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An Assessment of Deaths and Inpatient Hospital Discharge Rates in Nebraska Due to Cardiovascular Disease

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Executive Summary

Why examine CVD data?

- ◆ To show trends in CVD death and inpatient hospital discharge rates in Nebraska.
- ◆ To examine these trends in Nebraska over time.
- ◆ To describe the characteristics of CVD death rates and inpatient hospital discharge rates in Nebraska.

What do the analyses presented in this Reporter show?

Trends in CVD Death Rates

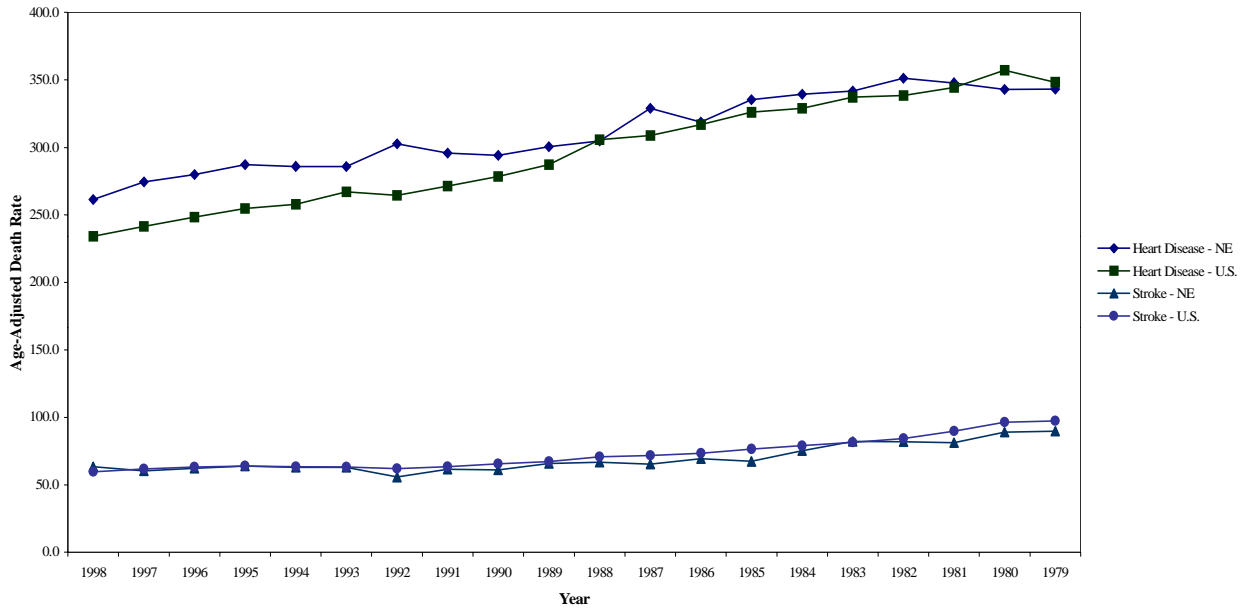
- ◆ From 1979 to 1998, age-adjusted death rates in Nebraska due to heart disease and stroke have declined (see **Figure 1**).
 - ◆ Heart Disease, NE: 1979; 343.2 per 100,000
 - ◆ Heart Disease, US: 1979; 348.3 per 100,000
 - ◆ Heart Disease, NE: 1998; 261.4 per 100,000
 - ◆ Heart Disease, US: 1998; 234.2 per 100,000
 - ◆ Stroke, NE: 1979; 89.8 per 100,000
 - ◆ Stroke, US: 1979; 97.3 per 100,000
 - ◆ Stroke, NE: 1998; 63.3 per 100,000
 - ◆ Stroke, US: 1998; 59.6 per 100,000



Nebraska Center for Rural Health Research at the
University of Nebraska Medical Center
In partnership with
The Nebraska Health and Human Services System

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**Figure 1. Trends in Age-Adjusted Death Rates (deaths per 100,000 population)
Due to Heart Disease and Stroke, U.S. and Nebraska 1979 through 1998**



Sources: Nebraska Health and Human Services System, 1979-1998. U.S. Census Bureau. Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Single Year of Age and Sex. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau, Census 2000. Centers for Disease Control, 2000. See <http://wonder.cdc.gov/mortsql.shtml>. Last modified June 20, 2000.

