.3	9.1	4.9	10.2	4.3	9.8	20.0	6.4	9.3
Alcoholic psychoses	291	2.3	0.1	0.6	8.9	34.0	5.1	2.4	5.4	9.4	5.4	15.2	1.5	5.9
Nondependent alcohol abuse	305.0	3.4	3.4	7.6	7.0	3.7	1.3	3.7	—	1.1	5.3	4.0	2.8	6.1
Diseases of the nervous system and sense organs	320-389	1.2	5.0	9.0	2.9	4.2	11.5	78.5	22.1	55.2	29.4	79.2	7.2	9.0
Otitis media	381.0-381.4	382	12.8	18.0	31.0	63.9	10.5	29.9	5.1	16.7	10.8	23.6	4.6	7.8
Endocrine, nutrition, metabolic diseases	240-279	48.6	37.3	79.0	21.0	53.1	26.2	69.3	31.5	25.6	34.6	64.9	14.6	61.6
Diabetes mellitus	250	25.3	26.2	60.0	9.2	30.9	20.6	54.1	14.7	16.5	23.5	49.4	9.0	53.2
Infectious and parasitic diseases	001-139	28.1	31.8	49.0	31.8	30.1	8.7	44.6	16.2	28.8	22.8	87.0	10.9	50.4
Tuberculosis, all forms	010-018	0.6	2.4	6.8	4.0	1.8	0.0	3.7	0.3	2.6	1.4	4.0	0.1	2.8
Diseases of the skin and subcutaneous tissue	680-709	24.2	29.6	68.4	33.8	35.3	11.7	47.4	23.4	25.2	19.8	58.0	8.7	31.4
Cellulitis and abscesses, excluding digital	682	7.0	9.3	6.0	3.6	3.6	6.6	9.9	7.0	5.3	7.7	31.0	5.3	24.6
Symptoms, signs, and ill-defined conditions	780-799	22.2	57.0	110.0	75.0	74.2	33.6	99.7	56.1	40.6	55.9	90.9	16.8	47.1
Supplementary classification	V01-V82 ^g	19.4 ^h	64.5	105.0	73.8	128.5	51.9	91.5	82.4	67.7	39.8	96.5	4.7	71.7
Diseases of the blood and blood-forming organs	280-289	15.1	6.6	17.3	8.5	6.4	0.2	9.0	5.5	4.6	7.7	6.7	2.5	9.0
Congenital anomalies	740-759	13.5	8.4	10.6	15.2	11.2	2.3	11.5	1.1	11.8	6.5	13.6	1.7	2.8
Conditions arising in perinatal period	760-779	7.1	22.4	30.9	38.2	22.7	7.4	24.2	4.2	33.7	14.7	37.7	5.5	18.5
Short gestation, low birthweight disorders	765	2.3	5.2	4.7	24.6	1.7	1.1	6.2	1.3	10.9	2.7	6.4	1.2	1.7
All ⁱ		1,585.1	1,210.1	2,199.0	1,702.5	1,374.1	505.7	334.6	653.9	228.6	691.1	837.5	41.8	93.4

^aDirect, contract general and, where noted, two tribally-run hospitals (Bristol Bay, Alaska area, and Choctaw, Nashville-USEI program).
^bMajor diagnostic categories include discharges and service population for Bristol Bay, 638; hospital and Bristol Bay Service Unit, subcategories do not. All rates exclude discharge data and estimated service population for Norton Sound, 638; hospital and service unit.
^cMajor diagnostic categories include discharges for Choctaw, 638; hospital and service population for Choctaw service unit.
^dRate excludes 578 discharges from Ganado, a tribally operated hospital, but does not exclude Ganado's service population. The 578 discharges constitute a small percentage of Navajo area hospitalizations (19,904 excluding Ganado).
^eExcludes discharges from and service population for Claremore Hospital, which is tribally operated.
^fIncludes females with deliveries (ICD-9-CM code V27), because IHS includes these discharges with complications of pregnancy, instead of in the supplementary classification as XCHS does (see note g).
^gExcludes females with deliveries (ICD-9-CM code V27), the rate for which is included in complications of pregnancy.
^hTotals may not add due to rounding.
ⁱSOURCE: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, *Advance Data From Vital and Health Statistics*, No. 112, DHHS Pub. No. 85-1258, Hyattsville, MD, PHS, Sept. 27, 1985. IHS data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Utilization of Indian Health Service and Contract Hospitals Fiscal Year 1984, internal document, no date, and U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Patient Care Statistics Staff, Hospital Discharge Rate for Leading Causes, internal document, Feb. 1985.

**Table 4-17.—Number of Outpatient Clinical Impressions, Males and Females:
Indian Health Service Facilities, Fiscal Year 1984**

Male		Female	
Condition	Number of clinical impressions	Condition	Number of clinical impressions
Upper respiratory infection, common cold . . .	97,991	Prenatal care	155,270
Acute otitis media	63,697	Upper respiratory infection, common cold . . .	134,881
Hypertensive disease	61,203	Diabetes mellitus.	102,268
Diabetes mellitus.	58,365	Hypertensive disease	75,277
Well child care	57,892	Acute otitis media	63,661
Laceration, open wound	42,437	Well child care	58,790
Physical examination	36,629	Tests only (lab, X-ray)	55,721
Refractive error	32,562	Refractive error	51,962

SOURCE: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Patient Care Statistics Staff, Internal document, Rockville, MD, Feb 15, 1985

**Table 4-18.—Number of Outpatient Clinical Impressions by Leading Diagnostic Categories
Indian Health Service Facilities:
11 IHS Areas, Fiscal Year 1984**

Diagnostic category	Number of clinical impressions	Percent of total
Supplementary classification.	756,960	20.6
Respiratory system diseases.	473,983	12.9
Nervous system and sense organ diseases	457,282	12.4
Injuries and poisonings	245,526	6.7
Diseases of skin and subcutaneous tissue	215,625	5.9
Pregnancy, childbirth, and puerperium	207,734	5.7
Endocrine, nutritional, and metabolic disorders.	202,037	5.5
Circulatory system diseases	199,044	5.4
Symptoms and ill-defined conditions	174,923	4.8
Musculoskeletal system diseases . .	172,424	4.7
All other	567,951	15.5
Total, all categories	3,673,489	100.0

*This category includes well child care, hospital and medical/surgical followup, physical examinations, tests (lab and X-ray), socio-economic and environmental problems, and "all other" clinical impressions

SOURCE: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Patient Care Statistics Staff, internal document, Rockville, MD, Feb 13, 1985.

need for such services in the Indian population. The need for these services can be inferred from the high poverty and unemployment rates discussed in chapter 3, the high mortality rates from preventable or "social" (101) causes and the widely held view that mental health problems are epidemic among both reservation and urban Indians (121,124,211). Many problems of American In-

dians are related to continuing social and emotional stresses: alcohol abuse, accidents, suicide, homicide, teenage pregnancy, and child abuse and neglect (34). Even as social and emotional disturbances are resulting in higher death rates among Indians, the high death rate itself leads to additional mental health problems of grief (110). Despite this need, hospitalizations for mental disorders have been declining in the IHS system more rapidly than they have in U.S. non-Federal short-stay hospitals (see figure 4-16), and outpatient encounters for mental health problems were not among the leading reasons for IHS outpatient visits in 1984. Mental health services are generally regarded as relatively unavailable in IHS areas, and alcohol treatment and prevention programs are conceded to not meet the need for them among the IHS areas (19,76).

Summary

In summary, a global view across IHS areas indicates that although there have been substantial improvements, the health status of Indians continues to lag behind that of U.S. all races populations taken together. Considerable improvement has been achieved in neonatal health and reducing deaths from accidents, infectious diseases, and tuberculosis. The health of older infants and young children, and death from external causes (accidents, homicide, suicide), alcoholism, pneumonia, and diabetes, remain significant problems. Health status in individual IHS areas is discussed in the following section.

Table 4-19.—Age Distribution of Outpatient Care IHS Service Areas 1984 and U.S. All Races 1981 Compared to Age Distribution in the Population and Age-Specific Mortality Rates

Age group	Percent distribution of outpatient visits (by age group)			Percent in age group ^a			Ratio age-specific mortality rate Indians ^b to U.S. all races ^c
	IHS	U.S.	Ratio	U.S.		Ratio	
	11 areas 1984	all races 1981	Indians to U.S. all races	Indians ^d all races	all races	Indians to U.S. all races	
All ages.	100.0 ^e /0	100.0/0	—	100.0/0	100.0 ^f /0	—	—
<15	31.2	18.3	1.7	32.5	22.7	1.4	1.5
15 to 24.	18.3	13.5	1.4	22.5	18.7	1.2	2.7
25 to 44.	25.4	26.6	1.0	26.7	27.8	1.0	4.6
45 to 64	16.4	23.3	0.7	13.1	19.7	0.7	1.2
>65	8.4	18.4	0.5	5.3	11.3	0.5	0.9
Unknown.	0.3	—	—	—	—	—	—

^aAs of 1980 U.S. Census

^bThree year period centered in 1981

^cIndians, reservation States, separate calculations are not made for service area Indians

^dCalendar year 1981

SOURCES. IHS outpatient data: U S Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "1981 Summary National Ambulatory Medical Care Survey," *Advance Data from Vital and Health Statistics, No 88* (Hyattsville, MD PHS, Mar 16, 1983) U.S. all races outpatient data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities Fiscal Year 1984* (Rockville, MD IHS, no date)

Table 4-20.—Percent Distribution of Outpatient Visits by Patient Age Group and Area: Indian Health Service Facilities, Fiscal Year 1984

Area	Total		Age groups					
	Number	Percent	<1	1 to 15	15 to 24	25 to 44	45 to 64	>65
Aberdeen	410,354	100.0	6.1	27.2 ^a	17.4	24.5 ^b	16.8	8.0
Alaska	323,097	100.0	7.0	20.3 ^b	19.5 ^a	29.8 ^a	15.5 ^b	7.0 ^b
Albuquerque.	302,817	100.0	7.2	24.4	17.9	26.2 ^a	15.0 ^b	8.9
Bemidji	112,356	100.0	4.8 ^b	23.6	15.4 ^b	24.7	20.9 ^a	10.7 ^a
Billings	332,379	100.0	6.2	24.1	18.9	25.8	16.1	7.8
Nashville	73,059	100.0	5.6 ^b	27.7 ^a	16.3	24.2 ^b	16.7	9.4 ^a
Navajo	698,150	100.0	8.7 ^a	26.2 ^a	19.1 ^a	25.1	14.0 ^b	6.7 ^b
Oklahoma	661,217	100.0	5.6 ^b	22.6 ^b	18.8	22.9 ^b	18.2 ^a	11.8 ^a
Phoenix	445,770	100.0	8.4 ^a	23.1	19.1 ^a	25.9	16.4	6.7 ^b
Portland	235,924	100.0	6.2	24.8	15.6 ^b	25.7	18.1	9.4 ^a
Tucson	78,366	100.0	8.7 ^a	22.6 ^b	15.0 ^b	26.5 ^a	19.0 ^a	8.0
Total	3,673,489	100.0	7.0	24.2	18.3	25.4	16.4	8.4

^aArea with one of highest three percentages within age group

^bArea with one of the lowest three percentages within age group

SOURCE U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation, and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities Fiscal Year 1984* (Rockville, MD IHS, no date)

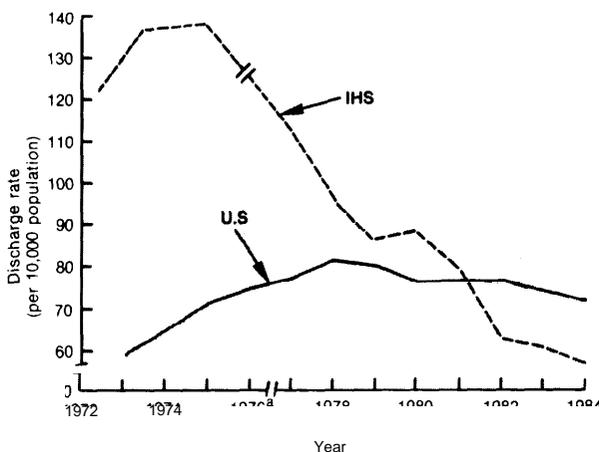
Table 4-21.—Dental Services Required in 12 IHS Areas

Area	Population	Services required ^a	Services provided ^b				Number of services required but not provided ^c	Percent required but not provided
			IHS	Contract	Tribes (638)	Total		
Aberdeen	70,648	500,188	104,490	17,706	25,555	147,751	352,437	70%
Alaska	71,329	505,009	103,249	23,481	67,093	193,823	311,186	62
Albuquerque	51,211	362,574	114,402	34,512	1,410	150,324	212,250	59
Bemidji	47,000	332,760	55,921	29,970	43,778	129,669	203,091	61
Billings	40,106	283,951	135,068	8,770	—	143,838	140,113	49
California	71,642	507,226	—	6,563	119,108	125,671	381,555	75
Nashville	35,822	253,620	33,843	12,956	42,380	89,179	164,441	65
Navajo	162,005	1,146,995	295,296	39,071	—	334,367	812,628	71
Oklahoma	190,451	1,348,393	267,704	42,597	11,874	322,175	1,026,218	76
Phoenix	82,309	582,748	136,430	8,769	2,327	149,853	432,895	74
Portland	96,427	682,703	89,448	50,075	15,477	155,000	527,703	77
Tucson	17,852	126,392	12,748	2,520	—	15,268	111,124	88
Area total	936,802	6,832,559	1,348,599	276,990	329,002	1,954,918	4,675,641	70%

^aEqual to 118 units required, 60 percent of service population (IHS, "Findings from an Oral Health Survey of Native Americans," internal document, Rockville, MD, Jan 31, 1985)
^bD.S. not included services provided in urban programs, some of which may have been provided to IHS service area Population
^cEqual to total services provided subtracted from services required.

SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Dental Services Branch, internal documents, Rockville, MD, various dates, 1985

Figure 4-16.— Hospitalizations for Mental Disorders IHS Direct and Contract Hospitals and U.S. Non-Federal Short-Stay Hospitals 1973-1984



*Missing data

SOURCES: 1973-1983 IHS and 1974-1980 and 1982-83 U.S. data: IHS, Patient Statistics Branch, Hospital discharge rates, internal documents, January 15, 1974 -Feb. 6, 1984; 1984 IHS data: US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Office of Planning, Evaluation and Legislation, Program Statistics Branch, Patient Care Statistics Staff, Utilization of Indian Health Service and Contract Hospitals, Fiscal Year 1984, internal document, Rockville, MD; no date. 1981 U.S. data: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Utilization of Short-Stay Hospitals United States, 1981 Annual Summary," Vital and Health Statistics, Series 13, No. 72 DHHS Publication No (PHS) 83-1733 (Hyattsville, MD Public Health Service, August 1983). 1984 U.S. data: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics, 1984 Summary: National Hospital Discharge Survey, Advance Data from Vital and Health Statistics, No 112, DHHS Publication No (PHS) 85.1250 (Hyattsville, MD: PHS, Sept 27, 1985)

AREA-SPECIFIC FINDINGS

Aberdeen Area

Aberdeen is the seventh most populous of the IHS areas, with IHS estimating that the service population was 70,648 persons in 1984. Aberdeen includes the four reservation States of North Dakota, South Dakota, Nebraska, and Iowa, although most Indians in the Aberdeen area reside in North or South Dakota, States with great extremes of temperature, rough terrain, and few natural resources. Harsh living conditions and limited socioeconomic opportunities in the Aberdeen area contribute to the poor health of Indians.

Although death rates have declined in the Aberdeen area in the past decade, and the pattern of causes has changed somewhat (see table 4-22), Aberdeen continues to have the highest mortality rate of IHS areas. The age-adjusted mortality rate in Aberdeen for the 3-year period centered in 1981 (1,261.3 per 100,000 population) exceeded that of the U.S. all races population by more than 200 percent. The rate for females was 2.3 times that of U.S. all races females, and for males, 2.1 times that of U.S. all races males. Current hospitalization rates for Aberdeen (2,199.4 per 10,000

IHS eligible population (195)) also exceed those of U.S. all races (203), although there are diagnostic categories for which hospitalization rates are lower for the Aberdeen population.

For all but one of the 15 leading causes of death (malignant neoplasms among males), mortality rates were higher in the Aberdeen area than they were for the U.S. all races population (table 4-23). The 15 leading causes of death among Aberdeen females were diseases of the heart, malignant neoplasms, accidents, liver disease, cerebrovascular disease, diabetes, pneumonia, homicide, conditions arising in the perinatal period, nephritis and other diseases of the urinary tract, suicide, congenital anomalies, tuberculosis, septicemia, and "all other external causes." Among Aberdeen males, diseases of the heart were the leading cause of death, followed by accidents, malignant neoplasms, liver disease, suicide, homicide, pneumonia, conditions arising in the perinatal period, cerebrovascular disease, diabetes, "all other external causes," chronic pulmonary diseases, nephritis and other diseases of the urinary tract, congenital anomalies, and other diseases of the arteries, arterioles, and capillaries. Thus, what are

**Table 4.22.—Changes in Crude Death Rates, 1972-82:
IHS Aberdeen Area (rates per 100,000 population)**

IHS Code Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790 Accidents/adverse effects	252.3	231.7	158.4	-37.2
800 Motor vehicle	134.0	135.4	101.5	-24.2
810 All other accidents	118.3	96.2	56.9	-51.9
310 Diseases of the heart	218.9	211.4	192.8	-11.9
150 Malignant neoplasms	96.5	80.3	99.0	2.5
620 Liver disease/cirrhosis	67.3	71.1	61.0	-9.3
510 Pneumonia/influenza.	64.6	55.2	39.0	-39.7
740 Conditions arising in perinatal period	50.3	47.8	31.8	-36.8
430 Cerebrovascular disease	42.8	41.0	36.4	-15.0
260 Diabetes mellitus	32.6	31.8	28.7	-11.9
830 Homicide	27.8	36.1	37.4	34.6
820 Suicide	23.1	28.1	32.8	42.0
All other causes	247.8	275.5	174.6	-29.5
ALL All causes	1,124.0	1,110.0	945.9	-15.8

SOURCES 1972-74 and 1975-77 deaths: U S Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, *Selected Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub No (H SA)-79-1005 (Rockville, MD HSA, 1979). 1972-74 and 1975-68 population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985 1980-82 data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Table 4-23.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Aberdeen IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code	Rank	Cause name	Number of deaths	Age-adjusted Indians	mortality rate U.S. all races	Ratio of Aberdeen area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	136	181.5	135.1	1.3
150	2.	Malignant neoplasms.	100	149.3	108.6	1.4
790	3.	Accidents/adverse effects.	97	108.0	20.4	5.3
620	4.	Liver disease/cirrhosis.	56	86.3		11.7
430	5.	Cerebrovascular disease	39	48.9	35.4	1.4
260	6.	Diabetes mellitus	32	47.9	9.6	5.0
510	7.	Pneumonidinfluenza	29	33.4	9.2	3.6
830	8.	Homicide	22	27.1	4.3	6.3
740	9.	Perinatal conditions	20	11.2	8.2	1.4
640	10.	Nephritis, et al	17	25.5	3.6	7.1
820	11.	Suicide	10	11.5	5.7	2.0
730	12.	Congenital anomalies	9	5.6	5.5	1.0
030	13.	Tuberculosis	7	10.0	0.4	25.1
090	14.	Septicemia.	7	8.5	2.4	3.5
840	15.	All other external causes	6	5.7	0.9	6.3
		All others	160	193.8	63.7	3.0
ALL		All causes	747	954.2	420.4	2.3
Males:						
310	1.	Diseases of the heart	240	414.7	271.2	1.5
790	2.	Accidents/adverse effects	212	263.4	60.2	4.4
150	3.	Malignant neoplasms.	93	159.8	163.7	1.0
620	4.	Liver disease/cirrhosis.	63	113.4	16.0	7.1
820	5.	Suicide	54	65.0	18.0	3.6
830	6.	Homicide	51	64.9	16.7	3.9
510	7.	Pneumonia/influenza	47	65.3	16.6	3.9
740	8.	Conditions arising in perinatal period	42	24.8	10.3	2.4
430	9.	Cerebrovascular disease	32	52.3	41.7	1.3
260	10.	Diabetes mellitus	24	41.4	10.0	4.1
840	11.	All other external causes	20	29.6	2.2	13.4
540	12.	Chronic pulmonary disease	18	29.9	26.2	1.1
670	13.	Renal failure, etc.	10	17.0	4.9	3.5
730	14.	Congenital anomalies	12	7.1	6.1	1.2
490	15.	Other artery diseases	9	14.8	8.5	1.7
		All others	171	249.6	81.0	3.1
ALL		All causes	1,098	1,613.0	753.3	2.1

SOURCES U.S. all races: US. Department of Health and Human Resources, Public Health Service, National CenterforHealth Statistics, "AdvanceReport, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp., June 22, 1984; Indians in IHS areas: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

widely believed to be preventable causes of mortality predominate among both male and female Indians in Aberdeen.

