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Asthma Hospitalizations Among Nebraska Children 1995-1997

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Introduction

The purpose of this Reporter is to describe the discharge rate, length of stay, payer characteristics, and average charges associated with asthma hospitalizations among Nebraska resident children using inpatient hospital discharge data from the Nebraska Association of Hospitals and Health Systems.

We have chosen asthma as our focus in this issue because most hospitalizations related to asthma are preventable. Past Nebraska Health Information Project reports have indicated that asthma is the second most frequent hospitalization reason among conditions considered ambulatory care sensitive (preventable) for Nebraska children aged 0-14. Further, because the asthma-related hospitalization is a preventable one, this type of hospitalization may be an indicator of lack of access to primary care.

Findings

Nebraska data show that children are hospitalized for asthma more often than adults. This is consistent with trends observed in U.S. data. Most importantly, the descriptive data presented here show that publicly insured children with asthma in Western Nebraska may be at higher risk of hospitalization than children who are commercially insured or children who live in other areas of the state. Further research is needed to determine the causes of these differences.

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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Part 1. Introduction

Purpose

To describe the rate of discharge, length of stay, and average charges associated with asthma hospitalizations among Nebraska resident children using inpatient hospital discharge data from the Nebraska Association of Hospitals and Health Systems.

Data Relevance

According to the Centers for Disease Control (CDC) in 1993/94 an estimated 13.7 million persons in the U.S. reported having asthma. About one-third of these, 4.1 million, are under the age of 15. Prevalence of asthma increased more dramatically among children than in any other age group from 1980 to 1994[1]. As shown in **Table 1**, the incidence of self-reported asthma increased 160% between 1980 and 1994 for children age 0 to 4. The incidence of asthma over the same time period increased nearly 74% for children aged 5 through 14 years.

Table 1. Self-Reported Prevalence of Asthma per 1,000 Population by Age in the U.S. National Health Interview Surveys (1980) and (1993/94)

Age Group	1980*	1993/94*	Percent Change 1979/80 to 1993/4
0 to 4	22.2	57.8	160.4%
5 to 14	42.8	74.4	73.8%
15 to 34	27.7	51.8	87.0%
35 to 64	28.1	44.6	58.7%
65 and Older	30.7	44.6	45.3%
All Ages	**30.7**	**53.8**	**75.2%**

Source: Mannino DM, et al. (1998). "Surveillance for Asthma - United States, 1960-1995". **MMWR**, April 24, 1998. Vol. 47, No. SS-1.

* Rate of self-reported asthma, per 1,000 population.

Table 2 shows that the U.S. rate of hospitalization for asthma has also been increasing. The table shows that since 1979/80 the rate of inpatient hospital discharges for which asthma was listed as the primary diagnosis increased 45% for children ages 0 to 4. Also, there were increases in the rates of discharge for those in the 5 to 14 and 15 to 34 age groups. Conversely, among people in the 35 to 64, and 65 and older age groups there were decreases in asthma-related discharge rates[1, 2].

(1) Self-reported prevalance. Data for children reported by the adult responding on behalf of the family.
Source: Mannino, DM, et al. (1998). "Surveillance for Asthma - United States, 1960-1995". MMWR, April 24, 1998. Vol. 47, No. SS-1. Reported data are from the 1980 and 1993-94 National Health Interview Surveys.
(2) Source: National Hospital Discharge Survey, 1995. U.S. Census Bureau, July 1 Estimates, 1995.

Table 2. Estimated Average Rates* of Hospitalizations for Asthma as the First Listed Diagnosis, by Age Group U.S. National Hospital Discharge Survey, 1979-1994.**

Age Group	1979/80*	1993/94*	Percent Change 1979/80-1993/4
0 to 4	3.43	4.97	44.9%
5 to 14	1.59	1.80	13.2%
15 to 34	0.87	1.00	14.9%
35 to 64	1.82	1.52	-16.5%
65 and Older	3.15	2.56	-18.7%
All Ages	**1.76**	**1.81**	**2.8%**

Source: Mannino, DM, et al (1998). "Surveillance for Asthma - United States, 1960-1995". **MMWR**, April 24, 1998. Vol. 47, No. SS-1.