Note: The Nebraska population for 1979 by age and sex was calculated by taking the percentage that the total 1979 population was of the 1980 total population and multiplying that percentage by all age groups for each sex.

- ◆ American Indians were the only racial/ethnic group to experience an increase in age-adjusted five-year moving average death rates due to CVD in Nebraska from 1979 to 1998, primarily because their age-adjusted death rate due to heart disease increased. The group with the largest decrease was the category of All Other Races. Hispanics also experienced a decline in death rates from 1979 to 1998.
- ◆ In 1998, the Central Health Service Area had the highest age-adjusted death rate due to heart disease (298.2 per 100,000). In the same year, the Eastern Health Service Area had the lowest death rate due to heart disease (242.4 per 100,000).
- ◆ In 1998, the Northern Health Service Area had the highest age-adjusted death rate due to stroke (71.6 per 100,000). In the same year, the Southwest Health Service Area had the lowest death rate due to stroke (49.1 per 100,000).



Trends in CVD Inpatient Hospital Discharge Rates

- ◆ In 1996, the age-adjusted discharge rate due to heart disease was 10.583 per 1,000, which increased to 11.512 per 1,000 by 1998. In 1996, the age adjusted discharge rate due to stroke was 2.623 per 1,000, which increased to 2.735 per 1,000 by 1998.
- ◆ In Nebraska, men have consistently experienced a higher age-adjusted discharge rate due to heart disease than women. In 1998, the rates were 14.243 per 1,000 for men and 9.293 per 1,000 for women.
- ◆ Men have also had a higher age-adjusted discharge rate due to stroke in Nebraska than women have had. In 1998, the rates were 3.025 per 1,000 for men and 2.515 per 1,000 for women.

Part 1. Introduction

Purpose

CVD is a leading cause of death and hospitalization in Nebraska and the United States (1, 2, 3). In 1998, 5,887 Nebraskans died from heart disease and stroke, accounting for 39% of all Nebraska deaths in that year (1). In 1998, over 25,000 hospital discharges were related to heart disease and stroke. Despite the importance of CVD as a public health issue in Nebraska, limited information has been available on patterns and trends in disease occurrence in the state. The purpose of this Reporter is to describe the trends in death rates and inpatient hospitalization rates due to CVD.

Data Relevance

Previous research examining CVD in the United States indicates that CVD-related death and hospital discharge rates are:

- ◆ higher among racial minorities (3-5);
- ◆ about equal for men and women (3); and
- ◆ higher among older individuals, particularly the 65+ age group (3).

The goals of examining the deaths and hospital discharges in Nebraska due to CVD are to:

- ◆ show the trends in death rates and inpatient hospital discharge rates;
- ◆ examine the trends in death rates and inpatient hospital discharge rates; and
- ◆ describe the trends in death rates and inpatient hospital discharge rates.

Part 2. Characteristics of Death Rates Due to CVD

A. *What are the trends in annual, total, sex-specific, age-adjusted death rates due to heart disease and stroke in Nebraska from 1979 through 1998?*

Age-adjusted death rates due to heart disease have steadily declined since 1979 both for men and for women. However, the death rate for men in the state of Nebraska has declined much more (by 35.4%) than the death rate for women (by 9.1%). Data from 1998 show that men are 1.2 times more likely than women are to die from heart disease in the state of Nebraska (see **Table 1**).

Table 2 shows that the age-adjusted death rate due to stroke also has declined since 1979 both for men and for women, although the death rate for men has declined more (by 31.7%) than has the death rate for women (by 28.4%). Data from 1998 show that women are 1.1 times more likely than men are to die from stroke in the state of Nebraska. Table 2 does, however, show a slight increase in the age-adjusted death rate due to stroke from 1997 to 1998 both for men and for women.