Although deaths from diseases of the heart and the circulatory system are generally lower among Indians than among other U.S. populations, they are slightly higher among Aberdeen area Indians of both sexes than among the U.S. all races population, despite a 12-percent decline in the Aberdeen death rate from heart disease since the 1972 to 1973 period. When deaths from both sexes are combined, diseases of the heart are the leading cause of death among Aberdeen area Indians. In Aberdeen, diseases of the heart are not limited to

older Indians. The Aberdeen Indian death rate from heart disease begins to exceed that of U.S. all races for the 15 to 24 year age bracket, and exceeds the U.S. rate for all subsequent age groups (table 4-24). Cerebrovascular disease is also a leading cause of death among Aberdeen Indians, occurring at 1.4 times the U.S. all races rate for females, and 1.3 times the U.S. all races rate for males. The Aberdeen area hospitalization rate for circulatory system diseases, however, is substantially lower than that in U.S. non-Federal short-stay hospitals. The low hospitalization rate cannot be explained fully by the relatively young Indian population, because younger Aberdeen area Indians have a high heart disease death rate. One-

**Table 4-24.—Heart Disease Mortality by Age
IHS Aberdeen Area Indians 1980-82 and
U.S. All Races 1981 (rate per 100,000 population)**

Age group	Mortality rate		Ratio Aberdeen area Indians to U.S. all races
	IHS Aberdeen area Indians	Us. all races	
0 to 4	7.2	106.1	0.1
5 to 14	—	0.9	—
15 to 24	11.5	2.6	4.4
25 to 34	18.4	8.4	2.2
35 to 44	143.4	43.2	3.3
45 to 54	358.1	177.7	2.0
55 to 64	846.4	481.5	1.8
65 to 74	1,692.4	1,175.8	1.4
75 to 84	2,955.1	2,850.3	1.0
>85	7,265.0	7,459.0	1.0

SOURCES Indian data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC 1985 U.S. all races data: U S Department of Health and Human Services Public Health Service National Center for Health Statistics, Advance Report of Final Mortality Statistics 1981, *Monthly Vital Statistics Report* 33(3) supp June 22 1984

third of female deaths and one-half of male deaths from heart disease in Aberdeen area Indians are caused by acute myocardial infarction, indicating that medical care is often not obtained in time to save the victim.

Although the Aberdeen area death rate from accidents has declined almost 40 percent since the early 1970s, accidents, particularly motor vehicle accidents, remain the leading cause of death for Aberdeen males. Furthermore, the death rate from accidents for female Indians in Aberdeen far exceeds that of U.S. all races females, and Aberdeen, with Alaska, has the second highest (after the Billings area) accidental death rate for females of all IHS areas. Deaths from causes other than motor vehicle accidents account for most of the decline in mortality since the early 1970s.

Aberdeen has the second highest rate of suicide among IHS areas for both males and females. Furthermore, the Aberdeen suicide rate increased 42 percent in the decade for which data are available. Age-specific information is not available for earlier periods, but as shown in table 4-25, compared to other U.S. populations in 1980 to 1982, suicide in Aberdeen was a problem of younger Indians. As in the United States generally, there were more suicides among men (160). Although the Aberdeen female rate was much lower than that for Aberdeen males, it was still double that of U.S. all races and U.S. white females (201).

**Table 4.25.—Suicide Mortality by Age
IHS Aberdeen Area Indians 1980.82 and U.S.
All Races 1981 (rate per 100,000 population)**

Age Group	Mortality rate		Ratio Aberdeen area Indians to U.S. all races
	IHS Aberdeen area Indians	Us. all races	
0 to 4,	—	—	—
5 to 14	2.0	0.5	4.0
15 to 24,	59.6	12.3	4.8
25 to 34	80.9	16.3	5.0
35 to 44	53.8	15.9	3.4
45 to 54,	53.8	16.1	3.3
55 to 64	22.0	16.4	1.3
65 to 74	—	16.2	—
75 to 84	—	18.6	—
>85	—	17.7	—

SOURCES Indian data: U S Department of Health and Human Services Public Health Service Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC 1985 U.S. all races data: U S Department of Health and Human Services Public Health Service National Center for Health Statistics, Advance Report of Final Mortality Statistics 1981 *Monthly Vital Statistics Report* 33(3) supp June 22 1984

In addition to having substantial numbers of deaths due to accidents and suicides, the Aberdeen area had the highest rate of deaths by homicide of all IHS areas for both males and females. In 1980 to 1982, deaths by homicide among Aberdeen men exceeded that of U.S. all races men by a ratio of 3.9; for women the comparable ratio was even greater, 6.3. As it has for suicide, the homicide rate increased by one-third between 1972 and 1982.

Deaths due to "all other external causes" (e.g., substance abuse, injury by firearms) were also high in the Aberdeen area, particularly for males. These were the 11th leading cause of death in Aberdeen, compared to being the 15th leading cause of death for both sexes for all IHS areas.

Violence contributes substantially to illness and injury as well. Injuries and poisonings were the second leading reason for hospitalization in the Aberdeen area. At a rate of **297.0** per 10,000 population, it was almost twice that of patients of all races in U.S. non-Federal short-stay hospitals. The serious nature of many of the injuries in Aberdeen is reflected in the greater proportion of patients sent outside of the IHS direct system for contract care: in 1984, 17.6 percent of inpatient treatment for injuries and poisonings was handled by Aberdeen contract general hospitals, compared to 15.1 percent for all IHS areas (201). Further-

more, almost 8 percent of outpatient visits by males (12,816 visits) in fiscal year 1984 were for lacerations and open wounds; dislocations, sprains and strains; and superficial injuries and contusions (table 4-26).

Cancer is the third leading cause of death in the Aberdeen area. (As for the general U.S. population, the cancer mortality rate for Indians in the Aberdeen area remained about level during the 1972-82 period.) Cancer mortality in Aberdeen area Indians differs somewhat by sex. For Indian women the mortality rate from all malignant neoplasms exceeded the rate for U.S. all races females by a ratio of 1.4. While the overall cancer death

rate for Indian men in Aberdeen (159.8 per 100,000 population) exceeded that of other IHS areas on average (98.5 per 100,000 population), it was slightly below the rate for U.S. all races men (163.7). However, the age-adjusted rate for Aberdeen males exceeded that of U.S. all races men for cancers of the digestive system (1.8 ratio). Aberdeen cancer deaths also differ from those of U.S. all races in that rates were generally higher in both the youngest age group (0 to 4 years) and the age groups after 34 years of age, although age-specific differences varied somewhat by cause.

The rate of hospital discharges for malignant neoplasms among Aberdeen Indians was about

Table 4-26.—Fifteen Most Frequent Outpatient Diagnoses:^aAberdeen Area, Fiscal Year 1984

Rank	Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	300	Upper respiratory infection, common cold	17,855	7.3
2.	080	Diabetes mellitus	15,992	6.6
3.	819	Other preventive health services	13,770	5.6
4.	480	Prenatal care	12,447	5.1
5.	250	Acute otitis media	8,162	3.3
6.	283	Hypertensive disease	7,842	3.2
7.	818	Well-child care	6,472	2.7
8.	301	Pharyngitis and tonsillitis (non-strep)	6,102	2.5
9.	812	Other ill-defined, undiagnosed diseases	5,225	2.1
10.	400	Urinary tract infection	4,811	2.0
11.	510	Eczema, urticaria or skin allergy	4,715	1.9
12.	823	Tests only (laboratory and X-ray)	4,669	1.9
13.	575	Other musculoskeletal, connective tissue disease	4,225	1.7
14.	821	Physical examination	4,053	1.7
15.	827	All other	4,915	1.9
Male:				
1.	300	Upper respiratory infection, common cold	12,290	7.6
2.	819	Other preventive health services	8,974	5.6
3.	250	Acute otitis media	7,842	4.9
4.	080	Diabetes mellitus	7,736	4.8
5.	283	Hypertensive disease	6,761	4.2
6.	818	Well-child care	6,363	4.0
7.	730	Laceration, open wound	5,630	3.5
8.	301	Pharyngitis and tonsillitis (non-strep)	4,276	2.7
9.	821	Physical examination	4,161	2.6
10.	702	Dislocations, sprains, and strains	3,760	2.3
11.	731	Superficial injury or contusion	3,426	2.1
12.	812	Other ill-defined, undiagnosed diseases	3,171	2.0
13.	575	Other musculoskeletal, connective tissue diseases	2,993	1.9
14.	820	Hospital medical/surgical followup	2,951	1.8
15.	510	Eczema, urticaria, or skin allergy	2,837	1.8
		All other causes, both sexes	205,928	
	ALL	All causes, both sexes	410,354	100.0

^aThe IHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed, therefore, they may not be valid.

SOURCES: 15 leading clinical impressions: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. Aberdeen total: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date).

one-third that of U.S. all races in non-Federal short-stay hospitals (see table 4-19). Cancer was also not among the 15 leading reasons for Aberdeen outpatient visits. These findings again indicate that medical care for cancer is relatively deficient.

The extent of the diabetes problem in Aberdeen is difficult to deduce from available mortality and morbidity information. Although it is still above the national rate, the diabetes death rate in Aberdeen has declined over time and has decreased in importance as a leading cause of death. Diabetes was the 10th leading cause of death in 1980 to 1982, compared to its being the 8th leading cause of deaths in 1972 to 1974 and the 9th leading cause in 1975 to 1977. However, the diabetes death rates in Aberdeen still exceeded the U.S. all races rate for females by 5:1 and for males by 4:1, although the absolute number of deaths attributed to diabetes in Aberdeen was small. However, the death rate from renal failure increased, exceeding the U.S. all races rates by 7.9 for females and 3.5 for males. A continuing problem with diabetes and its effects is reflected in the rate of health care utilization for diabetes. Hospital discharge rates in Aberdeen for diabetes was **60** per 10,000 population in 1984, compared to **25.3** per 10,000 population for U.S. all races. Diabetes was also a leading cause of outpatient visits for both male and female Aberdeen Indians, accounting for 4.8 percent (**7,736**) of male visits (fourth leading cause) and 6.6 percent (15,992) of female visits in 1984 (second leading cause). Based on the high rates of care for diabetes, it seems unusual that vision problems were not among the 15 leading causes of outpatient visits.

Pneumonia and upper respiratory system diseases were also significant problems in Aberdeen, with Aberdeen Indians dying and being hospitalized at rates more than three times that of U.S. all races populations with pneumonia. Chronic pulmonary disease was a less likely cause of death, but upper respiratory infections including the common cold, pharyngitis and tonsillitis, and acute otitis media predominated as causes of outpatient visits. Hospitalizations for otitis media were common in the Aberdeen area, which had the second highest rate of IHS areas, and exceeded

the rate for U.S. non-Federal short-stay hospitals by more than 2:1.

In 1980 to 1982, Aberdeen's neonatal death rate exceeded that of U.S. all races by a ratio of 1.3. The postneonatal death rate for Aberdeen Indians was 11.4 per 1,000 live births, compared to 3.9 for U.S. all races, a ratio of 2.9. The leading cause of neonatal deaths was prematurity and/or low birth weight, and the leading cause of death for Aberdeen postneonates was sudden infant death syndrome, which occurred at a rate 1.8 times that of U.S. all races in 1981 (table 4-27).

The contribution of alcohol use to most causes of mortality and morbidity in the Aberdeen area cannot be quantified. However, chronic liver disease and cirrhosis, which is related to alcohol abuse, ranked fourth as a cause of death among Aberdeen Indians in 1980 to 1982, as it has since at least 1972. Aberdeen deaths from liver disease and cirrhosis were 8.7 times the U.S. all races rate for both sexes (11.7 for females and 7.1 times for males), although Aberdeen was not the highest of all IHS areas. Correspondingly, the Aberdeen area had a slightly higher rate of hospitalizations for alcoholic liver disease (5.9) than did IHS areas as a whole (4.4). Hospitalization for alcohol dependence syndrome in Aberdeen was 6.1 times the rate of U.S. non-Federal short-stay hospitals, which was the highest among IHS areas, but this was influenced by the fact that Aberdeen has one of only two psychiatric wards in the IHS system. (Aberdeen has 9 psychiatric beds and the IHS hospital in Gallup has 13.)

Aberdeen patient care statistics also indicate high rates of health care utilization for chronic infectious diseases and conditions. Hospitalizations for infectious and parasitic diseases were common among Aberdeen Indians relative to U.S. all races populations, as were outpatient visits for the skin diseases eczema and urticaria, urinary tract infections among women, and musculoskeletal and connective tissue disorders.

In summary, for almost all diseases and causes of death, Indians in the Aberdeen area were in poor health compared to other U.S. populations and to other Indians.

Table 4-27.—infant Deaths and Death Rates IHS Aberdeen Area, 1980-82

IHS code ^a Cause	Deaths			Rates (per 1,000 live births)		
	Total	Neonates	Postneonates	Total	Neonates	Postneonates
010 Intestinal infection	1	—	1	0.1	—	0.1
040 Septicemia	2	—	2	0.3	—	0.3
120 Blood diseases	1	—	1	0.1	—	0.1
130 Meningitis	2	—	2	0.3	—	0.3
140 Other nervous diseases	1	—	1	0.1	—	0.1
150 Acute upper respiratory infection	2	—	2	0.3	—	0.3
170 Pneumonia/influenza	8	—	8	1.1	—	1.1
180 Pneumonia	8	—	8	1.1	—	1.1
200 Other respiratory diseases	2	—	2	0.3	—	0.3
220 Gastritis, etc.	1	—	1	0.1	—	0.1
230 Other digestive	3	—	3	0.4	—	0.4
240 Congenital anomalies	17	10	7	2.3	1.3	0.9
380 Conditions arising in perinatal period	62	60	2	8.3	8.0	0.3
580 Symptoms/signs/other	47	5	42	6.3	0.7	5.6
590 SIBS.	39	4	35	5.2	0.5	4.7
600 Symptoms/signs/other	8	1	7	1.1	0.1	0.9
610 Accidents/adverse effects	6	1	5	0.3	0.1	0.1
650 Homicide	1	—	1	0.1	—	0.1
680 All other causes	6	—	6	0.8	—	0.8
ALL All	162	76	86	21.7	10.2	11.5

^aIHS code, equivalence to ICD-9 Recode 61 for infant deaths available from IHS

SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

Alaska Area

Eskimos, Aleuts, and Indians in the entire State of Alaska are served by the Alaska area, a population estimated to be 71,329 in 1984.

Alaska shows many of the same mortality patterns as do other Indian areas, particularly those in the Central and North Central Western continental States, but it is unusual in several aspects; notably, accidents, liver disease, cancers of the digestive system, and diabetes. Morbidity data are difficult to interpret, because information is not collected from one tribally administered hospital and a number of tribally administered health centers.

The Alaska overall crude mortality rate decreased an estimated 8.1 percent from 1972 to 1982. In 1980 to 1982 the age-adjusted mortality rate in Alaska exceeded that of U.S. all races by 1.6 (see table 4-28).

As for almost all IHS areas, the most common cause of death in Alaska was accidents. Alaska differs from most other IHS areas, however, in that accidents were the leading cause of death for females as well as males, and many of the deaths

caused by accidents were not caused by motor vehicles. Accidents were responsible for 17 percent of female deaths in 1980 to 1982, at a rate 4.8 times that of U.S. all races females, and for almost a third of male deaths (299 of 957), at a rate 5.3 times that of U.S. all races males. While Alaska's mortality rate from accidents declined between 1972 and 1982 (see table 4-29), most of the change has been in the motor vehicle rate, and the overall decline has not been as great as it has for most other IHS areas.

As they are in almost all IHS areas, Alaska death rates from other forms of "social" mortality were higher than U.S. all races rates. Alaska is an interesting area to watch because of significant social and economic changes in the last several years. The mortality rate from homicides has fluctuated since 1972, resulting in a total increase of 19.4 percent compared to a U.S. average increase of 4 percent (142,143). By contrast, there has been an average decline for all IHS areas of 16.8 percent. The Alaska crude mortality rate from suicide declined between 1972 to 1982, as did that of IHS areas on average, while the U.S. crude rate remained stable (142,143). In 1980 to 1982, the age-adjusted homicide and suicide rates

Table 4-28.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Alaska IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths		Age-adjusted mortality rate		Ratio of Alaska area Indians to U.S. all races
			Indians	U.S. all races	Indians	U.S. all races	
Females:							
790	1.	Accidents/adverse effects.	88	97.7	20.4		4.8
310	2.	Diseases of the heart	82	122.2	135.1		0.9
150	3.	Malignant neoplasms.	67	99.9	108.6		0.9
430	4.	Cerebrovascular diseases	26	38.3	35.4		1.1
510	5.	Pneumonia/influenza	26	33.2	9.2		3.6
620	6.	Liver disease/cirrhosis.	20	28.5	7.4		3.9
830	7.	Homicide	16	18.2	4.3		4.2
740	8.	Conditions arising in perinatal period	14	10.1	8.2		1.2
840	9.	All other external causes	9	7.6	0.9		8.5
030	10.	Tuberculosis	8	12.8	0.4		32.0
640	11.	Nephritis, et al	8	12.7	3.6		3.5
730	12.	Congenital anomalies	8	5.8	5.5		1.1
820	13.	Suicide	8	7.5	5.7		1.3
540	14.	Chronic pulmonary diseases	7	11.2	9.5		1.2
090	15.	Septicemia.	5	7.0	2.4		2.9
		All others	116	149.1	63.8		55.8
ALL	...	All causes	508	661.8	420.4		1.6
Males:							
790	1.	Accidents/adverse effects.	299	319.6	60.2		5.3
310	2.	Diseases of the heart	145	206.9	271.2		0.8
150	3.	Malignant neoplasms	115	175.1	163.7		1.1
430	4.	Cerebrovascular disease.	37	52.4	41.7		1.3
820	5.	Suicide	34	34.8	18.0		1.9
830	6.	Homicide	33	32.4	16.7		1.9
510	7.	Pneumonia/influenza	32	37.6	16.6		2.3
740	8.	Conditions arising in perinatal period	29	20.3	10.3		2.0
840	9.	All other external causes	27	29.5	2.2		13.4
620	10.	Liver disease/cirrhosis.	17	25.8	16.0		1.6
540	11.	Chronic pulmonary disease	14	16.6	26.2		0.6
730	12.	Congenital anomalies	11	7.7	6.1		1.3
030	13.	Tuberculosis	5	7.3	1.0		7.3
140	14.	All other infectious/parasitic diseases	4	6.6	1.7		3.9
260	15.	Diabetes mellitus	4	5.3	10.0		0.5
		All others.	151	212.0	91.6		44.2
ALL	...	All causes	957	1,164.4	753.3		1.5

^aEquivalence to ICD-9 Codes available from IHS

SOURCES: U.S. all races: U.S. Department of Health and Human Resources, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) *supp.*, June 22, 1984, **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

for Alaska males were both 1.9 times that of U.S. all races males, making suicide and homicide the fifth and sixth leading causes of death for Alaska area males.