* Rate per 1,000 population.
**See note about the National Hospital Discharge Survey on page 10.

In Nebraska from 1995 to 1997, asthma was the second leading preventable hospitalization(1) among children 14 and under. As shown in **Table 3**, nearly 19 percent of preventable hospitalizations among Nebraska resident children are due to asthma.

Table 3. Reasons for Preventable Hospitalizations Among Nebraska Resident Children*, 1995 to 1997

Bacterial Pneumonia	27.6%
Asthma	**18.8%**
Dehydration	12.5%
Grand Mal Status / Convulsions	10.2%
Gastroenteritis	10.0%
ENT Infections	7.5%
Other Conditions	13.4%
Total	**100.0%**

Source: Nebraska Association of Hospitals and Health Systems, 1998.

*Ages 0-14 years.

(1) Primary diagnosis of asthma. See definition of preventable hospitalization on page 10.

Part 2. Characteristics of Discharges: Childhood Asthma

How do childhood asthma discharge rates in Nebraska compare with U. S. rates?

Nebraska has a lower rate of hospitalization for asthma than the U.S. **Table 4** shows that for all ages, the overall discharge rate for asthma in the U.S. (1995) is nearly two and a half times higher than the rate observed in Nebraska in 1995 to 1997. In both the U.S. and Nebraska, discharge rates for children from birth to 4 and from 5 to 14 are higher than rates observed in other age groups.

Table 4. Asthma as Primary Diagnosis on Discharge: Rate Per 1,000 Population by Age Group, U.S. (1995) and Nebraska (1995-1997)

Age	U.S. 1995	Nebraska (1995-1997)
0 to 4	6.05	1.38
5 to 14	2.47	0.10
15 to 34	1.03	0.50
35 to 64	1.50	0.71
65 and Older	2.30	0.45
All Ages	**1.94**	**0.70**

Sources: National Hospital Discharge Survey, 1995.
Nebraska Association of Hospitals and Health Systems, 1998.
US Bureau of the Census, July 1 Estimates, 1995, 1996 and 1997.

*Rate Per 1,000 population.

How do childhood asthma discharge rates in Nebraska differ across the state[(1)]?

The discharge rate for all children in Nebraska from birth to 14 years of age was 1.08 per 1,000 population for the years of 1995-1997. The comparable rate for the U.S. in 1995 was 3.69 per 1,000 population[(2)]. **Table 5** compares the Nebraska childhood asthma discharge rate to substate areas. Most notably, these data show the following:

◆ Statewide, children aged 0 to 4 years have a 45.3% higher rate of discharge than children aged 5 to 14 years of age.

◆ The Western health service area has significantly ($p<.05$) more discharges than the other areas in the 0 to 4 age group.

(1) See geographic definitions and boundary map on page 11.
(2) Source: National Hospital Discharge Survey, 1995. See note on page 10.

◆ The Eastern health service area has significantly (p<.05) more asthma related discharges than the other areas of the state for the 5 to 14 age group.

◆ The Southeastern and Northern health service areas have significantly (p<.05) fewer discharges than the other regions for both the 0 to 4 and 5 to 14 year age groups.

Table 5. Discharge Rates* for Asthma by Age and Geographic Area [(1)]
Nebraska, 1994-1996

	All Children 0 - 14 Years	0 - 4 Years	5 - 14 Years
Nebraska	**10.8**	**13.8**	**9.5**
Health Service Areas [(2)]			
Western	11.7	21.3	7.7
Southwest	10.6	13.3	9.6
Central	10.2	16.5	7.5
Northern	8.5	11.3	7.3
Southeast	6.6	8.0	5.9
Eastern	15.0	16.8	14.1
Metropolitan County Status [(3)]			
Metropolitan	12.5	14.1	11.6
Non-Metropolitan	9.2	13.5	7.3

Sources: Nebraska Association of Hospitals and Health Systems, 1998
US Bureau of the Census, July 1 Estimates, 1995, 1996 and 1997.