Table 1. Trends in Annual, Total, and Sex-Specific Age-Adjusted Death Rates⁽¹⁾ from Heart Disease in Nebraska, Selected Years 1979 through 1998

	Year											
	1998	1997	1996	1995	1993	1991	1989	1987	1985	1983	1981	1979 ⁽²⁾
Male	289.8	318.5	319.0	333.3	340.3	352.1	360.8	406.5	431.3	441.7	445.2	448.3
Female	237.0	238.8	247.9	249.1	242.4	251.3	252.6	270.2	263.4	265.7	271.5	260.8
Total	261.4	274.5	279.9	287.2	285.8	295.8	300.5	329.1	335.4	341.8	347.9	343.2

Sources: Nebraska Health and Human Services System, 1979-1998. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau. Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Single Year of Age and Sex. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 100,000.

(2) The Nebraska population for 1979 by age and sex was calculated by taking the percentage that the total 1979 population was of the 1980 total population and multiplying that percentage by all age groups for each sex.



Table 2. Trends in Annual, Total, and Sex-Specific Age-Adjusted Death Rates⁽¹⁾ from Stroke in Nebraska, Selected Years 1979 through 1998

	Year											
	1998	1997	1996	1995	1993	1991	1989	1987	1985	1983	1981	1979 ⁽²⁾
Male	61.1	55.9	57.3	62.0	61.5	55.6	64.6	65.6	61.9	79.9	78.2	89.5
Female	64.4	63.1	65.3	65.1	63.8	65.3	66.3	65.0	70.7	83.5	83.4	89.9
Total	63.3	60.3	62.2	63.9	63.0	61.6	65.8	65.3	67.3	82.2	81.2	89.8

Sources: Nebraska Health and Human Services System, 1979-1998. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau. Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Single Year of Age and Sex. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 100,000.

(2) The Nebraska population for 1979 by age and sex was calculated by taking the percentage that the total 1979 population was of the 1980 total population and multiplying that percentage by all age groups for each sex.

B. What are the trends in age-adjusted five-year moving average death rates by race/ethnicity due to heart disease and stroke in Nebraska from 1979 through 1998?

Table 3 shows that the age-adjusted five-year moving average death rate due to heart disease decreased for all races except American Indians, whose age-adjusted death rate increased 10.2% over the time period. The lowest age-adjusted death rate was seen in the category of those of all Other Races while the highest age-adjusted death rate was seen in American Indians. According to 1998 data, American Indians are 1.2 times more likely than Blacks to die from heart disease. American Indians are also 1.6 times more likely than Whites and 6.4 times more likely than the category of All Other Races to die from heart disease in the state of Nebraska.

Table 4 shows that the age-adjusted five-year moving average death rate due to stroke has decreased for Whites (by 27.0%), American Indians (by 17.0%), All Other Races (by 29.2%), and Hispanics (by 51.2%). The age-adjusted death rate has stayed relatively stable for Blacks (increasing by just 0.1%). From 1996 to 1998, however, the age-adjusted death rates due to stroke have increased for every race and ethnicity except Whites. Blacks have an age-adjusted death rate 1.5 times higher than Whites, 1.3 times higher than American Indians, and 2.9 times higher than All Other Races.

Table 3. Trends in Age-Adjusted Five-Year Moving Average⁽¹⁾ Death Rates⁽²⁾ from Heart Disease by Race and Ethnicity in Nebraska, 1979 through 1998

	Year															
	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
Race																
White	275.7	280.4	285.9	289.2	290.9	293.4	297.5	302.9	307.8	315.9	323.7	331.2	335.7	341.4	342.8	343.6
Black	344.0	364.8	376.4	383.2	380.9	388.4	374.9	377.7	368.1	378.2	399.3	409.5	415.7	424.1	427.5	443.1
American Indian	427.1	383.5	383.0	370.9	329.1	364.7	407.6	395.4	390.8	415.5	400.1	348.9	339.7	359.9	370.1	387.6
All Others	67.3	63.2	82.3	76.5	89.4	165.2	181.2	183.5	195.9	184.2	116.7	119.4	97.3	97.3	125.1	110.9
Ethnicity																
Hispanic Origin	121.2	122.2	119.9	109.4	112.2	120.1	128.3	125.6	147.7	158.2	165.8	163.8	169.5	176.4	188.1	173.3