It is unusual for the rate of hospitalizations in an IHS area to exceed the rate for U.S. non-Federal short-stay hospitals (see discussion of other areas), but in fiscal year 1984 Alaska Natives were hospitalized for injuries and poisonings at a rate of 240 per 10,000 population, well above the U.S. all races average of 148.1 (203), and the

IHS average of 151 per 10,000 population. The high rate of accidents and injuries among Alaska males also can be inferred from outpatient statistics. In fiscal year 1984, diagnoses related to violence (laceration, open wound; dislocations, sprains, and strains; fracture of an extremity) accounted for 7.4 percent, and 3 of the 15 leading causes, of male outpatient visits (see table 4-30).

Heart disease was the second leading cause of death in Alaska, but it did not exceed the U.S. all races rate for either male or female Alaska Na-

**Table 4-29.—Changes in Crude Death Rates, 1972-82:
IHS Alaska Area (rate per 100,000 population)**

IHS Code Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790 Accidents/adverse effects	231.6	220.6	196.1	-8.2
800 Motor vehicle accidents	30.6	45.6	26.4	-13.9
810 All other accidents	183.0	175.0	169.8	-7.2
310 Diseases of the heart	100.4	95.8	115.1	14.6
150 Malignant neoplasm	91.2	87.8	92.2	1.1
430 Cerebrovascular disease	39.1	29.0	31.9	-18.3
510 Pneumonia/influenza	38.5	34.7	29.4	-23.6
280 Diabetes mellitus			2.0	
740 Conditions arising in perinatal period	33.0	26.8	21.8	-34.0
820 Suicide	30.0	43.9	21.3	-29.0
830 Homicide	20.8	26.2	24.8	19.4
620 Liver disease/cirrhosis	16.5	27.3	18.8	13.6
730 Congenital anomalies	11.0	10.8	9.6	-12.5
All other causes	194.9	187.4	179.5	-7.9
ALL All causes	807.6	790.3	742.5	-8.1

SOURCES 1972-74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA)-79-1005 (Rockville, MD:HSA, 1979). 1972-74 and 1975-88 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985. 1980-82 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

tives. However, mortality from heart disease has increased since 1972, from a crude rate of 100.4 per 100,000 population to 115.1 in the 1980 to 1982 period, so it is a disease of increasing concern to Alaska Natives. The increased concern with heart disease and continuing concern with cerebrovascular disease are reflected in an increase in hospitalizations for circulatory system diseases, from 3.5 percent of all diagnoses in 1979 to 4.4 percent in 1984 (excluding Norton Sound), but the 1984 rate (74.7 per 10,000 population in 1984, excluding the Norton Sound service unit population from the denominator) was still far below the U.S. all races rate of 238.6 per 10,000 population.

Malignant neoplasms (cancers) were the third leading cause of death for Alaska Native males and females (67 females and 115 males in the 3-year period, 1980-82). Occurring at a rate about equal to that of U.S. all races males and females. The exception was cancers of the digestive system, for which the rate was about twice that of the U.S. all races rate, probably as a consequence of an epidemic of hepatitis resulting in hepatocellular cancer (1,160). A greater proportion of Alaska hospitalizations was accounted for by malignant neoplasms than in the IHS system on average (2.6 percent of discharges in Alaska v.

1.5 percent of discharges on average (195)), although the rate per 10,000 population for Alaska (44.1) was almost half that of U.S. non-Federal short-stay hospitals (203).

Respiratory system diseases are a significant problem for Alaska Natives. Pneumonia continues to be a leading cause of death for both male and female Alaska Natives, exceeding the U.S. all races rate by more than 2:1. The Alaska Native death rate from pneumonia and influenza did not decline as much as it did for Indians in other IHS service areas (a 23.6-percent decline in Alaska v. a 42.6-percent decline on average). In 1984 upper respiratory infections accounted for 8.7 percent of outpatient visits among males and 3.6 percent among females. Otitis media alone accounted for another 8.8 percent of male, and 5.4 percent of female, outpatient visits, making it the leading cause of outpatient visits for males, and the third leading cause of outpatient visits for females. Alaska's hospitalization rate for otitis media was five times the rate of U.S. non-Federal short-stay hospitals.

Alaska's high infant mortality rate of 17.3 deaths per 1,000 live births was due primarily to high postneonatal mortality. As in all other IHS

Table 4.30.—Fifteen Most Frequent Outpatient Diagnoses: Alaska Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	480	Prenatal care	16,626	8.8
2.	251	Chronic otitis media with or without mastoiditis	10,235	5.4
3.	820	Hospital medical/surgical followup	7,539	4.0
4.	300	Upper respiratory infection, common cold	6,697	3.6
5.	819	Other preventive health services	5,590	3.0
6.	283	Hypertensive disease	4,510	2.4
7.	301	Pharyngitis and tonsillitis (nonstrep)	4,105	2.2
8.	823	Tests only (lab, X-ray)	4,094	2.2
9.	450	Infection of female genitalia (excluding VD)	3,839	2.0
10.	210	Refractive error	3,618	1.9
11.	821	Physical examination	3,507	1.9
12.	400	Urinary tract infection.	3,473	1.8
13.	818	Well child care	3,369	1.8
14.	810	All other symptoms.	5,037	2.7
15.	827	All other	10,507	5.6
Male:				
1.	251	Chronic otitis media with or without mastoiditis	10,215	8.8
2.	820	Hospital medical/surgical followup	5,052	4.3
3.	300	Upper respiratory infection, common cold	4,918	4.2
4.	730	Laceration or open wound.	3,962	3.4
5.	818	Well child care...	3,516	3.0
6.	821	Physical examination	2,871	2.5
7.	283	Hypertensive disease	2,756	2.4
8.	301	Pharyngitis and tonsillitis (nonstrep)	2,645	2.3
9.	310	All other respiratory diseases	2,543	2.2
10.	702	Dislocations, sprains, and strains	2,480	2.1
11.	819	Other preventive health services	2,370	2.0
12.	823	tests only (lab, X-ray)	2,315	2.0
13.	701	Fracture of extremity	2,255	1.9
14.	810	All other symptoms.. . . .	3,480	3.0
15.	827	All other	6,467	8.8
		All other causes, both sexes.	172,506	
	ALL	All causes, both sexes	323,097	100.0

*IHS refers to the as clinical impressions because they are recorded before a clinical diagnosis is completed, therefore, they may not be valid diagnoses

SOURCES **15 leading clinical impressions:** US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. **Alaska total:** US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD IHS, no date)

areas, sudden infant death syndrome contributed most to the postneonatal death rate, but pneumonia was also a leading cause of death for Alaska infants, particularly postneonates (see table 4-31). Some Alaska area hospitalizations for causes related to infant mortality have declined in the recent past, but they were still high relative to rates for U.S. all races. In 1979, the Alaska discharge rate for congenital anomalies was 18 per 10,000 population. In 1984 it was 15.2 per 10,000 population, compared to a U.S. non-Federal short-stay hospital discharge rate of 13.5. For conditions arising in the perinatal period, the 1979 hospital discharge rate in Alaska was 14.1 per 10,000 population; in 1984 the Alaska rate (excluding Norton

Sound) was a striking 38.2, 5.4 times the U.S. all races rate of 7.1, although this high hospitalization rate was at least partially due to a need to hospitalize because of hazardous weather, road, and flight conditions. (The overall rate of hospitalizations and the average length of stay are higher for Alaska IHS direct and contract facilities than for both the IHS and the U.S. average.) Alaska ranks second among IHS areas in the number of visits for prenatal care.

The Alaska area is unusual in that it has a very low diabetes mortality rate, only four Indians (males) having died from this disease in the 1980-82 period. Similarly, diabetes was not among the

Table 4.-31.— Infant Deaths and Death Rates IHS Alaska Area, 1980-82

IHS code* Cause	Deaths			Rates (per 1,000 live births)		
	Total	Neonates	Postneonates	Total	Neonates	Postneonates
040 Septicemia	1	—	1	0.1	—	0.1
050 Viral diseases..	1	—	1	0.1	—	0.1
130 Meningitis	3	—	3	0.4	—	0.4
140 Other nervous diseases	4	—	4	0.6	—	0.6
160 Bronchitis	—	—	1	0.1	—	0.1
170 Pneumonia/influenza,	1	1	7	1.2	0.1	1.0
180 Pneumonia	8	1	7	—	0.1	1.0
240 Congenital anomalies	17	13	4	2.5	1.9	0.6
380 Conditions arising in perinatal period	42	42	—	6.1	6.1	—
580 Symptoms/signs/other	29	1	28	4.2	0.1	4.1
590 SIBS.	26	1	25	3.8	0.1	3.6
600 Symptoms/signs/other	3	—	3	0.4	—	0.4
610 Accidents	4	—	4	0.6	—	0.6
650 Homicide	2	—	2	0.3	—	0.3
680 All other causes	7	—	—	1.0	0.3	0.7
ALL All	119	59	60	17.3	8.6	8.7

*IHS code, equivalence to ICD-9 recode 61 for infant deaths available from IHS.

SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

15 leading reasons for outpatient encounters in 1984. However, the increase in hospitalizations for diabetes from 5.9 per 10,000 population in 1979 (166) to approximately 9.2 per 10,000 in 1984 (excluding two tribally administered hospitals) may mean that diabetes is increasing as a problem, although this rate was still much lower than the IHS 1984 average hospitalization rate of 26.2.

Alcohol abuse is viewed as a problem in Alaska as elsewhere among Indian populations (64), but the death rate from liver disease and cirrhosis was surprisingly low, particularly among males. Complacency about the issue of alcohol use and abuse is not in order, however, as the death rate from liver disease and cirrhosis may be rising. There was an overall increase of 13.6 percent in deaths from liver disease and cirrhosis between 1972 and 1982, compared to a decline for IHS on average of 29.7 percent and a decline for U.S. all races of 20 percent (142,143,202).

Consistent with the lower death rate from liver disease and cirrhosis, the hospitalization rate for alcoholic liver disease in Alaska (1.9 per 10,000 population in 1984) was only slightly higher than that for U.S. short-stay non-Federal hospitals (1.6), and much lower than that of IHS hospitals on average (4.4 excluding all tribally administered hospitals). Comparisons among rates for alcohol-related conditions that are treated as mental dis-

orders are less clear. In 1984, 55 Alaska Natives were hospitalized for alcoholic psychoses, which resulted in a rate (8.9 per 10,000 population) four times that of U.S. short-stay non-Federal hospitals, but less than the average IHS rate of 10.1 per 10,000 population. On the other hand, 1984 hospitalization rates for both alcohol-dependence syndrome and nondependent alcohol abuse were higher in Alaska than among either the U.S. all races or IHS population on average.

Hospitalizations for mental disorders were higher in Alaska (635 hospitalizations, including Bristol Bay, for a rate of 96.7 per 10,000 population) than in U.S. short-stay non-Federal hospitals (1.7 million hospital discharges, for a rate of 72.1 per 10,000 population).

In summary, the health status of Alaska Natives is both like and unlike other IHS areas. Based on mortality data, there have been substantial improvements since 1972 in cerebrovascular disease, pneumonia, suicide, and infant mortality, although death rates from these causes still exceeded those of the U.S. all races population. In the same period, Alaska Native death rates from heart disease, liver disease and cirrhosis, and homicide increased, while death rates from these causes declined throughout IHS on average. In particular, accidents, especially those not involving motor vehicles, pose a special problem for Alaska Na-

tives, and deaths caused by accidents have not declined as much in Alaska as throughout IHS on average. Further, patient care data indicate that chronic otitis media is a severe problem among Alaska Natives, a problem undoubtedly contributed to by reduced access to medical care as a result of geographic isolation.

Albuquerque Area

The Albuquerque area serves about **40** percent of the Indian population in New Mexico and a very small percent of the Indian population in Colorado, for an estimated total service population of 51,329 Indians.

The Albuquerque area overall mortality rate for the 3-year period centered in 1981 was not one of the highest of the IHS areas, but mortality rates for both males and females nevertheless exceeded the U.S. all races rate. Among males, the 10 leading causes of death were accidents and adverse effects, heart disease, malignant neoplasms, suicide, liver disease and cirrhosis, pneumonia and influenza, cerebrovascular disease, homicide, nephritis, and, diabetes mellitus. For females, the 10 leading causes were accidents, heart disease, malignant neoplasms, diabetes mellitus, liver disease and cirrhosis, cerebrovascular disease, pneumonia and influenza, congenital anomalies, atherosclerosis, and suicide. The age-adjusted death rates and ratio to the U.S. all races are shown in table 4-32, but these figures should be interpreted cautiously because of small absolute numbers.

The Albuquerque death rate from accidents, particularly motor vehicle accidents, exceeded that of U.S. all races populations by **3.2** for both males and females, and was the leading cause of death for both sexes. Death from other violence-related causes also exceeded that of the U.S. all races population: the female suicide rate by 1.2, the male suicide rate by 3, and the male homicide rate by 1.6. As shown in table 4-33, substantial progress has been made in reducing the death rate from accidents and homicide, but the suicide death rate changed very little between 1972 and 1982. That this pattern of mortality may be continuing can be gathered from observing that injuries and poisonings were the second leading

cause of hospital discharges in Albuquerque in 1984. However, the 1984 rate of hospitalizations for these external causes (161.5 per 10,000 population) was only slightly greater than the rates for both U.S. short-stay non-Federal hospitals (148.1) and IHS hospitals (151.0). Between 1979 and 1984, the Albuquerque rate of hospitalizations for injuries and poisonings declined slightly, but not as much as the U.S. all races rate.

As a further indication of the prevalence of violence and injury in Albuquerque, lacerations and open wounds were responsible for 3.2 percent of male outpatient visits to IHS facilities, making them the 10th leading cause of male visits. Hospitalizations for mental disorders were also unusually high in Albuquerque, although this was undoubtedly due in part to the availability of 13 psychiatric beds in the Gallup (New Mexico) service unit.

In general, death rates for cancer and cardiovascular diseases were lower among Albuquerque Indians than among the U.S. all races population, with the two exceptions of Albuquerque male mortality rates from genital cancer and intracerebral hemorrhage. Crude mortality rates for both diseases of the heart and malignant neoplasms declined between 1972 and 1982, the decline in cancer mortality being an exception to the patterns for the U.S. and IHS on average. As were the IHS rates on average, Albuquerque hospitalization rates in 1984 were substantially *lower* than comparable rates for U.S. all races for circulatory system diseases and malignant neoplasms.

The diabetes death rate was apparently not as high in Albuquerque as it was in other IHS areas, but the problem may be getting worse. The crude death rate from diabetes increased 26.6 percent between 1972 and 1982, although small numbers may make comparisons unreliable. Albuquerque's hospital discharge rate for diabetes in 1984 (30.9 per 10,000 population) exceeded that of IHS direct and contract hospitals on average (26.2), and of U.S. short-stay non-Federal hospitals (25.3). Further, diabetes accounted for 4.6 percent of male outpatient visits and 4.9 percent of female outpatient visits in Albuquerque in 1984, a substantial proportion of all outpatient encounters.

Table 4-32.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Albuquerque IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code*	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	mortality rate U.S. all races	Ratio of Albuquerque area Indians to U.S. all races
Females:						
790	1.	Accidents/adverse effects	43	65.7	20.4	3.2
310	2.	Diseases of the heart	32	57.6	135.1	0.4
150	3.	Malignant neoplasms	30	63.9	108.6	0.6
260	4.	Diabetes mellitus	19	44.7	9.6	4.7
620	5.	Liver disease/cirrhosis	17	35.3	7.4	4.8
430	6.	Cerebrovascular diseases	8	15.7	35.4	0.4
510	7.	Pneumonia/influenza	8	17.0	9.2	1.8
730	8.	Congenital anomalies	8	8.4	5.5	1.5
480		Atherosclerosis	5	7.7	4.6	1.7
820	9.10.	Suicide	5	6.8	5.7	1.2
090	11.	Septicemia	4	9.5	2.4	3.9
830	12.	Homicide	4	4.9	4.3	1.1
740	13.	Conditions arising in perinatal period	3	2.6	8.2	0.3
140	14.	All other infectious/parasitic diseases	2	3.4	1.3	2.6
490	15.	Other arterial diseases	2	3.4	3.0	1.1
		All others	66	121.2	59.7	2.0
ALL		All causes	256	467.8	420.4	1.1
Males:						
790	1.	Accidents/adverse effects	109	189.9	60.2	3.2
310	2.	Diseases of the heart	49	104.8	271.2	0.4
150	3.	Malignant neoplasm	44	100.4	163.7	0.6
820	4.	Suicide	36	53.6	18.0	3.0
620	5.	Liver disease/cirrhosis	26	60.3	16.0	3.8
510	6.	Pneumonia/influenza	19	29.5	16.6	1.8
430	7.	Cerebrovascular diseases	17	30.6	41.7	0.7
830	8.	Homicide	16	27.0	16.7	1.6
640	9.	Nephritis, et al	11	25.9	5.6	4.6
260	10.	Diabetes mellitus	10	26.1	10.0	2.6
740	11.	Conditions arising in perinatal period	8	7.0	10.3	0.7
730	12.	Congenital anomalies	6	7.4	6.1	1.2
840	13.	All other external conditions	5	12.5	2.2	5.7
090	14.	Septicemia	4	9.0	3.4	2.6
270	15.	Nutrition deficiencies	2	1.8	0.5	3.6
		All others	137	273.8	111.1	2.5
All		All causes	494	959.6	753.3	1.3

*Equivalence to ICD-9 codes available from the Indian Health Service.

SOURCES: **U.S. all races:** U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3)supp., June 22, 1984; **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

As in other IHS areas, postneonatal mortality in Albuquerque remains a significant health problem. In the 3-year period 1980-82, the total Albuquerque area infant mortality rate (9.7 per 1,000 live births), and the rate for neonates (4.6), were both lower than the rates for U.S. all races (11.9 and 8.0). The postneonatal rate of 5.1 was, however, 1.3 times that of the U.S. all races rate (3.9), and was accounted for mostly by sudden infant death syndrome (SIDS) (7 of the 38 infant deaths in 1980 to 1982). As throughout IHS, Indians in Albuquerque suffer from severe problems related to alcohol abuse. The relatively high infant death

rate from congenital anomalies and the high morbidity and mortality rates from accidents, suicide, and diabetes are all consistent with an alcoholism problem in Albuquerque that is illustrated more directly by liver disease and cirrhosis death rates and hospitalizations for alcoholic liver disease, alcoholic psychoses, and other alcohol-related mental disorders. Most dramatic were the liver disease and cirrhosis death and hospitalization rates. In 1980 to 1982 Albuquerque mortality rates for alcoholic liver disease exceeded U.S. all races rates by 4.8 for females and 3.8 for males. Compared to a hospitalization rate for alcoholic liver disease

**Table 4-33.—Changes in Crude Death Rates, 1972-82:
IHS Albuquerque Area (rate per 100,000 population)**

IHS Code	Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790	Accidents/adverse effects	166.2	140.0	106.2	- 36.1
800	Motor vehicle accidents	119.1	96.3	65.7	- 44.9
810	All other accidents	47.1	43.7	40.5	- 14.0
310	Diseases of the heart	78.2	58.0	56.6	- 27.6
620	Liver disease/cirrhosis	66.6	50.1	30.0	- 54.9
150	Malignant neoplasms	61.3	53.3	51.7	- 15.7
430	Cerebrovascular disease	35.5	24.6	17.5	- 50.8
830	Homicide	28.4	15.1	14.0	-50.8
510	Pneumonia/influenza	27.5	25.4	18.9	-31.4
520	Pneumonia			18.9	
820	Suicide	26.6	31.0	28.7	7.7
260	Diabetes mellitus	16.0	16.7	20.3	26.6
740	Conditions arising in perinatal period	13.3	17.5	7.7	-42.2
630	All other causes	249.2	236.7	172.4	-30.8
ALL	All causes	769.8	668.4	524.0	-31.9

SOURCES: 1972-74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, *Selected Vital Statistics for Indian Health Service Areas and Service Units 1972 to 1977*, DHEW Pub No (HSA)-79-1005 (Rockville, MD: HSA, 1979) 1972-74 and 1975-66 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985 1960.62 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

for U.S. all races of 1.6 per 10,000 population and an overall IHS rate of 4.4, the Albuquerque rate of 7.0 per 10,000 population was striking. Hospitalization rates for alcoholic psychoses, alcohol dependence syndrome, and nondependent alcohol abuse also exceeded U.S. and IHS rates on average.