* Rate per 10,000 population.

(1) See geographic definitions and boundary map on page 11.

Who are the primary payers for hospitalizations related to childhood asthma? How does the distribution of payer types vary across the state[1]?

As shown in **Table 6**, commercial insurance is listed as the primary payer in 60% of the observed asthma discharges among children in Nebraska. Public insurance is listed as the primary payer for 37.5% of the discharges and self-pay is listed for 2.5% of the discharges[2]. This distribution holds true for *all but one* of Nebraska's health service areas. In the Western service area, the pattern of primary payers is reversed. Here, about 60% of asthma-related discharges list public insurance as the primary payer and about 36% list commercial insurance as the primary payer.

Table 6. Primary Payer Indicated on Asthma Related Discharges by Area[1]: Nebraska Resident Children, 1995-1997

	Commercial	Public	Self-pay(2)
Nebraska	**60.0%**	**37.5%**	**2.5%**
Health Service Areas			
Western	35.6%	60.3%	4.1%
Southwest	55.3%	39.5%	5.3%
Central	63.8%	33.3%	2.9%
Northern	62.9%	34.0%	3.1%
Southeast	68.3%	27.5%	4.2%
Eastern	59.8%	39.0%	1.2%
Metropolitan County Status			
Metropolitan	62.0%	36.3%	1.7%
Non-Metropolitan	57.4%	38.9%	3.7%

Sources: Nebraska Association of Hospitals and Health Systems, 1998

The Western health service[1] area shows dramatically different proportions for commercial and public payers - significantly lower ($p<.05$) for commercial and significantly ($p<.05$) higher for public - from the other health service areas.

(1) See geographic definitions and boundary map on page 11.

(2) Please see definition of self-pay discharges on page 10.

Table 7. Average Length of Stay: Asthma Discharges (Children 0-14 Years) by Primary Payer Source and Area of Residence, 1995 - 1997

	All Payers*	Commercial*	Public*	Self-pay*(1)
	Ave Stay (s.d.*)	Ave Stay (s.d.*)	Ave Stay (s.d.*)	Ave Stay (s.d.*)
Nebraska	**2.45 (1.15)**	**2.36 (1.46)**	**2.61 (1.73)**	**1.97 (1.19)**
Health Service Areas				
Western	**2.96 (1.76)**	2.88 (1.56)	3.02 (1.84)	**
Southwest	**1.98 (0.92)**	1.83 (0.79)	2.67 (1.05)	**
Central	**2.08 (1.25)**	2.04 (1.20)	2.21 (1.37)	**
Northern	**2.47 (1.38)**	2.44 (1.53)	2.57 (1.14)	**
Southeast	**2.54 (1.54)**	2.40 (1.29)	3.04 (1.20)	1.43 (0.79)
Eastern	**2.50 (1.71)**	2.44 (1.59)	2.58 (1.89)	2.85 (0.90)
Metropolitan County Status				
Metropolitan	**2.52 (1.68)**	2.44 (1.52)	2.66 (1.93)	2.33 (1.07)
Non-Metropolitan	**2.35 (1.40)**	2.25 (1.36)	2.55 (1.44)	1.72 (1.23)

Source: Nebraska Association of Hospitals and Health Systems, 1998

* s.d.=standard deviation shown in parentheses

** Five or fewer cases

What is the average length of stay (ALOS) for a childhood asthma hospitalization in Nebraska? Do these lengths of stay vary geographically[(2)]?

The average length of stay (ALOS) for an asthma-related hospitalization for Nebraska children from birth through age 14 is 2.5 days. According to data from the National Hospital Discharge Survey [(3)], the ALOS for the U.S. in 1995 was more than double that amount -- 5.4 days for the average stay[(3)]. **Table 7** shows how the ALOS in Nebraska for asthma-related hospitalizations varies by health plan type and by geographic area of the state. The data in **Table 7** also shows that:

◆ Among health service areas, the Western area has the highest overall ALOS. The Southwest area has the lowest ALOS. Among the discharges of residents from metropolitan counties, the ALOS is 2.5 days, only slightly higher than the 2.4 days observed among residents of non-metropolitan counties.