Sources: Nebraska Health and Human Services System, 1979-1998. U.S. Census Bureau. 1990 to 1999 Annual Time Series of State Population Estimates by Age, Sex, Race, and Hispanic Origin. U.S. Census Bureau. Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Age, Sex, Race, and Hispanic Origin. U.S. Census Bureau, Census 2000. Profile of General Demographic for the United States: 2000.

Note: The Nebraska population for 1979 and 1980 by age and race/ethnicity was calculated by taking the percentage that the total 1980 population was of the 1981 total population and the total 1979 population was of the 1981 total population and multiplying that percentage by all age groups for each race/ethnicity.

(1) Moving averages were calculated beginning in 1983 for the years 1979-1983.

(2) Rates per 100,000.

Table 4. Trends in Age-Adjusted Five-Year Moving Average⁽¹⁾ Death Rates⁽²⁾ from Stroke by Race and Ethnicity in Nebraska, 1979 through 1998

	Year															
	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
Race																
White	61.8	62.0	61.0	61.0	60.6	61.2	61.8	63.8	65.5	66.8	68.8	72.0	75.2	77.5	81.7	84.6
Black	90.7	78.1	80.2	79.7	68.5	63.9	72.3	67.7	65.0	66.0	65.9	63.1	66.6	77.1	85.4	90.6
American Indian	69.6	63.9	67.4	70.1	64.7	66.3	62.3	59.9	54.4	56.2	61.7	61.0	71.8	57.3	75.1	83.9
All Others	31.5	27.8	34.5	12.5	13.7	43.9	46.8	56.8	59.6	65.7	22.5	23.5	24.4	25.4	26.1	44.5
Ethnicity																
Hispanic Origin	25.1	22.2	21.8	23.0	20.9	21.0	27.1	33.0	33.6	30.7	35.4	36.3	35.2	51.4	56.5	51.4

Sources: Nebraska Health and Human Services System, 1979-1998. U.S. Census Bureau. 1990 to 1999 Annual Time Series of State Population Estimates by Age, Sex, Race, and Hispanic Origin. U.S. Census Bureau. Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Age, Sex, Race, and Hispanic Origin. U.S. Census Bureau, Census 2000. Profile of General Demographic for the United States: 2000.

Note: The Nebraska population for 1979 and 1980 by age and race/ethnicity was calculated by taking the percentage that the total 1980 population was of the 1981 total population and the total 1979 population was of the 1981 total population and multiplying that percentage by all age groups for each race/ethnicity.

(1) Moving averages were calculated beginning in 1983 for the years 1979-1983.

(2) Rates per 100,000.



C. What are the trends in the annual age-adjusted death rates due to heart disease and stroke by health service area in Nebraska from 1994 through 1998?

The age-adjusted death rate due to heart disease in Nebraska is 1.1 times higher in the Central health service area than the statewide rate. Death rates in the Northern, Southwest, and Western health service areas also were higher than the state-wide rate in a majority of years from 1994 to 1998 (see **Table 5**).

Table 6 shows the age-adjusted death rate in Nebraska due to stroke by health service area. The age-adjusted death rate due to stroke was consistently higher in the Northern health service area than the statewide rate (1.1 times higher in 1998). The Central and Southeast health service areas also had age-adjusted death rates higher than the state for the majority of the years from 1994 to 1998. Only the Southwest health service area had an age-adjusted death rate due to stroke that was consistently lower than the statewide rate for each year of the five-year period from 1994 to 1998.