Bemidji Area

In 1984, the Bemidji area served an estimated 47,000 Indians in the reservation States of Minnesota, Wisconsin, and Michigan. The small IHS service population and the relative lack of IHS facilities in the Bemidji area make the analysis of health status in Bemidji difficult. However, despite improvement over time, the health of Bemidji Indians apparently remains poor. In the 3-year period centered in 1973, the crude mortality rate for Bemidji was 879.9 per 100,000 population. In the 3-year period centered in 1981, it was 707.3, a 19.6-percent decline (table 4-34). Most of the decline was due to reductions in mortality from accidents, pneumonia and influenza, diabetes mellitus, cerebrovascular disease, and homicide, although declines in diseases of the heart and atherosclerosis contributed to overall

improvement as well. However, there has been no improvement in the cancer mortality rate, and deaths from suicide and chronic liver disease and cirrhosis have increased. In the 3-year period centered in 1981, overall mortality of Bemidji Indians exceeded that of U.S. all races by 1.7.

The Bemidji area crude death rate from heart disease declined only 3.2 percent between 1972 to 1974. In 1980 to 1982, the age-adjusted death rate from diseases of the heart exceeded that of U.S. all races by 1.5 for males and almost 2 for females (table 4-35). Bemidji females had the worst, and Bemidji males the second worst, overall mortality rate from heart disease of all Indians in IHS service areas (see figure 4-14). Bemidji is unusual in that diseases of the heart rather than accidents are the leading cause of death among Indian males, and cerebrovascular disease rather than liver disease is the fourth leading cause of death among Indian males and females. IHS outpatient, but not inpatient, information indicates a severe problem with cardiovascular disease (see table 4-36). Hypertension, which is implicated in ischemic heart disease and cerebrovascular disease (100), accounted for 6.7 percent of male visits and 4.8 percent of female visits in 1984, making these the second and third reasons for outpatient

**Table 4-34.—Changes in Crude Death Rates, 1972-82:
IHS Bemidji Area (rate per 100,000 population)**

IHS Code	Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
310	Diseases of the heart	232.5	218.8	225.1	-3.2
790	Accidents/adverse effects	175.7	121.1	120.6	-31.4
800	Motor vehicle accidents	104.6	58.6	73.3	-30.0
810	All other accidents	71.0	62.5	47.3	-33.4
150	Malignant neoplasms	96.9	81.0	98.4	1.6
430	Cerebrovascular disease	69.7	74.2	39.7	-43.1
510	Pneumonia/influenza	60.7	29.3	20.6	-66.1
260	Diabetes mellitus	36.1	33.2	19.1	-47.1
620	Liver disease/cirrhosis	20.6	38.1	23.7	14.8
830	Homicide	18.0	23.4	11.5	-36.4
820	Suicide	14.2	24.4	19.1	34.4
480	Atherosclerosis	11.6	10.7	8.4	-27.7
	All other causes	143.9	141.0	121.1	-15.8
ALL	All causes	879.9	795.2	707.3	-19.6

SOURCES 1972-74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA)-79-1005 (Rockville, MD: HSA, 1979). 1972-74 and 1975-86 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985. 1980-82 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

visits respectively (see table 4-35). Only the Oklahoma City area (see below) had a higher percentage of IHS direct care encounters for hypertensive disease. However, the Bemidji area hospitalization rate of 54 per 10,000 population for circulatory system diseases was far lower than the U.S. short-stay hospital rate of 238.6 per 10,000 population, and was among the lowest of IHS areas (see table 4-19).

In the 3-year period centered in 1981, the age-adjusted cancer mortality rate of Bemidji females exceeded the U.S. all races female rate. The higher death rates for females were primarily from malignant neoplasms of the digestive and respiratory systems. The only cancer site for which Bemidji males had a greater death rate than U.S. all races males was the urinary tract. As have U.S. rates on the whole, the cancer death rate in Bemidji remained essentially unchanged between 1972 to 1974 and 1980 to 1982. Bemidji hospitalization rates for neoplasms have been surprisingly low, and average lengths of stay shorter than that in U.S. hospitals. The hospital discharge rate for malignant neoplasms in Bemidji was 10.7 per 10,000 population in 1979 (166), and 10.8 per 10,000 population in 1984. Comparable rates in U.S. non-Federal short-stay hospitals were 80.8 and 87.8 per 10,000 population. No cancer related

diagnoses are among the leading causes of outpatient visits in Bemidji. (The low Bemidji rates could mean that fewer Indians than should be are treated for cancer, that coding for either or both the underlying cause of death and the first-listed diagnosis for hospital discharge are listed incorrectly, or that Indians are receiving treatment for cancer in non-IHS facilities.)

As in most IHS areas, in the 3-year period centered in 1981, accidents were the second leading cause of death among Bemidji males, and the third leading cause of death among Bemidji females, exceeding the U.S. all races rates by more than three times for both males and females. Deaths from violent causes other than accidents appear to be relatively less of a problem in Bemidji than in other IHS areas, the exception being male suicides, of which there were 22 in 1980 to 1982, a rate 1.7 times that of U.S. all races. Compared to other IHS areas, Bemidji was notable in that suicide was not among the 15 leading causes of death for Indian females in 1980 to 1982. Despite high accident and injury mortality rates, Bemidji's 1984 hospitalization rate per 10,000 population for injuries and poisonings (63.0) was markedly less than that of U.S. non-Federal short-stay hospitals (148.1). However, injury-related diagnoses (lacerations and open wounds; superficial inju-

Table 4-35.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Bemidji IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Bemidji area Indians to U.S. all races
m						
310	1.	Diseases of the heart	125	262.5	135.1	1.9
150	2.	Malignant neoplasms.	66	148.3	108.6	1.4
790	3.	Accidents/adverse effects.	46	74.9	20.4	3.7
430	4.	Cerebrovascular diseases	21	36.6	35.4	1.0
620	5.	Liver disease/cirrhosis,	16	366	7.4	4.9
260	6.	Diabetes mellitus	15	34.8	9.6	3.6
510	7.	Pneumonia/influenza	11	23.1	9.2	2.5
480	8.	Atherosclerosis.	7	13.0	4.6	2.8
090	9.	Septicemia.	6	10.4	2.4	4.3
540	10.	Chronic pulmonary diseases	5	9.3	9.5	1.0
830	11.	Homicide	5	7.5	4.3	1.7
640	12.	Nephritis, et al	4	8.9	3.6	2.5
610	13.	Hernia/intestinal obstruction	3	4.8	1.3	3.7
630	14.	Cholelithiasis/gallbladder	3	6.1	0.7	8.8
730	15.	Congenital anomalies	3	3.4	5.5	0.6
		All others	45	82.3	62.8	1.3
ALL	...	All causes	381	762.5	420.4	1.8
Males:						
310	1.	Disease of the heart	170	402.2	271.2	1.5
790	2.	Accidents/adverse effects.	112	189.7	60.2	3.2
150	3.4.	Malignant neoplasms.	63	153.2	163.7	0.9
430		Cerebrovascular diseases	31	73.5	41.7	1.8
820	5:	Suicide	22	30.6	18.0	1.7
510	6.	Pneumonia/influenza	16	30.6	16.6	1.8
620	7.	Liver disease/cirrhosis.	15	35.4	16.0	2.2
540	8.	Chronic pulmonary diseases	13	33.0	26.2	1.3
260	9.	Diabetes mellitus	10	26.2	10.0	2.6
830	10.	Homicide	10	16.5	16.7	1.0
740	11.	Conditions arising in perinatal period	9	10.2	10.3	1.0
730	12.	Congenital anomalies	7	7.9	6.1	1.3
640	13.	Nephritis, et al	5	10.8	5.6	1.9
480	14.	Atherosclerosis.	4	9.4	6.0	1.6
490	15.	Other arterial diseases	4	10.3	8.5	1.2
		All others.	55	102.6	76.5	1.3
ALL	. . .	All causes	546	1,142.1	753.3	1.5

a Equivalence to ICD-9 code available from the Indian Health Service.

SOURCES U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics "Advance Report, Final Mortality Statistics 1981," Monthly *Vital Statistics Report* 33(3):supp, June 22, 1984, Indians in IHS areas: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to [the Office of Technology Assessment, Washington, DC, 1985

ries and contusions; dislocations, sprains, and strains) were among the 15 leading causes of outpatient visits for Bemidji males in 1984, accounting for 6.7 percent of male visits.

Other ailments of special note in Bemidji are reflected in morbidity but not mortality data: skin diseases, vision problems, disorders of the musculoskeletal system, and for females, urinary tract infections. Skin diseases constituted 2 of the 15 leading causes of male outpatient visits, and 1 of the 15 leading causes of female outpatient visits

in 1984. As in almost all IHS areas, otitis media accounted for a high proportion of ambulatory care. Although there were few deaths from diabetes in 1980 to 1982 in Bemidji, it was a leading cause of outpatient visits in 1984, accounting for 6.8 and 7.2 percent of visits among females and males, respectively. Bemidji's hospitalization rate for diabetes (97 discharges 20.6 per 10,000 population in 1984) was lower than that of U.S. short-stay non-Federal hospitals (25.3) in 1984, but it was high relative to hospitalization rates for other diseases.

Table 4-36.—Fifteen Most Frequent Outpatient Diagnoses:^aBemidji Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
	080	Diabetes mellitus	4,276	6.8
12.	819	Other preventive health services	4,123	6.5
3.	300	Upper respiratory infection, common cold	3,668	5.8
4.	283	Hypertensive disease	3,020	4.8
5.	250	Acute otitis media	2,776	4.4
6.	480	Prenatal care	2,651	4.2
7.	575	Other muskuloskeletal and connective tissue disease	1,794	2.8
8.	823	Tests only (lab, X-ray)	1,482	2.3
9.	210	Refractive error	1,473	2.3
10.	818	Well child care	1,362	2.2
11.	812	Other iii-defined, undiagnosed diseases	1,219	1.9
12.	400	Urinary tract infection	1,105	1.7
13.	510	Eczema, urticaria, orskin allergy	1,103	1.7
14.	301	Pharyngitis and tonsillitis (nonstrep)	1,093	1.7
15.	827	All other	1,143	1.8
Male:				
1.	080	Diabetes mellitus	3,481	7.2
2.	283	Hypertensive disease	3,237	6.7
3.	250	Acute otitis media	3,164	6.6
4.	300	Upper respiratory infection, common cold	2,638	5.5
5.	819	Other preventive health services	2,396	5.0
6.	818	Well child care	1,487	3.1
7.	730	Laceration, open wound	1,419	2.9
8.	575	Other muskuloskeletal and connective tissue disease	1,393	2.9
9.	210	Refractive error	1,116	2.3
10.	731	Superficial injury or contusion	939	2.0
11.	702	Dislocations, sprains, and strains	884	1.8
12.	520	Other diseases of skin	836	1.7
13.	355	Diseases of teeth and gums	833	1.7
14.	510	Eczema, urticaria, or skin allergy	824	1.7
15.	827	All other	836	1.7
		All other causes, both sexes	54,585	
	ALL	All causes, both sexes	112,356	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses

SOURCES: ¹⁵ leading clinical impressions: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. Bemidji total: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date)

Billings Area

IHS estimates that its Billings area serves approximately 40,000 Indians residing in Montana and Wyoming.

The Billings service population is equal to 4.3 percent of the estimated IHS service population. However, in the 1980-82 period, Billings had 6.8 percent of IHS deaths. As in most other IHS areas, poor socioeconomic conditions in Billings correlate with poor health. The Billings area has shown only a 7-percent decline in overall mortality since the early 1970s, from a crude rate of 1,015.6 to 943.3 deaths per 100,000 population. The com-

bined age-adjusted mortality rate for the Billings area in the 1980-82 period was 1,260, 1.3 deaths per 100,000 service population, a rate more than twice that of U.S. all races.

The leading causes of death among Indian males in 1980 to 1982 were accidents, heart disease, cancers, liver disease and cirrhosis, suicide, homicide, and cerebrovascular disease (see table 4-37). These causes accounted for 74 percent of all deaths. For females, the leading causes of death in 1980 to 1982 were heart disease, accidents, malignant neoplasms, liver disease and cirrhosis, diabetes mellitus, conditions originating in the perinatal period, cerebrovascular disease, pneu-

Table 4-37.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Billings IHS Area Indians 1980.82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Billings area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	88	229.6	135.1	1.7
790	2.	Accidents/adverse effects,	63	122.4	20.4	6.0
150	3.	Malignant neoplasms.	59	159.6	108.6	1.5
620	4.	Liver disease/cirrhosis.	40	109.0	7.4	14.7
260	5.	Diabetes mellitus	18	50.4	9.6	5.2
740	6.	Conditions arising in perinatal period	15	16.7	8.2	2.0
430		Cerebrovascular diseases	14	32.6	35.4	0.9
510	7A	Pneumonia/influenza	14	30.1	9.2	3.3
830	9.	Homicide	9	16.2	4.3	3.8
540	10.	Chronic pulmonary diseases	8	23.6	9.5	2.5
640	11.	Nephritis, et al	7	16.6	3.6	4.6
630	12.	Cholelithiasis/gallbladder	4	8.9	0.7	12.8
730	13.	Congenital anomalies	4	4.4	5.5	0.8
090	14.	Septicemia.	3	9.1	2.4	3.8
140	15.	All other infectious/parasitic diseases	3	6.9	1.3	5.3
		All others	75	161.0	59.2	2.7
ALL		All causes	424	997.1	420.4	2.4
Males:						
790	1.	Accidents/adverse effects.	168	354.5	60.2	5.9
310	2.	Diseases of the heart	119	340.3	271.2	1.3
150	3.	Malignant neoplasms.	51	153.6	163.7	0.9
620	4.	Liver disease/cirrhosis.	40	114.8	16.0	7.2
820	5.	Suicide	29	61.6	18.0	3.4
830	6.	Homicide	29	57.4	16.7	3.4
430	7.	Cerebrovascular diseases.	20	57.8	41.7	1.4
510	8.	Pneumonia/influenza	15	41.2	16.6	2.5
540	9.	Chronic pulmonary disease	11	31.9	26.2	1.2
260	10.	Diabetes mellitus	9	25.5	10.0	2.6
090	11.	Septicemia.	7	20.9	3.4	6.2
740	12.	Conditions arising in perinatal period	7	7.9	10.3	0.8
140	13.	All other infectious/parasitic diseases	5	12.3	1.7	7.2
640	14.	Nephritis, et al	5	11.6	5.6	2.1
030	15.	Tuberculosis	4	12.5	1.0	12.5
		All others	97	235.6	91.0	2.6
ALL		All causes	616	1,539.4	753.3	2.0

^aEquivalence to ICD-9 code available from the Indian Health Service

^bIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed, therefore, they may not be valid diagnoses

SOURCES U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3) supp., June 22, 1984, Indians in IHS areas: US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

monia and influenza, and homicide. These causes accounted for 75 percent of all deaths (see table 4-13), Deaths from other causes are too small from which to draw solid inferences, but severe health problems are suggested in the finding that the rates of almost all major causes of Indian deaths in Billings exceeded that of U.S. all races.

The Billings area crude death rate from accidents of all types declined an estimated 11 percent between 1972 and 1982 (table 4-38), but accidents remained the leading cause of death among

males, for whom the mortality rate was almost six times that of U.S. all races males. This ratio also applied to females, although in 1980 to 1982 accidents were not the leading cause of death for females. While suicide and homicide were the 10th and 11th causes of death for U.S. all races populations in 1981, they were the 5th and 6th leading causes of death among Billings males, each having claimed 29 lives in the 3-year period centered in 1981. The age of suicides in 1980 to 1981 was different from both U.S. all races and other IHS areas. The greatest single number of Billings

**Table 4.38.—Changes in Crude Death Rates, 1972-82:
IHS Billings Area (rate per 100,000 population)**

IHS Code Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790 Accidents/adverse effects	236.4	214.3	209.5	- 11.4
310 Diseases of the heart	190.2	185.6	187.7	- 1.3
150 Malignant neoplasms	84.4	80.0	99.8	18.2
620 Liver disease/cirrhosis	69.8	66.6	72.6	4.0
510 Pneumonia/influenza	55.1	32.8	26.3	-52.3
430 Cerebrovascular disease	36.0	29.7	30.8	- 14.3
740 Conditions arising in perinatal period	32.6	28.7	20.0	-38.8
820 Suicide	29.2	20.5	29.0	-0.6
820 Homicide	23.6	25.6	34.5	46.1
730 Congenital anomalies	14.6		7.3	- 50.3
All other causes	243.7	219.8	225.8	- 7.1
ALL All causes	1,015.6	903.6	943.3	- 7.1

SOURCES: 1972-74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, *Selected Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA)-79-1005 (Rockville, MD: HSA, 1979). 1972-74 and 1975-86 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985. 1980-82 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

area suicides occurred in the 15 to 24 age group, while this age group was among the lowest for U.S. all races in 1981.

Hospitalizations and outpatient visits reflect the impact of accidents and other violence. Hospitalizations for injuries and poisonings occurred at a rate almost twice that for all IHS direct and contract hospitals and U.S. non-Federal short-stay hospitals. Lacerations and open wounds accounted for 2.7 percent of male outpatient visits, and dislocations, sprains, and strains accounted for another 2 percent (see table 4-39).

Deaths from diseases of the heart have remained relatively stable, from a crude rate of 190.2 per 100,000 population (169 deaths) in 1972 to 1974, to 185.6 (181 deaths) in 1975 to 1977, and to 187.7 (207 deaths) in 1980 to 1982, a decrease of only 2.4 percent. Based on data for 1980 to 1982, Billings area males are 1.25 times as likely as U.S. all races males to die from diseases of the heart, particularly acute myocardial infarction, making heart disease the second leading cause of male deaths. The ratio is worse for females, who are 1.7 times as likely as their U.S. all races counterparts to die of heart disease. The 88 heart disease deaths in 1980 to 1982 accounted for 21 percent of Billings area female deaths. Cerebrovascular mortality was also the seventh leading cause of death for males and females, although absolute

numbers were small. Consistent with the high rate of cardiovascular mortality, hospitalizations for diseases of the circulatory system occurred at a rate twice that of IHS areas on average, though a little less than that of U.S. non-Federal short-stay hospitals.

Malignant neoplasms were the third leading cause of death in 1980 to 1982. In the decade between 1972 and 1982, the cancer mortality rate increased from a crude rate of 84.4 per 100,000 population to 99.8 per 100,000, an 18-percent increase, although absolute numbers are small and changes should be interpreted cautiously. In the 3-year period centered in 1981, 51 males and 59 females died of cancer. As in Aberdeen and Bemidji, age-adjusted cancer death rates exceeded the U.S. all races rate by 1.5 for women, but did not exceed the U.S. rate for men. Cancer of the respiratory system was the leading cause of cancer deaths in both sexes. Data indicating that 1984 hospitalizations for cancer occurred at twice the rate of IHS hospitals in all areas indicate that cancer continues to be a problem in Billings relative to other IHS areas.