◆ Among primary payer types, discharges with public insurance have a longer ALOS than those with commercial insurance or those with no insurance [(1)]. This pattern holds true in each of the six major health service delivery areas and in both metropolitan and non-metropolitan areas.

◆ Overall, Western area children with asthma, on average, have a longer ALOS than children from any other region with any other payer type. The exception to this pattern are those children from the Southeast region who have indicated a public insurer as primary payer.

(1) Please see note about self-pay discharges on page 10.

(2) See geographic definitions and boundary map on page 11.

(3) National Hospital Discharge Survey, 1995. See note on page 10.

What are the average charges associated with an asthma-related hospital stay among Nebraska children between 1995 and 1997, and did these charges vary geographically[1]?

As shown in **Table 8**, the average charge per day is $3,704 for Nebraska resident children hospitalized with a primary diagnosis of asthma from 1995-1997. Among health service areas:

◆ The Eastern region tends to have the highest average daily charge -- $4,432 -- though the difference is not significant when compared with other areas of the state.

◆ Among health service areas, average charges tend to be higher (but not significantly so) for discharges that were covered by public insurance than for those covered by commercial insurance. The exception to this pattern was the Northern health service area, where the average charge for commercially insured discharges was almost $600 more than the average age charge for the publicly insured.

◆ Publicly insured patient discharges from the Eastern area of the state (Douglas and Sarpy counties) had the highest overall average charge of $4,916 -- about 22% higher than average charge for the publicly insured statewide and about 33% higher than the average charge for all statewide discharges statewide for this diagnosis. These cases also had the highest standard deviation when compared with discharges observed in other areas/payer types.

Table 8. Average Charges for Asthma Discharges (Children 0-14 Years) by Primary Payer and Area of Residence, 1995 - 1997

	All Payers		Commercial		Public		Self-pay(2)	
	Ave Charge	s.d.*	Ave Charge	s.d.*	Ave Charge	s.d.*	Ave Charge	s.d.*
Nebraska	**$ 3,704**	$ 5,305	$ 3,545	$ 3,344	$ 4,023	$ 7,541	$ 2,738	s.e.*
Health Service Areas								
Western	**$ 3,710**	**$ 2,356**	$ 3,600	$ 2,107	$ 3,730	$ 2,430	**	**
Southwest	**$ 2,228**	**$ 1,328**	$ 2,121	$ 1,048	$ 2,391	$ 1,705	**	**
Central	**$ 2,578**	**$ 1,960**	$ 2,534	$ 2,128	$ 2,724	$ 1,688	**	**
Northern	**$ 3,275**	**$ 2,681**	$ 3,496	$ 3,181	$ 2,920	$ 1,463	**	**
Southeast	**$ 3,302**	**$ 2,409**	$ 3,192	$ 2,149	$ 3,832	$ 2,991	$ 1,614	$ 878
Eastern	**$ 4,432**	**$ 7,219**	$ 4,123	$ 4,056	$ 4,916	$ 10,410	$ 4,065	$ 1,212
Metropolitan County Status								
Metropolitan	**$ 4,249**	**$ 6,602**	$ 3,947	$ 3,720	$ 4,820	$ 9,806	$ 3,123	$ 1,586
Non-Metropolitan	**$ 2,941**	**$ 2,322**	$ 2,932	$ 2,132	$ 2,999	$ 2,999	$ 2,482	$ 2,482

Source: Nebraska Association of Hospitals and Health Systems, 1998

* s.d.=standard deviation

** Five or fewer cases

(1) See geographic definitions and boundary map on page 11.

(2) Please see definition of self-pay discharges on page 10.