Table 5. Trends in Annual and Total Age-Adjusted Death Rates⁽¹⁾ from Heart Disease in Nebraska by Service Area, 1994 through 1998

Health Service Area	Year				
	1998	1997	1996	1995	1994
Western	266.8	272.6	276.4	314.0	293.1
Southwest	279.5	277.0	291.8	287.3	301.6
Central	298.2	312.0	273.8	295.2	312.5
Northern	265.6	278.8	300.7	293.1	309.5
Southeast	248.1	267.7	275.2	270.2	265.5
Eastern	242.4	254.1	268.7	285.7	264.6
Total	261.4	274.6	280.0	287.3	286.1

Sources: Nebraska Health and Human Services System, 1994-1998. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 100,000.

Table 6. Trends in Annual and Total Age-Adjusted Death Rates⁽¹⁾ from Stroke in Nebraska by Service Area, 1994 through 1998

Health Service Area	Year				
	1998	1997	1996	1995	1994
Western	59.6	50.2	59.2	63.1	68.0
Southwest	49.1	50.4	54.5	44.8	53.7
Central	67.1	65.2	62.5	59.6	58.7
Northern	71.6	68.7	67.1	72.0	73.9
Southeast	64.1	60.8	63.5	62.5	65.0
Eastern	59.8	56.4	59.6	67.3	56.0
Total	63.3	60.4	62.3	63.9	62.9

Sources: Nebraska Health and Human Services System, 1994-1998. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 100,000.

Part 3. Characteristics of Inpatient Hospital Discharge Rates from CVD

A. *What are the trends in annual, total, sex-specific, age-adjusted inpatient hospital discharge rates due to heart disease and stroke in Nebraska during 1996, 1997, and 1998?*

Table 7 shows that men have had the highest age-adjusted inpatient hospital discharge rate due to heart disease. Data from 1998 show that men are 1.5 times more likely than women to have an inpatient hospital discharge due to heart disease. The age-adjusted discharge rate for women has been consistently lower than the total for the state from 1996 to 1998.

Table 8 shows that men have also had the highest age-adjusted rate of inpatient hospital discharges due to stroke from 1996 to 1998. The rate for men has increased by 4.5% while the rate for women has increased 3.6%. Data from 1998 also show that men are 1.2 times more likely to have an inpatient hospital discharge due to stroke than women.

Table 7. Trends in Annual, Total, and Sex-Specific Age-Adjusted Inpatient Hospital Discharge Rates⁽¹⁾ from Heart Disease in Nebraska, 1996, 1997, and 1998⁽²⁾

	Year		
	1998	1997	1996
Male	14.243	14.150	13.062
Female	9.293	8.962	8.545
Total	11.512	11.302	10.583

Source: Nebraska Association of Hospitals and Health Systems, 1999. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 1,000

(2) Calendar years. Reflects an estimated inpatient hospital discharge rate of 92% for 1998, 91% for 1997, and 90% for 1996.

Table 8. Trends in Annual, Total, and Sex-Specific Age-Adjusted Inpatient Hospital Discharge Rates⁽¹⁾ from Stroke in Nebraska, 1996, 1997, and 1998⁽²⁾

	Year		
	1998	1997	1996
Male	3.025	2.854	2.894
Female	2.515	2.545	2.425
Total	2.735	2.681	2.623

Source: Nebraska Association of Hospitals and Health Systems, 1999. U.S. Census Bureau. Population Estimates for States by Age and Sex: Annual Time Series July 1, 1990 to July 1, 1998. U.S. Census Bureau, Census 2000. Profile of General Demographic Characteristics for the United States: 2000.

(1) Rates per 1,000

(2) Calendar years. Reflects an estimated inpatient hospital discharge rate of 92% for 1998, 91% for 1997, and 90% for 1996.



Part 4. Summary

In Nebraska, as is the case in the U.S., the death rate due to CVD has been declining while the inpatient hospitalization rate has increased over the last few years. However, in Nebraska, the death rate due to stroke has increased in recent years as well. Unlike Nebraska, the death rate due to stroke has continued to decline in the U.S. Other findings of note in Nebraska:

- ◆ The age-adjusted death rate due to heart disease has declined less for women than for men;
- ◆ The age-adjusted death rate due to stroke is higher for women than for men and has begun to slightly increase;
- ◆ American Indians have the highest age-adjusted death rates due to heart disease;
- ◆ Blacks have the highest age-adjusted death rate due to stroke;
- ◆ The Central health service area has the highest age-adjusted death rate due to heart disease;
- ◆ The Northern health service area has the highest age-adjusted death rate due to stroke; and
- ◆ Hospital discharges due to heart disease and stroke have been increasing.