Unlike the experience in other IHS areas, the Billings diabetes crude death rate increased from 16.4 per 100,000 population to 24.5 per 100,000 population in the 8-year period from 1975 to 1982. Small numbers indicate that inferences should be

Table 4.39.—Fifteen Most Frequent Outpatient Diagnoses:^aBillings Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	480	Prenatal care	11,037	5.6
2.	300	Upper respiratory infection, common cold	8,960	4.6
3.	819	Other preventive health services	6,663	3.4
4.	080	Diabetes mellitus	6,475	3.3
5.	251	Chronic otitis media with/without mastoiditis	6,342	3.2
6.	823	Tests only (lab, X-ray)	6,192	3.2
7.	820	Hospital medical/surgical followup	5,068	2.6
8.	821	Physical examination	4,704	2.4
9.	812	Other ill-defined, undiagnosed diseases	4,203	2.1
10.	818	Well child care	4,165	2.1
11.	301	Pharyngitis and tonsillitis (nonstrep)	3,940	2.0
12.	810	All other symptoms.	3,932	2.0
13.	400	Urinary tract infection.	3,181	1.6
14.	283	Hypertensive disease	2,886	1.5
15.	827	Another	38,362	19.6
Male:				
1.	251	Chronic otitis media with/without mastoiditis	6,894	5.2
2.	300	Upper respiratory infection, common cold	6,385	4.8
3.	821	Physical examination	5,224	3.9
4.	812	Other ill-defined, undiagnosed diseases	4,801	3.6
5.	819	Other preventive health services	4,714	3.5
6.	820	Hospital medical/surgical followup	4,154	3.1
7.	818	Well child care	4,087	3.1
8.	080	Diabetes mellitus	4,063	3.0
9.	730	Laceration, open wound	3,546	2.7
10.	823	Tests only (lab, X-ray)	3,202	2.4
11.	301	Pharyngitis and tonsillitis (nonstrep)	2,776	2.1
12.	810	All other symptoms.	2,672	2.0
13.	283	Hypertensive disease	2,579	1.9
14.	702	Dislocations, sprains, and strains	2,513	1.9
15.	827	All other	25,320	18.9
		All other causes, both sexes.	133,339	
	ALL	All causes, both sexes	332,379	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed, therefore, they may not be valid diagnoses

SOURCES 15 leading clinical impressions: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report On 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque NM, 1985 Billings total: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service Office of Planning, Evaluation and Legislation, Program Statistics Branch *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD IHS, no date)

made cautiously, but the growing significance of the diabetes problem is also reflected in the Billings hospitalization rate. The 217 hospital discharges for diabetes in 1984 (195) equaled a rate of 54.1 discharges per 10,000 population, more than twice the diabetes discharge rate for U.S. short-stay non-Federal hospitals (see table 4-19), although, as is typical, the proportion of hospitalizations was lower than the proportion of deaths. Outpatient encounters for diabetes were, however, relatively low in Billings (about 3 percent of visits compared to an IHS average of 4.4), and despite the high rate of hospitalization for diabetes, refractive disorders were not among the top 15 clinical impressions.

Both neonatal and postneonatal infant mortality were higher in 1980 to 1982 than for U.S. all races, but not as high as the infant death rates for several other IHS areas (see figure 4-16). The single largest cause of infant deaths in Billings, as in most other IHS areas, was sudden infant death syndrome (175a).

Billings is no different from other areas in that alcohol abuse has been implicated in almost all the leading causes of death. High death rates from liver disease and cirrhosis, the fourth leading cause of death, confirm the alcoholism problem. In 1980 to 1982 the male death rate from liver disease and cirrhosis was more than 7 times that of U.S. all

racers males, and the female death rate was more than 14 times that of U.S. all races females. As another indicator of the alcohol abuse problem, the hospitalization rate for Billings Indians for alcohol-related conditions was substantially greater than that of both IHS and U.S. non-Federal short-stay hospitals.

Both otitis media and urinary tract infections were among the leading causes of outpatient visits. In 1984, 6,894 (5.2 percent) of male outpatient visits, and 6,342 (3.2 percent) of female outpatient visits to Billings area IHS facilities were for chronic otitis media, making the condition the second leading cause of outpatient visits for males and the third for females. Billings had the third highest rate of hospitalizations for otitis media of IHS areas, at a rate more than twice that of U.S. non-Federal short-stay hospitals.

Mental disorders accounted for a higher proportion of hospitalizations in Billings than in other IHS areas. In Billings, 474 discharges for mental disorders were made in direct and contract hospitals in 1984, for a rate of 118.1 per 10,000 service population. The U.S. short-stay non-Federal hospital rate for 1984 was considerably lower, **72.1 (203)**. Two-thirds of Billings inpatient visits were for disorders related to alcohol abuse. Mental disorders, however, were not among the 15 leading reasons for outpatient visits in Billings, although one or more categories of mental disorders were among the leading reasons for outpatient encounters in several of the Billings service units (175),

California Program

The California program covers an estimated 73,262 of California's 216,070 Indians.

While data pertaining to the health status of all other IHS programs and areas have their limitations, information about Indians in California is practically nonexistent. This state of affairs exists for several reasons, the primary one being the loss of reservation lands as a consequence of changing and diverse Federal policies applied to California Indians. The California population is a great ethnic mix, with a great number of Hispanics and individuals who are part Hispanic, and

Indians from countries other than the United States, making identification of "Indians" difficult. Thus, Indians may be harder to recognize as Indians for vital statistics purposes (births and deaths), although they may be likely to identify themselves as such for U.S. Census purposes. As a consequence, natality and mortality statistics are said to be seriously underreported. Although no one knows how extensive the undercounting is, it is clear that 471 deaths in 3 years for the service population of nearly 70,000 people and 1,056 Indian deaths among the estimated 216,000 Indians in the entire State of California is very unlikely. Those numbers of deaths would reflect mortality rates of 278.74 and 201.7, half that of the U.S. all races rate and even lower than the death rates of some of the wealthiest counties in the country. Douglas County (Colorado) for example, the seventh wealthiest county with a median family income of \$30,154 in 1979, had an age-adjusted death rate of 362.4 per 100,000 population in 1981. The 1980 age-adjusted death rates for Montgomery County (Maryland), the sixth wealthiest county in the Nation, was 460.7 per 100,000 population. The lack of valid mortality data might be remedied by the availability of patient care statistics, but there are no IHS direct care facilities in California, and IHS-funded facilities administered by Indian organizations are neither required to report on reasons for treatment, nor provided the equipment to do so efficiently and compatibly with IHS patient care systems (43).

However, while actual mortality rates appeared invalid to California Indian health care administrators, officials and tribal members contacted by OTA agreed that, based on their experience, the rank order of causes reflected in the mortality statistics was probably correct. In fact, the rank order is comparable to that of causes of death for Indians in other IHS areas. The leading causes of death among California Indians in 1980 to 1982 were estimated to be, in descending order, diseases of the heart; accidents; malignant neoplasms; cerebrovascular disease; chronic liver disease and cirrhosis; homicide; diabetes mellitus; suicide; pneumonia; chronic pulmonary disease; nephritis, nephrotic syndrome, and nephrosis; certain conditions originating in the perinatal period;

atherosclerosis; tuberculosis; and other diseases of arteries, arterioles, and capillaries. These data indicate that Indians in California experience much the same health problems as Indians in other parts of the country.

Nashville Program

It is difficult to write of the Nashville program in the same sense that other IHS programs and areas are discussed. Indian areas in the Nashville program are widely dispersed. Currently, the area serves an estimated 36,000 Indians in nine reservation States: Alabama, Mississippi, Louisiana, Florida, North Carolina, Pennsylvania, New York, Connecticut, and Maine (see figure 1-3 in ch. 1). However, unlike most other IHS areas, the reservation States included in the Nashville program contain more Indians who are not eligible for IHS service than they contain IHS service-eligible Indians (table 4-1). (The Nashville program office is located in Tennessee, which is not a reservation State, although it has an estimated 5,372 Indian residents).

There is little demographic, social, housing, and economic information about Indians served by the Nashville program. Many of the reservations are so small that the census will not release information on their social, economic, and housing characteristics in order to maintain confidentiality. The socioeconomic information that is available varies considerably across reservations. Based on data released by the U.S. Census Bureau, for example, the percent of Nashville area reservation Indians aged 25 and over who were high school graduates ranges from 69.4 percent among the Shinnecocks, a reservation of only 261 individuals in New York State, to 30.1 percent on the Indian Township Reservation in Maine, a reservation estimated to have only 384 Indians (146). Median family income ranged from \$26,250 on a reservation in Connecticut to \$6,250 on a reservation in Maine, and the percent of Indian homes lacking plumbing ranged from 0 to 39.6 percent (145). Bureau of Indian Affairs reports employment data for only six of the reservation States in the Nashville area. In these States, from **28** (Mississippi) to **60** percent (New York) of the labor force was estimated to be able to work but unemployed in January 1985 (209).

In the 1980-82 period, 557 Indian residents of IHS service areas in the Nashville area died, for an overall age-adjusted mortality rate of 765.4 per 100,000 population, a rate 1.3 times the U.S. all races rate (1.4 for females and 1.3 for males; see table 4-40). Because of the dispersion of Nashville area Indians, it is possible that the death rate is understated. In addition, as shown in table 4-41, in most service units the number of deaths that was reported was too small from which firm conclusions could be drawn. The largest service units, which contained the largest numbers of deaths, were the Seneca, the Cherokee, and the Choctaw; and the service units with the worst Indian to U.S. all races ratios were the Choctaw, the Seneca, and the St. Regis Mohawk, although all service units but the Seminole had age-adjusted mortality rates exceeding the U.S. all races average.

The leading cause of death was diseases of the heart, with the mortality rate exceeding that of U.S. all races by 1.3 for females, and 1.1 for males. The leading cause of death among males was accidents. In 1980 to 1982 Indian males died from accidents at an average rate 2.7 times that of U.S. all races in 1981. For females, on the other hand, accidents were the fifth leading cause of death. Suicide and homicide were the fifth and sixth causes of death among Nashville males, exceeding the rate for U.S. all races males by 1.7 and 1.9 times, respectively. As shown in table 4-43, the number of females who died from these two violent causes in 1980 to 1982 was too small for valid conclusions to be drawn.

On average, male deaths from cancer occurred at a rate lower than that of U.S. all races, except for cancer of the digestive system, which occurred at 1.2 times the U.S. rate for both sexes. The circumstances of the Nashville program make discussion of the absolute numbers of other deaths inappropriate. It is also difficult to draw conclusions about health status from patient care data for the Nashville area, because there are only two IHS-supported hospitals (one of them tribally operated) and only 11 health centers/stations in four States to serve the Indian population, which, as noted, is dispersed over nine States. Thus, one would expect that many Indians, even if IHS service-eligible, obtain health care from other providers. The patient care data that are available, primarily from tribally administered facil-

Table 4-40.— Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Nashville IHS Area Indians 1980.82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Nashville area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	66	173.7	135.1	1.3
150	2.	Malignant neoplasms.	41	116.8	108.6	1.1
430	3.	Cerebrovascular diseases	19	46.4	35.4	1.3
260	4.	Diabetes mellitus	13	34.2	9.6	3.6
790	5.	Accidents/adverse effects.	12	26.4	20.4	1.3
510	6.	Pneumonia/influenza	9	22.5	9.2	2.4
620	7.	Liver disease/cirrhosis.	7	21.3	7.4	2.9
830	8.	Homicide	5	13.1	4.3	3.0
640	9.	Nephritis, et al	3	7.1	3.6	2.0
730	10.	Congenital anomalies	3	6.4	5.5	1.2
740	11.	Conditions arising in perinatal period	3	6.4	8.2	0.8
820	12.	Suicide	2	4.2	5.7	0.7
090	13.	Septicemia.	1	2.8	2.4	1.2
250	14.	Benign neoplasms, other	1	2.5	1.7	1.5
270	15.	Nutritional deficiencies	1	2.5	0.4	6.3
		All others	37	96.2	62.9	1.5
ALL		All causes	223	582.5	420.4	1.4
Males:						
310	1.	Diseases of the heart	89	285.0	271.2	1.1
790	2.	Accidents/adverse effects	62	159.0	60.2	2.6
150	3.	Malignant neoplasm.	43	138.9	163.7	0.8
430	4.	Cerebrovascular diseases	19	60.9	41.7	1.5
260	5.	Diabetes mellitus	14	46.7	10.0	4.7
820	6.	Suicide	14	30.4	18.0	1.7
830	7.	Homicide	14	31.4	16.7	1.9
620	8.	Liver disease/cirrhosis.	12	41.1	16.0	2.6
510	9.	Pneumonia/influenza	11	29.4	16.6	1.8
740	10.	Conditions arising in perinatal period	10	21.0	10.3	2.0
840	11.	All other external conditions	3	6.0	2.2	2.7
090	12.	Septicemia	2	5.7	3.4	1.7
250	13.	Benign neoplasms, other	2	5.2	2.1	2.5
490	14.	Other arterial diseases	2	5.3	8.5	0.6
540	15.	Chronic pulmonary diseases	2	7.1	26.2	0.3
		All others	35	92.5	86.5	1.1
ALL		All causes	334	965.6	753.3	1.3

^aEquivalence to ICD-9 code available from the Indian Health Service.

SOURCES: U.S. all races: US, Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," Monthly Vital Statistics Report 33(3)supp., June 22, 1984, Indians in IHS areas: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

ities, were summarized earlier and show that overall hospital discharges from Nashville facilities occur at a rate far lower than from other IHS and U.S. short-stay non-Federal hospitals. The only exceptions are the categories "supplementary classification" (for Nashville, this is primarily after-care in IHS hospitals following discharge from contract hospitals) at a rate of 82.4 per 10,000 population, compared to an average IHS rate of 64 per 10,000 population and an average U.S. rate of 19.4 per 10,000 population; and "symptoms, signs and ill-defined conditions" (Nashville rate of 56.1, IHS rate of 57, and U.S. short-stay hospital rate of 22 per 10,000 population).

Hospitalization rates in the Nashville area in 1979 (166) were much higher than they were in 1984, which may reflect the decreasing pool of contract care funds (see ch. 6) and the increasing population base. Nashville is similar to other IHS areas in that "complications of pregnancy," including normal deliveries, is the first cause of hospitalization.

Nashville was also unusual in that outpatient visits for diseases of the teeth and gums were among the leading causes of visits for both males and females, and gastroenteritis and diarrhea were among the leading causes of visits for males (ta-

Table 4-41.—Estimated Deaths and Age-Adjusted Death Rates for Indians in the Nashville Program, by Service Unit, 1980-82

Service unit	Both sexes			1980 service population	Leading causes
	Deaths	Age-adjusted death rate ^a	Ratio to U.S. all races rate		
Cherokee	122	805.6	1.4	5,604	Male: Heart disease, cancer, accidents Female: Heart disease, cancer, diabetes mellitus
Chitimacha	5	428.3	NA	388	Male: Heart disease Female: Diabetes mellitus
Choctaw	108	865.5	1.5	4,155	Male: Accidents, heart disease, homicide, suicide Female: Cancer, heart disease, cerebrovascular disease
Coushatta	5	1,379.7	NA	234	Male: Heart disease Female: Heart disease
Miccosukee	14	276.4	NA	1,729	Male: Accidents, suicide Female: Heart disease
Narragansett ^b	NA	NA	NA	[1,207] ^b	
Passamaquoddy	28	813.6	1.4	1,346	Male: Cancer, heart disease, cerebrovascular disease Female: Heart disease, cerebrovascular disease, homicide
Penobscot	21	636.9	1.1	1,352	Male: Heart disease, cancer, accidents Female: Cancer, heart disease, pneumonia/influenza
Pequot ^b	NA	NA	NA	[821] ^b	
Poarch Creeks ^c	NA	NA	NA	[4,612] ^c	
Seminole	28	488.7	0.9	2,139	Male: Cancer, accidents Female: Cancer, heart disease
Seneca	170	876.0	1.5	7,258	Male: Heart disease, accidents, cancer, cerebrovascular disease Female: Heart disease, cancer, diabetes, cerebrovascular disease
St. Regis Mohawk	55	846.6	1.5	2,526	Male: Heart disease, cancer Female: Heart disease, cancer, cerebrovascular disease
Tunica Biloxi ^d	NA	NA	NA	[484] ^d	
All	557	765.4	1.3	35,822	Male: Heart disease, accidents, cancer, cerebrovascular disease, diabetes Female: Heart disease, cancer, cerebrovascular, diabetes, accidents

^aRate per 100,000 population

^bBecame a service Unit in 1983; population shown is estimate for 1983 Deaths in 1980-82 not available

^cBecame a service Unit in 1984; population shown is estimate for 1984 Deaths in 1980-82 not available

^dBecame a service Unit in 1982; population shown is estimate for 1982 Deaths in 1980-82 not available

SOURCES Indian deaths: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985 Population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Population Statistics Staff, "Estimated Indian and Alaska Native Service Population by Area and Service Unit," Internal document, Rockville, MD, Feb 1, 1985

ble 4-42). The Choctaw and Cherokee service units account for most of the visits for gastroenteritis. The St. Regis Mohawk service unit stood out, because skin diseases were among the leading cause of visits for both males and females, and vitamin deficiencies and neuroses are among the leading causes of visits for females (175).

Navajo Area

The Navajo area serves the Navajo reservation located in the States of Arizona, New Mexico, and

Utah. The service population in the Navajo area was estimated to be 162,005 in 1984.

In some respects the health status in the Navajo area is better than that of the U.S. all races population. Between 1972 and 1982, the Navajo area experienced a 31.2 percent decline in the crude death rate (see table 4-43), although the death rates from cancer and congenital anomalies rose in the same period. Of the 15 leading causes of death in 1980 to 1982, mortality rates were better on average than those of U.S. all races for dis-

Table 4.42.—Fifteen Most Frequent Outpatient Diagnoses:^aNashville Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	300	Upper respiratory infection, common cold	4,328	10.0
2.	819	Other preventive health services	2,834	6.6
3.	080	Diabetes mellitus	2,020	4.7
4.	480	Prenatal care	1,731	4.1
5.	283	Hypertensive disease	1,359	3.2
6.	250	Acute otitis media	1,303	3.1
7.	818	Well child care	1,124	2.6
8.	575	Other musculoskeletal and connective tissue diseases.. . . .	1,055	2.5
9.	823	Tests only (lab, X-ray)	919	2.2
10.	305	Respiratory allergy, asthma, and hay fever	836	2.0
11.	355	Diseases of teeth and gums	836	2.0
12.	808	Headache	788	1.8
13.	450	Infection of female genitalia (excluding VD)	728	1.7
14.	301	Pharyngitis and tonsillitis (nonstrep)	707	1.7
15.	827	All other	2,483	5.8
M				
1.		Upper respiratory infection, common cold	2,990	10.2
2.	819	Other preventive health services	1,674	5.7
3.	283	Hypertensive disease	1,357	4.6
4.	080	Diabetes mellitus	1,172	4.0
5.	250	Acute otitis media	1,136	3.9
6.	818	Well child care	1,009	3.4
7.	575	Other musculoskeletal and connective tissue disease.	868	3.0
8.	730	Laceration, open wound	805	2.7
9.	305	Respiratory allergy, asthma, and hay fever	719	2.4
10.	731	Superficial injury, contusion	698	2.4
11.	821	Physical examination	687	2.3
12.	355	Diseases of teeth and gums	604	2.1
13.	014	Gastroenteritis, diarrhea, etc.	591	2.0
14.	702	Dislocations, sprains, and strains	548	1.9
15.	827	All other	1,630	5.5
		All other causes, both sexes	33,520	
	ALL	All causes, both sexes	73,059	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses

SOURCES: **15 leading clinical impressions:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. Nashville **total:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date)

eases of the heart (although it was the second leading cause of death among Navajo), cancer, cerebrovascular disease, chronic and obstructive pulmonary disease, and neonatal mortality. However, for the remaining leading causes of death, and for several other causes, Navajo mortality exceeded that of U.S. all races in the 3-year period centered in 1981 (table 4-44).

The death rate from accidents, the leading cause of deaths in Navajo Indians of both sexes, exceeded that of U.S. all races by 4 times, 4.5 times for males, and 3.5 times for females. Navajo males were 1.3 times as likely as U.S. all races males to die from suicide, and 1.5 times as likely to die by homicide. Consistent with the high rate of

death by violence, the Navajo hospitalization rate for injuries and poisonings was relatively high as IHS areas go (142.8 per 100,000 population; see table 4-19), but the excess mortality among Navajos would seem to warrant an even higher hospitalization rate. Outpatient encounters in Navajo reinforce the impression that social causes of morbidity and mortality are prevalent. The categories of lacerations and open wounds, superficial injury or contusion, and fracture of the extremities accounted for 8.2 percent of male outpatient visits in 1984 (see table 4-45).

The Navajo female death rate for diabetes also exceeded that of U.S. all races females, and the high female death rate from chronic renal failure

**Table 4-43.—Changes in Crude Death Rates, 1972-82:
IHS Navajo Area (rate per 100,000 population)**

IHS Code	Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790	Accidents/adverse effects	241.7	196.8	155.1	- 35.8
800	Motor vehicle accidents	153.0	130.4	90.2	-41 .0
810	All other accidents	88.7	66.3	53.8	- 39.3
310	Diseases of the heart	68.0	52.5	58.7	- 13.6
510	Pneumonia/influenza	43.5	41.8	26.8	- 38.4
150	Malignant neoplasms	42.0	44.0	51.6	22.8
620	Liver disease/cirrhosis	26.6	22.8	14.1	-47.1
740	Conditions arising in perinatal period	25.3	18.9	8.9	-64.7
430	Cerebrovascular disease	23.5	17.6	13.9	-41 .1
830	Homicide	22.2	17.8	13.2	- 40.2
820	Suicide	19.7	21.4	11.8	- 39.9
	Enteritis, other diarrheal disease . . .	11.9			
	All other causes	259.7	215.8	185.1	- 28.6
All	All causes	784.1	648.6	539.2	-31 .2

SOURCES 1972-74 and 1975-77 **deaths**: U S Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, *Selected Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA) 79-1005 (Rockville, MD: HSA, 1979) 1972.74 and 1975-66 population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985 1960.82 data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

(22 deaths in the 1980-82 period, four times greater than the U.S. all races female rate) may be related to excess morbidity from diabetes. The Navajo male death rates from diabetes and renal failure also exceeded the U.S. all races male rates, but not by as much. It is interesting, then, that the 1984 hospitalization rate for diabetes was 16.5 per 10,000 population, a rate substantially below that of U.S. all races (25.3) and the IHS on average (26.2).

Among IHS areas, the Navajo have a fairly low infant mortality rate (12.8 in 1980 to 1982), although it still exceeded that of U.S. all races (11.9 in 1981). The postneonatal rate in Navajo (**8.6**), however, was more than twice that of U.S. all races. Unlike most other areas, SIDS was not the single most significant cause of death among Navajo postneonates. Eight Navajo infants died of congenital anomalies of the heart, eight from meningitis, and eight from SIDS in 1980 to 1982 (175a).

Deaths from liver disease and cirrhosis were the fifth leading cause of death among the Navajo, although the death rate from this cause, 21.4 per **100,000** population, was fairly low among IHS areas (an average of **48.1** per **100,000** IHS service population, compared to 11.4 for U.S. all

rates), Navajo hospitalizations for alcoholic liver disease (2.8 per **10,000** population in 1984) were low relative to most other IHS areas (4.4), but higher than those of U.S. all races. Hospitalizations for mental disorders, including alcohol dependence syndrome, were extremely low in Navajo (a discharge rate of 38.3 per **10,000** population) compared to the U.S. rate (72 per 10,000 population), and even compared to the IHS average rate (57 per 10,000 population). In addition, infant deaths from congenital anomalies may be due to fetal alcohol syndrome, the prevention of which has been the focus of a special effort among Indians (77). Pneumonia mortality and morbidity may also be related to alcohol abuse (100); among the Navajo, pneumonia is the fourth leading cause of death for both males and females.

In addition to disorders that lead eventually to death, the Navajo had a high prevalence of otitis media, upper respiratory infections, strep throat, and musculoskeletal and connective tissue disorders.

Thus, the Navajo area can be characterized as one whose health status has improved substantially in recent years and that has lower mortality rates for some of the leading causes of death in the general U.S. population—cancer, heart and

Table 4-44.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Navajo IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code*	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Navajo area Indians to U.S. all races
Females:						
790	1.	Accidents/adverse effects.	149	71.3	20.4	3.5
150	2.	Malignant neoplasms.	132	85.6	108.6	0.8
310	3.	Diseases of the heart	108	62.7	135.1	0.5
510	4.	Pneumonia/influenza	50	23.9	9.2	2.6
620	5.	Liver disease/cirrhosis.	32	20.5	7.4	2.8
430	6.	Cerebrovascular diseases	31	16.6	35.4	0.5
730	7.	Congenital anomalies	28	7.9	5.5	1.4
640	8.	Nephritis, et al	24	13.2	3.6	3.7
260	9.	Diabetes mellitus	23	15.3	9.6	1.6
740	10.	Conditions arising in perinatal period	13	3.5	8.2	0.4
830	11.	Homicide	12	5.7	4.3	1.3
090	12.	Septicemia.	10	5.9	2.4	2.5
270	13.	Nutritional deficiencies	8	3.3	0.4	8.2
630	14.	Cholelithiasis/gallbladder disease	7	4.0	0.7	5.7
030	15.	Tuberculosis	6	3.7	0.4	9.3
		All others	267	143.8	69.2	2.1
ALL		All causes	900	486.9	420.4	1.2
Males:						
790	1.	Accidents/adverse effects.	496	271.1	60.2	4.5
310	2.	Diseases of the heart	155	93.3	271.2	0.3
150	3.	Malignant neoplasms.	99	65.8	163.7	0.4
510	4.	Pneumonia/influenza	70	34.2	1.6	2.1
820	5.	Suicide	49	23.7	1.0	1.3
830	6.	Homicide	47	25.6	16.7	1.5
430	7.	Cerebrovascular diseases	31	17.5	41.7	0.4
620	8.	Liver disease/cirrhosis.	31	22.2	16.0	1.4
730	9.	Congenital anomalies	30	8.9	6.1	1.5
740	10.	Conditions arising in perinatal period	27	6.9	10.3	0.7
670	11.	Renal failure, et al	17	10.9	4.9	2.2
840	12.	All other external causes	19	11.3	2.2	5.1
260	13.	Diabetes mellitus	18	13.2	10.0	1.3
140	14.	All other infectious/parasitic diseases	11	5.3	1.7	3.1
540	15.	Chronic pulmonary diseases	11	7.0	26.2	0.3
		All others	403	328.2	87.8	3.7
ALL		All causes	1,514	845.1	753.3	1.1

*Equivalence to ICD-9 code available from the Indian Health Service

SOURCES **U.S. all races:** U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advancer Report, Final Mortality Statistics, 1981," *Monthly Vita/Statistics Report* 33(3):supp., June 22, 1984. **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

other cardiovascular disease, and chronic pulmonary disease. But it is an IHS area with one of the highest rates of death due to accidents, and greater than U.S. all races rates of death due to pneumonia and influenza, diabetes, and infectious diseases. The high rate of death from accidents was not accompanied by higher hospitalization rates for injuries.

Oklahoma City Area

The Oklahoma City area covers the State of Oklahoma and a small part of the State of Kansas. IHS estimated the Oklahoma City area service

population to be 190,451 in 1984. It further estimated that 49.6 percent of the Indian population of the State of Oklahoma, and 70.8 percent of the Indian population of the State of Kansas live in urban areas.

Oklahoma Indians appear to have relatively favorable health statistics, although deaths among Indians may be underreported because Oklahoma Indians are well-integrated into the general population of Oklahoma. Higher rates of employment (209) may mean that Oklahoma Indians are more likely to have sources of health care other than those of IHS, which would also tend to understate morbidity indicators taken from IHS patient

Table 4-45.—Fifteen Most Frequent Outpatient Diagnoses: Navajo Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
<i>Female:</i>				
1.	480	Prenatal care	37,608	9.3
2.	300	Upper respiratory infections, common cold	33,596	8.3
3.	819	Other preventive health services	19,702	4.9
4.	250	Acute otitis media.	19,540	4.8
5.	821	Physical examination	12,728	3.2
6.	080	Diabetes mellitus	11,673	2.9
7.	818	Well child care.	11,629	2.9
8.	210	Refractive error	8,869	2.2
9.	301	Pharyngitis, tonsillitis, (nonstrep)	8,644	2.1
10.	823	Tests only (lab, X-ray)	8,586	2.1
11.	400	Urinary tract infection.	8,528	2.1
12.	575	Other musculoskeletal, connective tissue diseases	8,427	2.1
13.	283	Hypertensive disease	8,267	2.0
14.	022	Strep throat	7,951	2.0
15.	827	All other	13,082	3.2
<i>Male:</i>				
1.	300	Upper respiratory infections, common cold	24,884	9.4
2.	250	Acute otitis media.	19,791	7.5
3.	818	Well child care.	11,852	4.5
4.	730	Lacerations, open wounds	10,298	3.9
5.	283	Hypertensive disease	8,400	3.2
6.	821	Physical examination	8,107	3.1
7.	819	Other preventive health services	7,541	2.8
8.	575	Other musculoskeletal, connective tissue diseases	6,998	2.6
9.	080	Diabetes mellitus	6,955	2.6
10.	301	Pharyngitis, tonsillitis (nonstrep)	5,962	2.2
11.	751	Superficial injury, contusion	5,915	2.2
12.	022	Strep throat	5,788	2.2
13.	701	Fracture of extremity	5,575	2.1
14.	210	Refractive error	5,312	2.0
15.	827	All other	8,427	3.2
		All other causes, both sexes.	337,515	
	ALL	All causes, both sexes	698,150	100.0

IHS refers to these as clinical Impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses

SOURCES 15 leading clinical impressions: US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM 1985 Navajo total: US Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date)

care data. Furthermore, the high population of Indians living in urban areas tends to make more alternate sources of health care available, although as a practical matter access to health care even in urban areas depends largely on socioeconomic status.

In the 1980-82 period, 2,873 Indians in the Oklahoma City area were reported to have died, for an average age-adjusted mortality rate of 530.6 per 100,000 population (table 4-46), a rate less than that of U.S. all races for 1981 (568.2). Oklahoma Indians had lower death rates than the U.S. all races population for diseases of the heart, cerebrovascular disease, cancer, suicide, and in-

fant mortality, and had age-adjusted death rates equal to that of the general population for conditions arising in the perinatal period and, unusual for IHS areas, in the postneonatal period. The crude death rate declined 13 percent in the 1972 to 1982 decade. Although the crude death rate from cancer increased unestimated 8.7 percent (see table 4-47), a rise in cancer rates incompatible with increasing life expectancy. However, Oklahoma Indians had other death rates and ratios resembling those of Indians in other IHS areas. Accidents were the third leading cause of death at a rate of 66.9 for both sexes, a rate 1.7 times that of U.S. all races. Diabetes was the fifth leading cause of death, with a rate of 26.9 for both

Table 4-46.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Oklahoma IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate		Ratio of Oklahoma area Indians to U.S. all races
				Indians	US. all races	
Females:						
310	1.	Diseases of the heart	335	96.5	135.1	0.7
150	2.	Malignant neoplasms.	211	72.8	108.6	0.7
430	3.	Cerebrovascular diseases	109	30.0	35.4	0.8
790	4.	Accidents/adverse effects.	93	34.5	20.4	1.7
260	5.	Diabetes melitus	73	27.0	9.6	2.8
620	6.	Liver disease/cirrhosis.	46	19.1	7.4	2.6
510	7.	Pneumonia/influenza	36	9.9	9.2	1.1
740	8.	Conditions arising inperinatal period	28	8.8	8.2	1.1
640	9.	Nephritis, et al	26	8.1	3.6	2.3
730	10.	Congenital anomalies	18	6.0	5.5	1.1
830	11.	Homicide	17	7.4	4.3	1.7
480	12.	Atherosclerosis	14	3.5	4.6	0.8
540	13.	Chronic pulmonary diseases	11	3.7	9.5	0.4
090	14.	Septicemia.	9	2.7	2.4	1.1
490	15.	Other arterial diseases	8	2.7	3.0	0.9
		All others	175	60.6	53.6	1.1
ALL		All causes	1,209	393.3	420.4	0.9
Males:						
310	1.	Diseases of the heart	494	208.8	271.2	0.8
790	2.	Accidents/adverse effects	251	101.2	60.2	1.7
150	3.	Malignant neoplasms	239	102.3	163.7	0.6
430	4.	Cerebrovascular diseases	73	29.3	41.7	0.7
620	5.	Liver disease/cirrhosis.	69	32.3	16.0	2.0
260	6.	Diabetes mellitus	59	27.0	10.0	2.7
510	7.	Pneumonia/influenza	51	18.8	16.6	1.1
830	8.	Homicide	44	17.9	16.7	1.1
740	9.	Conditions arising in perinatal period	32	9.7	10.3	0.9
820	10.	Suicide	30	12.2	18.0	0.7
540	11.	Chronic pulmonary diseases	28	11.8	26.2	0.5
640	12.	Nephritis, et al	19	7.3	5.6	1.3
090	13.	Septicemia	16	6.5	3.4	1.9
730	14.	Congenital anomalies	11	3.5	6.1	0.6
480	15.	Atherosclerosis.	9	3.0	6.0	0.5
		All others	239	101.4	81.6	1.2
ALL		All causes	1,664	693.0	753.3	0.9

^aEquivalence†. ICD-9 code available from the Indian Health Service.

SOURCES: U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3):supp., June 22, 1984; Indians in IHS areas: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

sexes, equal to 2.7 times the U.S. all races rate. Liver disease and cirrhosis was the sixth leading cause of death, with a rate of 25.4, 2.2 times the rate of U.S. all races. Pneumonia and influenza, the seventh leading cause of death, had a rate of 13.7, a ratio of 1.0 for females and 1.1 for males compared to the U.S. population. Homicide was the eighth leading cause of death at a rate of 12.6 for both sexes, equal to a ratio of 1.7 for females, and 1.0 for males when compared to the U.S. population. The crude death rate for motor vehicle accidents increased by almost 13 percent between 1972 and 1982.

In addition to problems of interpretation caused by the presence of alternative health care sources, hospitalization rates for Oklahoma Indians are difficult to interpret because IHS does not collect diagnostic data on the tribally administered hospital in the Claremore service unit. For this report, hospitalization rates were derived by excluding only the Claremore service unit population from the population denominator, which may tend to overstate hospital discharge rates. Nevertheless, some hospital discharge rates are what might be expected, or even lower than expected, given the pattern of mortality. Thus, for exam-

**Table 4-47.—Changes in Crude Death Rates, 1972-82:
IHS Oklahoma Area (rate per 100,000 population)**

IHS Code	Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
310	Diseases of the heart	186.6	164.9	156.5	- 16.1
150	Malignant neoplasms	78.1	81.0	84.9	8.7
790	Accidents/adverse effects	71.2	66.0	64.9	- 8.8
800	Motor vehicle accidents	40.0	40.9	45.1	12.8
810	All other accidents	31.1	25.0	19.8	- 36.3
430	Cerebrovascular disease	49.9	45.6	34.4	-31 .2
260	Diabetes mellitus	27.0	23.8	24.9	- 7.7
620	Liver disease/cirrhosis	24.2	34.4	21.7	- 10.3
510	Pneumonia/influenza	22.9	24.8	16.4	- 28.3
830	Homicide	15.1	12.1	11.5	- 23.8
740	Conditions arising in perinatal period	9.6	13.3	11.3	17.8
820	Suicide	8.5	7.0	6.6	-22.2
	All other causes	130.2	119.0	109.2	- 16.1
ALL	All causes	623.3	651.9	542.3	- 13.0

SOURCES 1972-74 and 1975-77 deaths: U S Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DH EW Pub No (HSA).79-1005 (Rockville, MD: HSA, 1979). 1972-74 and 1975-66 population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985 1960-62 data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

pie, the hospitalization rate for injuries and poisonings (74.6 per 10,000 service population) seems low relative to the area's death rates for accidents and homicide. The same can be said for hospitalizations for diabetes; even though the Oklahoma death rate exceeded that of U.S. all races, the area's hospitalization rate for diabetes (23.5 per 10,000 population, excluding Claremore) is about the same as that of U.S. all races.

Hospitalizations for conditions arising in the perinatal period (14.7 per 10,000 population in 1984) were higher than expected—more than twice the rate for U.S. short-stay non-Federal hospitals (7.1)—given that the infant mortality rate in the Oklahoma area was lower than that of U.S. all races in the **1980-82** period. The Oklahoma 1979 hospitalization rate for conditions arising in the perinatal period (5.7) was closer to what might have been expected in 1980 to 1982, as was the 1979 hospitalization rate for pregnancies with complications (36 percent of hospitalizations for pregnancies (166)).

Outpatient visits in Oklahoma are similar to that for the general U.S. population (i. e., high proportions of visits for hypertension, upper respiratory infections, prenatal care, well child care), except for higher percentages of care for refrac-

tive disorders and diabetes relative to the U.S. all races population (table **4-48**) (**200**).

Phoenix Area

The Phoenix area served an estimated **82,309** Indians in 1984, primarily in Arizona. Indians in Nevada and Utah are also included in the Phoenix service area.

As shown in table 4-49, the mortality rate in the Phoenix area has declined almost 20 percent since the 3-year period centered in 1972 to 1974, although changes in Phoenix area health status are difficult to interpret. The boundaries of the service area have changed since the early 1970s when the Phoenix area included small service units in Idaho, Oregon, and California (157). One should be cautious in drawing conclusions from hospitalization data as well, because the Phoenix area is the site of the Phoenix Indian Medical Center, a teaching and referral hospital of IHS.

In 1980 to 1982 the Phoenix area age-adjusted mortality rate was 918.2 for all causes, 1.6 times the U.S. all races rate (see table 4-so). The leading cause of the 1,711 deaths in the area in **1980** to **1982** was accidents, which occurred at a rate **3.8** times the U.S. all races rate for males and **3.9**

Table 4-48.—Fifteen Most Frequent Outpatient Diagnoses:^aOklahoma Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	480	Prenatal care	31,199	7.6
2.	819	Other preventive health services	28,936	7.0
3.	283	Hypertensive disease	26,676	6.5
4.	080	Diabetes mellitus	22,385	5.4
5.	210	Refractive error	19,206	4.7
6.	300	Upper respiratory infection, common cold	17,518	4.2
7.	818	Well child care	11,281	2.7
8.	823	Tests only (lab, X-ray)	10,926	2.6
9.	250	Acute otitis media	10,065	2.4
10.	821	Physical examination	9,712	2.4
11.	400	Urinary tract infection	7,618	1.8
12.	461	Other gynecologic problems	6,812	1.7
13.	575	Other musculoskeletal, connective tissue diseases	6,014	1.5
14.	301	Pharyngitis and tonsillitis (nonstrep)	5,847	1.4
15.	827	All other	37,199	9.0
Male:				
1.	283	Hypertensive disease	18,153	7.7
2.	300	Upper respiratory infection, common cold	13,191	5.6
3.	819	Other preventive health services	12,848	5.5
4.	080	Diabetes mellitus	12,341	5.2
5.	210	Refractive error	12,328	5.2
6.	818	Well child care	11,120	4.7
	250	Acute otitis media	10,310	4.4
7.	305	Respiratory allergy, asthma, and hay fever	5,292	2.3
8.	823	Tests only (lab, X-ray)	5,078	2.2
9.	823	Tests only (lab, X-ray)	5,078	2.2
10.	575	Other musculoskeletal, connective tissue disease	4,481	1.9
11.	520	Other diseases of the skin	4,091	1.7
12.	301	Pharyngitis and tonsillitis (nonstrep)	4,033	1.7
13.	355	Diseases of teeth, gums	4,006	1.7
14.	821	Physical examination	3,579	1.5
15.	827	All other	19,818	8.4
		All other causes, both sexes	269,179	
	ALL	All causes, both sexes	661,217	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses.