References

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APPENDIX A

List of ICD-9-CM codes used in this Data Reporter.

Heart Disease

390-398, 402, 404-429

Stroke

430-438

APPENDIX B

Explanation of age-adjustment in this Data Reporter.

The age-adjusted death rates were calculated by first calculating the age-specific death rates. Age-specific rates are calculated by taking the number of deaths in an age group and dividing by the population in that age group. (For example: The number of deaths from heart disease for ages 0-14 would be divided by the population of Nebraska in that year for that age group.)

To calculate the age-adjusted death rates, the age-specific rate is multiplied by the number of people in the standard population who are in the same age group. (For example: The age-specific rate calculated in the previous example would be multiplied by the population of the United States in the year 2000 who are also 0-14 years old.) Those numbers for each of the age groups in a given year are summed, and that number is divided by the total number of people in the standard population resulting in the age-adjusted rate.

In this Data Reporter, the United States population in 2000 was used as the standard population.



Data Notes

Data were collected by the Nebraska Association of Hospitals and Health Systems (NAHHS). Nebraska hospitals submit their data to the member's data repository on a regular basis for the purposes of cleaning, archiving and information processing.

Data are reported as they have been submitted to the NAHHS. For the three calendar years of data examined in this report, NAHHS was able to capture 92% of the total number of discharges from Nebraska hospitals during 1998, 91% of discharges during 1997, and 90% of discharges during 1996. The data reported in this document include all discharges from Nebraska community hospitals. Data do not include patients hospitalized at the following state or federal facilities:

Non-Reporting Federal/State Inpatient Facilities			
City	Facility Name	Location	Facility Name
Bellevue	Offutt Air Force Base	Norfolk	Regional Center
Grand Island	Veterans Administration	Omaha	Douglas County Hospital
Hastings	Regional Center	Omaha	Veterans Administration Medical Center
Lincoln	Veterans Administration	Winnebago	U.S. Public Health Services
Lincoln	Regional Center		

The information used for this Data Reporter has been stripped of personal identifiers, therefore data may include multiple discharges of a single person within one year. Information about the socioeconomic characteristics of patients are not collected. Reported data have not been adjusted for severity.

Definitions

AGE-ADJUSTED RATE. Age-adjusting eliminates fluctuations in the data due to differences in the age distribution of the population.

DEATH RATE. A ratio between mortality and population.

FIVE-YEAR MOVING AVERAGE. The five-year moving average is created by summing the number of deaths over a five-year period and dividing by five.

ICD-9-CM. International Classification of Diseases, 9th Revision, Clinical Modification. A method of classifying diseases and procedures statistically. The ICD-9-CM provides a means by which to classify morbidity data for the indexing of medical records and for basic health statistics needs. The ICD-9-CM is reviewed annually and updated to reflect changes in diagnoses and treatment in the clinical and inpatient settings.

MORTALITY. The number of deaths in a given time or place.

STANDARD POPULATION. The population that is used to age-adjust rates for comparison.

About the Nebraska Health Information Project

The Nebraska Health Information Project is a partnership project made possible with the financial support of the State of Nebraska and through additional personal and other resources provided by the University of Nebraska Medical Center. While initiated by Nebraska Unicameral, the ongoing success of the project results from cooperation and collaboration among a number of organizations and individuals, particularly those involved in delivering health care services, financing health care, and analyzing health related data.

Other reports have been published by the Nebraska Health Information Project, including biennial databooks which present Nebraska health and demographic data at the county, area, and state levels. To find out more about these reports and future reports visit our homepage at: <http://www.unmc.edu/nebraska>

The Nebraska Center for Rural Health Research

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