SOURCES: **15 leading clinical impressions:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. Oklahoma **total:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date)

times the U.S. all races rate for females. Deaths from other forms of violence also ranked high in the Phoenix area. Suicide was the sixth leading cause of death for males, at a rate 2.6 times that of U.S. all races males, and the male death rate as a result of homicide was 3.2 times that of U.S. all races males. Although the 1984 Phoenix area hospitalization rate for injuries and poisonings was almost double that of U.S. short-stay non-Federal hospitals (table 4-19), the ratio between Phoenix and U.S. hospital discharges was still lower than the ratio of combined mortality rates for deaths by external cause (3.3, the average of the ratios for accidents, suicide, homicide, and all other external causes).

Outpatient information confirms the prevalence of violent injury among Phoenix area Indians. Together, lacerations and open wounds; dislocations, sprains and strains; superficial injuries and contusions; and fractures of the extremities accounted for 9.6 percent of male outpatient visits in 1984 (see table 4-51).

Diseases of the heart were the second leading cause of death for Phoenix area Indians in 1980 to 1982, and cerebrovascular disease the ninth. The U.S. all races population had higher rates of death from these cardiovascular diseases, and from malignant neoplasms, which were the third leading cause of death for Phoenix area females

**Table 4-49.—Changes in Crude Death Rates, 1972-82:
IHS Phoenix Area (rates per 100,000 population)**

IHS Code	Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790	Accidents/adverse effects	210.7	175.8	136.5	- 35.2
800	Motor vehicle accidents	129.2	104.1	80.5	- 37.7
810	All other accidents	81.4	71.6	56.0	-31 .2
310	Diseases of the heart	99.7	97.8	130.0	30.4
620	Liver disease/cirrhosis	83.8	67.5	65.6	-21 .7
510	Pneumonia/influenza	56.0	49.7	36.3	- 35.1
150	Malignant neoplasms	51.3	54.9	53.8	4.9
820	Suicide	32.4	32.4	30.2	- 6.8
830	Homicide	26.5	31,9	34.1	28,8
740	Conditions arising in perinatal period	17.1	21.4	12.7	- 25.8
480	Atherosclerosis	16.5		2.6	- 84.2
030	Tuberculosis	10.6		3.1	- 70.1
	All other causes	306.2	284.4	243.8	- 20.4
ALL	All causes	910.8	815.8	748.7	- 17.8

^aIncludes atherosclerosis and tuberculosis, rates unknown

SOURCES 1972-74 and 1975-77 deaths: U S Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub No (HSA)-79.1005 (Rockville, MD: HSA, 1979). 1972-74 and 1975-66 population: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Internal documents, Rockville, MD, 1985 1980-82 data: U S Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

and the fourth for Phoenix area males. The comparatively low rate of hospitalization in the Phoenix area for circulatory system diseases is somewhat consistent with these cardiovascular death rates, if a bit low compared to U.S. all races rates. Phoenix area hospitalization rates for cancer (16.9 per 10,000 population) were also well below the U.S. average in **1984 (87.8** per 10,000 population).

Despite a decline in the mortality rate from diabetes mellitus between 1975 to **1977** and 1980 to **1982**, the disease was responsible for the deaths of **28** Phoenix area males and 44 females in the **1980-82** period, making diabetes the seventh leading cause of death. Deaths from renal failure and hospitalizations and outpatient encounters for diabetes were also indications of the incidence and severity of diabetes in the Phoenix area. Renal failure accounted for 30 deaths in 1980 to 1982, equal to 3.7 times the U.S. all races male death rate, and 5.9 times the U.S. all races female death rate. The Phoenix death rate from kidney disorders (nephritis, et al.) was one of the highest in the IHS system in 1980 to 1982 (see table 4-7). Hospitalization rates for diabetes in Phoenix (49.4 per 10,000 population) were almost double the U.S. all races and IHS all areas average rates in 1984. In 1984, diabetes was the leading cause of out-

patient visits among Phoenix area women and the second leading cause of outpatient visits among Phoenix area men, accounting for 19,514 female visits and **10,806** male visits, resulting in a rate of **3,683.6** visits per 10,000 population. (The Phoenix area is the site of a long-term epidemiological study of diabetes among the Pima Indians.)

The death rate from pneumonia was also markedly high in the Phoenix area, 3.3 times the U.S. all races rate for males (50 Phoenix area deaths) and 3.7 times the U.S. all races rate for females (33 Phoenix area deaths). Consistent with the relatively high rate of deaths from pneumonia, upper respiratory infections were a leading cause of outpatient visits in 1984 (table 4-51). Hospitalization rates for respiratory system disease (200.1 per 10,000 population in 1984) substantially exceeded the U.S. short-stay non-Federal hospital rate.

The death rate from liver disease and cirrhosis was particularly high in Phoenix. Ninety-six males and 54 females died from liver disease and cirrhosis in 1980 to 1982, at rates 7.3 and 8.2 times the U.S. all races rate, making this the third leading cause of death in the area. The Phoenix hospitalization rate for alcoholic liver disease was

Table 4-50.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Phoenix IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	mortality rate U.S. all races	Ratio of Phoenix area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	120	133.0	135.1	1.0
790	2.	Accidents/adverse effects	87	78.9	20.4	3.9
150	3.	Malignant neoplasms.	58	66.4	108.6	0 . 6
620	4.	Liver disease/cirrhosis	54	60.5	7.4	8.2
260	5.	Diabetes mellitus	44	52.3	9.6	5.4
510	6.	Pneumonia/influenza	33	31.7	9.2	3.5
430	7.	Cerebrovascular diseases	27	29.2	35.4	0.8
830	8.	Homicide	20	18.3	4.3	4.2
640	9.	Nephritis, et al	17	20.7	3.6	5.7
740	10.	Conditions arising in perinatal period	15	10.0	8.2	1.2
820	11.	Suicide	14	10.7	5.7	1.9
730	12.	Congenital anomalies	12	9.5	5.5	1.7
090	13.	Septicemia	6	5.7	2.4	2.4
480	14.	Atherosclerosis	5	3.8	4.6	0.8
490	15.	Other arterial disease	5	5.7	3.0	1.9
		All others	128	126.5	57.4	2.2
ALL		All causes	645	662.9	420.4	1.6
Males:						
790	1.	Accidents/adverse effects	225	227.2	60.2	3.8
310	2.	Diseases of the heart	117	229.4	271.2	0.8
620	3.	Liver disease/cirrhosis	96	116.9	16.0	7.3
150	4.	Malignant neoplasm.	65	87.1	163.7	0.5
830	5.	Homicide	58	53.5	16.7	3.2
820	6.	Suicide	55	46.2	18.0	2.6
510	7.	Pneumonia/influenza	50	52.6	16.6	3.2
430	8.	Cerebrovascular diseases	35	40.0	41.7	1.0
260	9.	Diabetes mellitus	28	37.5	10.0	3.8
640	10.	Nephritis, et al	18	22.5	5.6	4.0
740	11.	Conditions arising in perinatal period	14	9.4	10.3	0.9
090	12.	Septicemia	9	11.3	3.4	3.3
540	13.	Chronic pulmonary diseases	9	10.8	26.2	0.4
730	14.	Congenital anomalies	8	5.8	6.1	1.0
840	15.	All other external causes	8	6.8	2.2	3.1
		All others	271	244.6	85.4	2.9
ALL		All causes	1,066	1,201.6	753.3	1.6

^aEquivalence to ICD-9 code available from the Indian Health Service

SOURCES: **U.S. all races:** U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advancer Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3):supp., June 22, 1984; **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

more than 12 times the rate in U.S. short-stay non-Federal hospitals, and Phoenix area hospitalization rates for alcohol-related mental disorders also exceeded the rates in U.S. short-stay non-Federal hospitals.

Portland Area

Judging from changes in crude mortality rates, the Portland area, which in 1984 served 96,427 Indians in the reservation States of Washington, Oregon, and Idaho, has experienced the most dramatic improvement in health status of the IHS

areas. On all of the 10 leading causes of death in the 3-year period centered in 1973, there had been at least a 37-percent decline in the crude mortality rate by 1980 to 1982, including diseases of the heart, malignant neoplasms, and suicide, which sometimes rose or showed no improvement in other IHS areas (see table 4-52). However, the changing composition of the Portland service area (179,166) should be taken into account when comparing mortality rates over time. The population of the Portland area increased by almost 300 percent in the decade between 1972 and 1982 (see table 4-3 and 4-4). The mortality rate (adjusted for

Table 4-51.— Fifteen Most Frequent Outpatient Diagnoses:^aPhoenix Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	080	Diabetes mellitus	19,514	7.5
2.	480	Prenatal care	17,521	6.7
3.	300	Upper respiratory infection, common cold	14,289	5.5
4.	819	Other preventive health services	11,932	4.6
5.	250	Acute otitis media	10,508	4.0
6.	283	Hypertensive disease	8,409	3.2
7.	818	Well child care	8,259	3.2
8.	210	Refractive error	7,050	2.7
9.	305	Respiratory allergy, asthma and hay fever	6,348	2.4
10.	823	Tests only (lab, X-ray)	6,169	2.4
11.	400	Urinary tract infection	5,906	2.3
12.	575	Other muskuloskeletal, connective tissue diseases	4,908	1.9
13.	821	Physical examination	4,288	1.6
14.	014	Gastroenteritis, diarrhea, etc., no other symptoms	4,195	1.6
15.	827	All other	5,974	2.3
Male:				
1.	300	Upper respiratory infection, common cold	10,806	6.3
2.	080	Diabetes mellitus	10,566	6.2
3.	250	Acute otitis media	10,419	6.1
4.	818	Well child care	8,022	4.7
5.	730	Laceration, open wound	7,107	4.1
6.	283	Hypertensive disease	7,081	4.1
7.	819	Other preventive health services	6,426	3.7
8.	821	Physical examination	4,323	2.5
9.	305	Respiratory allergy, asthma, and hay fever	4,293	2.5
10.	702	Dislocations, sprains, and strains	3,854	2.2
11.	210	Refractive error	3,727	2.2
12.	731	Superficial injury, contusion	3,698	2.2
13.	575	Other muskuloskeletal, connective tissue diseases	3,656	2.1
14.	701	Fracture of extremity	3,595	2.1
15.	014	Gastroenteritis, diarrhea, etc., no other symptoms	3,538	2.1
		All other causes, both sexes	219,389	
	ALL	All causes, both sexes	445,770	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed, therefore, they may not be valid diagnoses

SOURCES **15 leading** clinical impressions: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985 **total:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville MD IHS, no date)

age) in the Portland area in 1980 to 1982 remained significantly above that of U.S. all races: 749.8 per 100,000 population compared to the U.S. all races rate for 1981 of 568.2, for a ratio of 1.3 (1.4 for females and 1.2 for males; table 4-53).

As in most other IHS areas, the leading causes of death among Portland males were from accidents, particularly motorvehicle accidents. Liver disease, suicide, and homicide death rates also exceeded the U.S. all races rates for males. Although deaths from diseases of the heart took more female lives than did the social causes, the accident mortality rate for females still was 3.7 times the U.S. all races female rate, and the liver disease

mortality rate exceeded the U.S. all races female rate by almost 9 times.

Because of the way medical care is provided in the Portland area, hospitalization and outpatient data are almost impossible to use as indicators of morbidity and mortality. Portland has no direct care hospital, so all inpatient care must be purchased through contract care, which has been severely restricted in recent years (see ch. 6). Thus, although Portland experienced a high death rate from violent causes in 1980 to 1981, the hospital discharge rate for injuries and poisonings was almost the lowest of the IHS areas in 1984. In 1979, the number of discharges for injuries and

**Table 4-52.—Changes in Crude Death Rates, 1972.82:
IHS Portland Area (rates per 100,000 population)**

IHS Code Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82 ^a
790 Accidents/adverse effects	254.5	163.8	117.6	-53.8
800 Motor vehicle accidents	152.0	104.6	71.5	-53.0
810 All other accidents	102.4	59.1	46.1	-55.0
310 Diseases of the heart	219.2	155.6	116.7	-46.8
620 Liver disease/cirrhosis	121.2	78.2	50.8	-58.1
150 Malignant neoplasms	79.3	61.8	49.5	-37.6
430 Cerebrovascular diseases	73.8	35.4	28.4	-61.5
510 Pneumonia/influenza	59.5	40.9	16.8	-71.8
820 Suicide	39.6	32.7	22.0	-44.5
740 Conditions arising in perinatal period	35.2	25.4	15.5	-56.0
830 Homicide	34.1	16.3	15.5	-54.5
260 Diabetes mellitus	29.7	12.7	16.8	-43.5
All other causes	268.2	170.0	137.3	-48.8
ALL All causes	1,214.3	792.8	586.9	-51.7

^aMay be invalid due to changes in population covered.

SOURCES: 1972.74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA)-79-1005 (Rockville, MD: HSA, 1979). 1972.74 and 1975-66 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, internal documents, Rockville, MD, 1985 1980-82 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

poisonings (166 discharges) was greater than in 1984, even though the Portland area population was 27 percent lower in 1979 than in 1984. This situation is characteristic of the Portland area in general: the total number of hospital discharges was 4,210 in 1979 and 4,222 in 1984, which, when adjusted for the rise in population, was a substantial decline. The 1984 proportion of outpatient visits for trauma was more consistent with Portland's mortality rate from those causes relative to other IHS areas: of the 15 leading reasons for outpatient visits among males, lacerations and open wounds accounted for 1.9 percent; and dislocations, sprains, and strains accounted for another 1.8 percent (see table 4-54).

Although more males than females in the Portland area died from diabetes in 1980 to 1982, the female death rate from renal failure was considerably worse than the male death rate. It is also noteworthy that refractive error was not among the leading causes of outpatient visits for either males or females, reportedly an effect of the limitation on contract care expenditures.

Although cardiovascular diseases and malignant neoplasms were leading causes of death for Portland area males and females, deaths from these causes did not exceed the U.S. all races rates.

As was typical of IHS areas, however, hypertensive disease was one of the five leading causes of outpatient visits for males and females in the Portland area.

The infant mortality rate in 1980 to 1982 was 16.9 per 1,000 live births, compared to the 1981 U.S. all races rate of 11.9. Causes of mortality varied, although for neonates, a large portion was attributable to respiratory distress (see table 4-55). The Portland 1980 to 1982 mortality rate for SIDS, the leading cause of death among post-neonates, was the worst of the IHS areas (see figure 4-16). It is noteworthy that outpatient visits for prenatal care, usually one of the five leading reasons for female encounters (194), was the 15th leading reason in Portland, accounting for 2,400 visits, or 1.7 percent. However, many pregnancies in the Portland area are apparently referred out of the IHS system because obstetricians are not available. IHS records show that in 1984 an additional 576 visits for prenatal care were made to non-IHS facilities, but not all non-IHS visits are coded and recorded for diagnosis, so it is impossible to estimate the amount of prenatal care given in the Portland area.

The high infant mortality rate may be related to a high rate of alcohol abuse among Portland

Table 4-53.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Portland IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Portland area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	113	129.7	135.1	1.0
790	2.	Accidents/adverse effects,	84	76.1	20.4	3.7
150	3.	Malignant neoplasm.	56	67.6	108.6	0.6
620	4.	Liver disease/cirrhosis	55	64.5	7.4	8.7
430	5.	Cerebrovascular diseases	34	39.1	35.4	1.1
510	6.	Pneumonia/influenza	20	20.6	9.2	2.2
260	7.	Diabetes mellitus	15	17.8	9.6	1.9
640	8.	Nephritis, et al	14	16.5	3.6	4.6
830	9.	Homicide	14	13.8	4.3	3.2
740	10.	Conditions arising in perinatal period	12	8.0	8.2	1.0
820	11.	Suicide	8	6.1	5.7	1.1
540	12.	Chronic pulmonary diseases	7	7.7	9.5	0.8
090	13.	Septicemia	6	7.0	2.4	2.9
730	14.	Congenital anomalies	6	4.0	5.5	0.7
420	15.	Hypertension with or without renal disease	4	4.4	1.7	2.6
		All others	102	105.7	53.8	2.0
ALL		All causes	550	588.6	420.4	1.4
Males:						
790	1.	Accidents/adverse effects.	189	176.2	60.2	2.9
310	2.	Diseases of the heart	158	215.5	271.2	0.8
620	3.	Liver disease/cirrhosis.	63	79.2	16.0	5.0
150	4.	Malignant neoplasms.	59	80.7	163.7	0.5
820	5.	Suicide	43	36.4	18.0	2.0
430	6.	Cerebrovascular diseases	32	41.2	41.7	1.0
260	7.	Diabetes mellitus	24	31.7	10.0	3.2
740	8.	Conditions arising in perinatal period	24	15.8	10.3	1.5
830	9.	Homicide	22	20.5	16.7	1.2
510	10.	Pneumonia/influenza	19	23.6	16.6	1.4
540	11.	Chronic pulmonary diseases	13	18.3	26.2	0.7
730	12.	Congenital anomalies	10	7.5	6.1	1.2
840	13.	All other external causes	7	8.4	2.2	3.8
640	14.	Nephritis, et al	5	6.5	5.6	1.2
090	15.	Septicemia	4	4.9	3.4	1.4
		All others	141	154.8	85.4	1.8
ALL		All causes	813	921.2	753.3	1.2

^aEquivalence to ICD-9 code available from the Indian Health Service.

SOURCES U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advance Report, Final Mortality Statistics, 1981" *Monthly Vital Statistics Report* 33(3) supp, June 22, 1984, Indians in IHS areas: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

area females, a hypothesis which is supported by anecdotal reports to OTA of alcohol abuse in the Portland area, and by vital statistics data indicating that the 1980 to 1982 Portland area female death rate from liver disease and cirrhosis was 8.7 times the U.S. all races rate for females. The liver disease and cirrhosis rate was also markedly high among Portland males. Liver disease and cirrhosis was the third leading cause of death among Portland area males, accounting for 63 deaths in 1980 to 1982, a rate 5 times that of U.S. all races males. Another indication of the prevalence of alcohol abuse in the Portland area was the hospi-

tal discharge rate of 1.3 per 10,000 population for alcoholic liver disease, which was comparable to the rate in U.S. short-stay non-Federal hospitals of 1.6 despite the overall decline in hospitalizations in Portland. However, hospital discharge rates for alcohol dependence syndrome and alcoholic psychoses were lower in Portland than in U.S. short-stay non-Federal hospitals and have declined markedly from 1979 (166). No mental disorders of any kind, including those related to alcohol abuse, were among the 15 leading causes of outpatient visits in 1984, although they were among the leading causes of visits in several serv-

Table 4-54.—Fifteen Most Frequent Outpatient Diagnoses:^aPortland Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	300	Upper respiratory infection, common cold	13,232	9.5
2.	819	Other preventive health services	9,757	7.0
3.	080	Diabetes mellitus	5,978	4.3
4.	283	Hypertensive disease	5,492	3.9
5.	250	Acute otitis media	4,974	3.6
6.	823	Tests only (lab, X-ray)	4,592	3.3
	818	Well child care	4,066	2.9
7.&	305	Respiratory allergy, asthma, and hay fever	3,811	2.7
9.	575	Other musculoskeletal, connective tissue disease	2,952	2.1
10.	510	Eczema, urticaria, or skin allergy	2,814	2.0
11.	812	Other ill-defined, undiagnosed disease.	2,715	2.0
12.	821	Physical examination	2,680	1.9
13.	550	Rheumatoid arthritis	2,666	1.9
14.	480	Prenatal care	2,400	1.7
15.	827	All other	4,025	2.9
Male				
1.	300	Upper respiratory infection, common cold	9,266	10.2
2.	819	Other preventive health services	5,349	5.9
3.	250	Acute otitis media	4,812	5.3
4.	283	Hypertensive disease	4,512	5.0
5.	818	Well child care	3,839	4.2
6.	080	Diabetes mellitus	3,617	4.0
7.	823	Tests only (lab, X-ray)	2,517	2.8
8.	821	Physical examination	2,313	2.5
9.	305	Respiratory allergy, asthma, and hay fever	2,310	2.5
10.	575	Other musculoskeletal, connective tissue diseases	1,897	2.1
11.	730	Laceration, open wound	1,713	1.9
12.	510	Eczema, urticaria, or skin allergy	1,632	1.8
13.	702	Dislocations, sprains, and strains	1,598	1.8
14.	812	Other ill-defined, undiagnosed diseases	1,591	1.8
15.	827	All other	2,776	3.1
		All other causes, both sexes.	114,028	
	ALL	All causes, both sexes	235,924	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses.

SOURCES: **15 leading clinical impressions:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985, Portland **total:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD:IHS, no date)

ice units. These figures do not, however, include the facilities which are funded under Self-Determination legislation and by Portland area Indian tribes (76).

Certain other problems that do not appear as underlying causes of death have been noted as particular problems in the Portland area. Besides the usual high number of outpatient encounters for otitis media and diabetes, rheumatoid arthritis disappears to be unusually prevalent in Portland area females. In 1984, this autoimmune disease accounted for 2,666, or 1.9 percent, of female visits in the Portland area on average. Another 2,952 female and 1,897 male visits were attributed to other musculoskeletal and connective tissue dis-

eases. Thus, it seems particularly inconsistent for the hospital discharge rate for diseases of the musculoskeletal system to be 18.6 per 10,000 population, far lower than the U.S. short-stay non-Federal hospital average and the average in other IHS areas. Skin diseases, including eczema and urticaria, were also among the leading causes of outpatient visits in the Portland area, making it all the more surprising that the area had the lowest hospital discharge rate (8.7 per 10,000 population) for such diseases in 1984, declining from a rate of 14.3 in 1979.

In summary, Portland area Indians suffer from much the same diseases and risk factors for illness and injury that Indians in other IHS areas

Table 4-55.—infant Deaths and Death Rates IHS Portland Area, 1980-82

IHS code ^a Cause	Deaths			Rates (per 1,000 live births)		
	Total	Neonates	Postneonates	Total	Neonates	Postneonates
010 Intestinal infection	1	—	1	0.2	—	0.2
040 Septicemia	1	—	1	0.2	—	0.2
130 Meningitis	1	—	1	0.2	—	0.2
150 Acute URI	1	—	1	0.2	—	0.2
160 Bronchitis	1	—	1	0.2	—	0.2
170 Pneumonia/influenza	1	—	1	0.2	—	0.2
200 Other respiratory diseases	1	—	1	0.2	—	0.2
240 Congenital anomalies	14	9	5	2.2	1.4	0.8
380 Conditions arising in perinatal period	36	36	—	5.6	5.6	—
500 Respiratory distress	11	11	—	1.7	1.7	—
580 Symptoms/signs/other	44	—	44	6.9	—	6.9
590 SIDS	43	—	43	6.7	—	6.7
600 Symptoms/signs/other	1	—	1	0.2	—	0.2
610 Accidents/adverse effects	1	—	1	0.2	—	0.2
680 All other causes	2	1	1	0.3	0.2	0.2
ALL All	104	46	58	16.9 ^b	7.2	9.7b

^aIHS code, equivalence to ICD-9 Recode 61 for infant deaths available from IHS.

^bWill not total due to rounding error

SOURCE. U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

do. Accidents, diabetes, and liver disease can be said to be epidemic among Portland area Indians, and in 1980 to 1982 the postneonatal mortality rate was the highest of IHS areas. In addition, Portland area Indians appear to suffer disproportionately from skin diseases and rheumatoid arthritis. Health status data indicate that restrictions on contract care funds may be affecting the availability of health services to Portland area Indians.

Tucson Area

The IHS Tucson area is located in South Central Arizona. It is the smallest of the IHS areas, with a service population estimated to be 17,852 in 1984.

As in all IHS areas, the crude death rate in Tucson declined in the decade between 1972 and 1982, although not as much as in IHS areas in total (see table 4-56). In the 3-year period centered in 1973, Tucson had the fourth highest death rate of the IHS areas; in 1980 to 1982 it had the third highest. The poor health status of Tucson Indians is also apparent from an estimated age-adjusted mortality rate of 1011.1 per 100,000 population in the 3-year period centered in 1981, a rate 1.8 times the U.S. all races rate.

Accidents remained the leading cause of death in Tucson in 1980 to 1982 (see table 4-57), despite

a 27-percent decline in the death rate from accidents since 1972 to 1974. Forty-two Tucson males died as a result of accidents in 1980 to 1982, a rate 3.7 times that of U.S. all races males. Though the number of Tucson females killed in accidents (19 deaths) was lower, accidents were the second leading cause of death for females, and their rate of death from accidents was 3.6 times the rate for U.S. all races females. Other forms of violent death were also prevalent in Tucson, particularly among males. Suicide was the fifth leading cause of death for males, and homicide, the eighth. Injuries and poisonings were the second leading cause of hospitalization in Tucson in both 1979 and 1984, although neither the 1979 or 1984 discharge rates for injuries and poisonings exceeded either the IHS or the U.S. all races averages. As for many other IHS areas, lacerations and open wounds, and superficial injuries and contusions were among the 15 leading causes of male outpatient visits in Tucson, accounting for a total of 5 percent of male visits (see table 4-58).

Heart disease was the leading cause of death for Tucson females, and Tucson is unusual in that the 1980 to 1982 mortality rate from heart disease for females exceeded that of U.S. all races females (by a ratio of 1.3).

The 1980 to 1982 infant mortality rate in Tucson was the second highest of IHS areas and 1.6

**Table 4-56.—Changes in Crude Death Rates, 1972-82:
IHS Tucson Area (rates per 100,000 population)**

IHS Code Cause	1972-74 rate	1975-77 rate	1980-82 rate	Percent change 1972-82
790 Accidents/adverse effects	168.1	166.1	122.5	-27.1
800 Motor vehicle accidents	114.0	124.6	90.4	-20.7
810 All other accidents	54.1	41.5	32.1	-40.6
620 Liver disease/cirrhosis	82.6	80.6	52.2	-36.8
310 Diseases of the heart	71.2	83.0	114.5	60.8
150 Malignant neoplasms	62.7	70.8	44.2	-29.5
510 Pneumonia/influenza	54.1	31.7	28.1	-48.0
260 Diabetes mellitus	42.7	19.5	36.1	-15.4
030 Tuberculosis	37.0		10.0	-72.9
430 Cerebrovascular diseases	31.3	24.4	18.1	-42.3
830 Homicide	31.3	19.5	20.1	-35.8
820 Suicide	22.8	26.8	38.2	67.3
All other causes	315.7	318.3	271.0	-14.1
ALL All causes	920.5	840.7^a	755.0	-18.0

^aIncludes tuberculosis; rate unknown.

SOURCES: 1972-74 and 1975-77 deaths: U.S. Department of Health, Education and Welfare, Public Health Service, Health Services Administration, Indian Health Service, Selected *Vital Statistics for Indian Health Service Areas and Service Units, 1972 to 1977*, DHEW Pub. No. (HSA)-79-1005 (Rockville, MD: HSA, 1979). 1972-74 and 1975-86 population: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Program Statistics Branch, Internal documents, Rockville, MD, 1985. 1980-82 data: U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985.

times that of the U.S. all races rate. As for almost all other IHS areas, the neonatal mortality rate in Tucson (6.1 per 1,000 live births) was lower than that of U.S. all races (8.0), but Tucson's postneonatal mortality rate was 3.5 times that of U.S. all races and the highest of all IHS areas. Unfortunately, the cause or causes of this high mortality rate cannot be specified; the two largest categories of postneonatal death being SIDS (six deaths) and other "symptoms, signs and ill-defined conditions" (four postneonatal and one neonatal death; table 4-59).

Although the absolute numbers were small, as for most other causes of death, liver disease and cirrhosis caused death in Tucson females at a rate 5.5 times (8 deaths) the U.S. all races females rate, and Tucson males had a death rate 8.3 times (18 deaths) the U.S. all races male rate. The Tucson hospital discharge rate for alcoholic liver disease (9.0 per 10,000 population) was also higher than the comparable rate in U.S. short-stay non-Federal hospitals (1.6). The Tucson hospital discharge rates for alcohol-related mental disorders relative to that of U.S. short-stay non-Federal hospitals varied and are difficult to interpret. There were higher rates of hospital discharges for both non-dependent alcohol abuse and alcoholic psychoses in Tucson than in U.S. short-stay non-Federal hos-

pitals, but a lower rate in Tucson for alcohol dependence syndrome (9.5 per 10,000 population for alcohol dependence syndrome compared to a rate of 16.7 for U.S. short-stay non-Federal hospitals). These statistics do not include data from the Papago tribe's alcohol program (funded under Public Law 93-638), which includes outpatient and residential treatment components (76). The Tucson discharge rate for mental disorders (38.1 per 10,000 population) was about half that of U.S. short-stay non-Federal hospitals (72.0), which is not surprising because there are no IHS psychiatric beds in the Tucson area. No mental disorders, including those for alcohol abuse, were among the 15 leading causes of outpatient visits in Tucson.

It is notable that in 1984 the Tucson hospital discharge rate for diabetes (53.2) was twice that of both the IHS on average and U.S. short-stay non-Federal hospitals. The Tucson rate in 1979 was 17.4 per 10,000 population, indicating perhaps that diabetes is a growing problem. Diabetes was also the leading cause of outpatient visits for females (8.0 percent of female visits) and the second leading cause of outpatient visits for males (6.9 percent of male visits). Changes in the crude death rate from diabetes (shown in table 4-30) are hard to interpret; apparently, low absolute numbers result in substantial variation year-by-year.

Table 4-57.—Fifteen Leading Causes of Deaths and Age-Adjusted Death Rates for Tucson IHS Area Indians 1980-82 and U.S. All Races 1981

IHS code ^a	Rank	Cause name	Number of deaths	Age-adjusted mortality rate Indians	U.S. all races	Ratio of Tucson area Indians to U.S. all races
Females:						
310	1.	Diseases of the heart	29	173.6	135.1	1.3
790	2.	Accidents/adverse effects	19	74.2	20.4	3.6
260	3.	Diabetes mellitus	9	53.9	9.6	5.6
090	4.	Septicemia	8	45.9	2.4	19.1
620	5.	Liver disease/cirrhosis	8	40.7	7.4	5.5
150	6.	Malignant neoplasms	7	42.5	108.6	0.4
430	7.	Cerebrovascular diseases	6	38.3	35.4	1.1
510	8.	Pneumonia/influenza	5	20.2	9.2	2.2
420	9.	Hypertension with or without renal disease	4	20.9	1.7	12.3
820	10.	Suicide	4	15.2	5.7	2.7
140	11.	All other infectious/parasitic diseases	3	19.3	1.3	14.9
640	12.	Nephritis, et al	3	19.3	3.6	5.4
730	13.	Congenital anomalies	3	7.5	5.5	1.4
740	14.	Conditions arising in perinatal period	2	5.0	8.2	0.6
840	15.	All other external causes	2	7.6	0.9	8.5
		All others	39	197.1	65.1	3.0
ALL		All causes	151	781.2	420.4	1.9
Males:						
790	1.	Accidents/adverse effects	42	222.5	60.2	3.7
310	2.	Diseases of the heart	28	169.9	271.2	0.6
620	3.	Liver disease/cirrhosis	18	132.2	16.0	8.3
150	4.	Malignant neoplasms	15	106.2	163.7	0.6
820	5.	Suicide	15	73.2	18.0	4.1
260	6.	Diabetes mellitus	9	55.5	10.0	5.6
510	7.	Pneumonia/influenza	9	45.0	16.6	2.7
830	8.	Homicide	9	43.8	16.7	2.6
030	9.	Tuberculosis	4	26.3	1.0	26.3
640	10.	Nephritis, et al	4	28.0	5.6	5.0
420	11.	Hypertension with or without renal disease	3	24.0	2.2	10.9
430	12.	Cerebrovascular disease	3	12.1	41.7	0.3
090	13.	Septicemia	2	7.5	3.4	2.2
540	14.	Chronic pulmonary diseases	2	9.9	26.2	0.4
730	15.	Congenital anomalies	2	5.0	6.1	0.8
		All others	60	311.7	94.7	3.3
ALL		All causes	225	1,272.8	753.3	1.7

^aEquivalence to ICD-9 code available from the Indian Health Service

SOURCES U.S. all races: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics, "Advancer Report, Final Mortality Statistics, 1981," *Monthly Vital Statistics Report* 33(3):supp., June 22, 1984. **Indians in IHS areas:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

In the 1980-82 period, relatively few (only six) Indian residents in Tucson died of renal failure, another common sequelae of diabetes, but this is not surprising if the problem is emerging only relatively recently, as suggested by the hospital discharge data.

There are other health problems in Tucson that are not evident from mortality data. As shown in table 4-32, otitis media accounted for 4.8 percent of outpatient visits among males, and 3.0 percent among females, although this rate was not unusually high for IHS areas. Urinary tract in-

fections accounted for a substantial portion of outpatient visits by females, and hypertensive disease also seemed to be common in both sexes. The Tucson area did seem to be unusual in having relatively large numbers of outpatient visits for skin diseases, including bacterial infection, fungal diseases, and "other diseases of the skin," amounting to 6.2 percent of male, and 4.7 percent of female visits. These skin diseases were not among the leading causes of visits to physicians' offices in the last survey of ambulatory medical care in the United States (200). Hospital discharge rates for skin diseases in Tucson (31.4 per 10,000 pop-

Table 4-58.—Fifteen Most Frequent Outpatient Diagnoses:^aTucson Area, Fiscal Year 1984

Rank	IHS Code	Clinical impressions	Number of visits	Percent of total visits by sex
Female:				
1.	080	Diabetes mellitus	3,889	8.0
2.	480	Prenatal care	3,726	7.7
3.	300	Upper respiratory infection, common cold	2,653	5.5
4.	251	Chronic otitis media with or without mastoiditis	1,472	3.0
5.	283	Hypertensive disease	1,422	2.9
6.	823	Tests only (lab, X-ray)	1,412	2.9
7.	520	Other diseases of skin	1,363	2.8
8.	820	Hospital medical/surgical followup	1,339	2.8
9.	486	Other complications of pregnancy	940	1.9
10.	504	Fungal diseases	921	1.9
11.	400	Urinary tract infection	913	1.9
12.	818	Well child care	909	1.9
13.	810	All other symptoms.	905	1.9
14.	819	Other preventive health services	837	1.7
15.	827	Another	4,637	9.6
Male				
1.	300	Upper respiratory infection, common cold	2,082	7.1
2.	080	Diabetes mellitus	2,026	6.9
3.	251	Chronic otitis media with or without mastoiditis	1,408	4.8
4.	283	Hypertensive disease	1,283	4.4
5.	820	Hospital medical/surgical followup	1,100	3.7
6.	818	Well child care	922	3.1
7.	520	Other diseases of skin	776	2.6
8.	730	Laceration, open wound	762	2.6
9.	731	Superficial injury, contusion	700	2.4
10.	810	All other symptoms.	683	2.3
11.	821	Physical examination	597	2.0
12.	014	Gastroenteritis, diarrhea, etc., no other symptoms.	583	2.0
13.	501	Other bacterial infections of skin	532	1.8
14.	504	Fungal diseases	530	1.8
15.	827	All other	2,429	8.2
		All other causes, both sexes	34,615	
	ALL	All causes, both sexes	78,366	100.0

^aIHS refers to these as clinical impressions, because they are recorded before a clinical diagnosis is completed; therefore, they may not be valid diagnoses.

SOURCES: **15 leading clinical impressions:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, "Special Report on 15 Leading Causes of Outpatient Care By Area and Service Unit, State and County," internal document, Albuquerque, NM, 1985. **Tucson total:** U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, Office of Planning, Evaluation and Legislation, Program Statistics Branch, *Summary of Leading Causes for Outpatient Visits, Indian Health Service Facilities, Fiscal Year 1984* (Rockville, MD: IHS, no date)

ulation) were higher than the U.S. rates and IHS average rates, although other IHS areas experienced even higher rates.

Although gastrointestinal infections are no longer a leading cause of death among Indians, gastroenteritis and/or diarrhea were among the leading causes of outpatient visits among Tucson males, and the hospital discharge rate for infectious and parasitic diseases was the second highest of IHS areas, second only to the Phoenix area. Skin and other infectious diseases are due at least in part to the lack of indoor plumbing (145).

In summary, the health status of Indians in the Tucson area is in many respects similar to that of Indians elsewhere in the United States, although there are certain problems such as gastroenteritis, skin diseases, and other infectious diseases that patient care and mortality data indicate are more prevalent among Indians in the Tucson area than elsewhere. With the small population, and resulting small absolute number of deaths, interpretations about change and relative importance are sometimes difficult to make.

Table 4-59.—infant Deaths and Death Rates IHS Tucson Area, 1980-82

IHS code ^a	Cause	Deaths			Rates (per 1,000 live births)		
		Total	Neonates	Postneonates	Total	Neonates	Postneonates
040	Septicemia	1	—	1	0.7	—	0.7
130	Meningitis	1	—	1	0.7	—	0.7
170	Pneumonia/influenza.	2	2	—	1.3	1.3	—
180	Pneumonia	2	2	—	1.3	1.3	—
220	Gastritis, etc.	2	—	2	1.3	—	1.3
230	Other digestive	1	—	1	0.7	—	0.7
240	Congenital anomalies	5	4	1	3.4	2.7	0.7
380	Conditions arising in perinatal period	4	2	2	2.7	1.3	1.3
580	Symptoms/signs/other	11	1	10	7.4	0.7	6.7
590	SIDS	6	—	6	4.0	—	4.0
600	Symptoms/signs/other	5	1	4	3.4	0.7	2.7
640	Accidents	1	—	1	0.7	—	0.7
680	All other causes	1	—	1	0.7	—	0.7
ALL	All	29	9	20	19.5	6.1	13.3

^aIHS code, equivalence to ICD-9 Recode 61 for infant deaths available from IHS

SOURCE U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Indian Health Service, computer tape supplied to the Office of Technology Assessment, Washington, DC, 1985

CONCLUSION

In conclusion, the health of American Indians on average has improved on many measures over the past 15 years, but in almost every IHS service area and on almost every measure it is still far behind that of the U.S. all races population. There is considerable variation among IHS areas, but the available mortality data indicate that Indians in almost all IHS service areas are at considerable risk for death by accident, suicide, homicide, and other external or "social" causes. In addition, they suffer disproportionately from alcoholism, dia-

betes, and pneumonia. Infant mortality has declined, but Indian infants continue to be at greater risk for death than infants of all other U.S. races combined, particularly in the postneonatal period. Comprehensive data about illness in Indians are difficult to obtain because of IHS's position that it is not the sole provider of health care to Indians, but for the most part available data support the conclusions drawn from mortality data and indicates the existence of additional problems.