Part 3. Summary

In Nebraska, as is the case in the U.S., the hospitalization rate for children with asthma is higher than it is for adults. However, Nebraska's rate for children is two and a half times lower than the national average. Other findings of note:

◆ Within the state, asthma related discharge rates are almost two times higher among children (age 0 to 14) than the rate observed in older age groups.

◆ The Western area of the state (see the map on page 11) has a significantly higher childhood asthma discharge rate than other areas of the state.

◆ Also in the Western area of the state, most childhood asthma hospitalizations were covered by some type of public health insurance. The proportion of these discharges was significantly different than the proportions observed in other areas of the state. Except for the Western area, the majority of childhood asthma hospitalizations were covered by commercial health insurance.

◆ There were no notable differences in ALOS or average charge across the state.

This report provides baseline data to the public policy, medical research, and public health community. More research is needed to determine the cause of the differences in discharge rates observed across the state. Differences in diagnosis coding may explain some of the variation. In addition, physician practice patterns, the number of asthma specialists, and differences in the population receiving care may also contribute.

Data Notes

About the Nebraska Inpatient Discharge Data

Data were collected by the Nebraska Association of Hospital 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. Therefore, for the three calendar years of data examined in this report, NAHHS was able to capture 90% of the total number of discharges from Nebraska hospitals during 1997, 89% of discharges during 1996, and 85% of discharges during 1995. The data reported in this document includes all discharges from Nebraska community hospitals, and does not include out-of-state residents except where otherwise noted. Data do not include patients hospitalized at the following state or federal facilities:

Non-Reporting Federal/State Inpatient Facilities

City	Facility Name	City	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 report 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.

About the National Hospital Discharge Survey

The National Hospital Discharge Survey (NHDS) is conducted annually by the National Center for Health Statistics (NCHS). The data were obtained from a sample of inpatient discharge records from a national sample of non-federal general, and short stay specialty hospitals in the U.S.

Definitions

AMBULATORY CARE SENSITIVE CONDITION. A condition or illness that can be treated and controlled in an out-patient setting. See preventable hospitalization.

ASTHMA DISCHARGE. Asthma discharges are defined in this report as those where the first listed diagnosis was coded between 493.0 and 493.9 according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

AVERAGE CHARGE. Average charge is calculated by dividing the sum of patient charges in dollars by the number of patients within an ICD-9-CM or DRG category.

AVERAGE LENGTH OF STAY (ALOS). Average length of stay is calculated by dividing the sum of inpatient days by the number of patients within the DRG category. Inpatient days are calculated by subtracting day of admission from day of discharge and adding 1. Therefore, persons entering and leaving a hospital on the same day have a length of stay of one.

COMMERCIAL PAYER. This category of payer type includes all private third party payers (insurance companies). These include self-funded employer insurance plans, managed care plans, and federally insured persons enrolled in managed care plans.

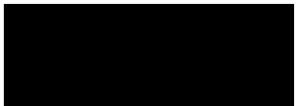
DRG. Diagnosis-related groups (DRGs) are classifications of hospital case types into clinically cohesive groups which are expected to have similar hospital resource use and length of stay patterns. Medicare uses this classification to determine inpatient reimbursement rates.

PREVENTABLE HOSPITALIZATION. As a measure of access to health care, the occurrence of a preventable hospitalization may indicate the presence of barriers to health care that exist in a community or population. A preventable hospitalization may or may not represent a failure in outpatient management. Similarly, it is not necessarily true that all untreated ambulatory care sensitive conditions will result in an admission to a hospital.

PUBLIC PAYER. Public payers include worker's compensation, Medicaid, Medicare, and military health plans.

SELF-PAY. Self-pay patients are those who were uninsured at the time of hospitalization. Therefore, the patient is the party responsible for all hospitalization charges. Self-pay discharges are those for which "self-pay" is indicated on the first of three listed payer fields on the discharge document. In Nebraska, the self-pay category includes charity or uncompensated care, where the hospital may expect little or no reimbursement for the services rendered. This category of discharge is under-reported, the extent to which is unknown.

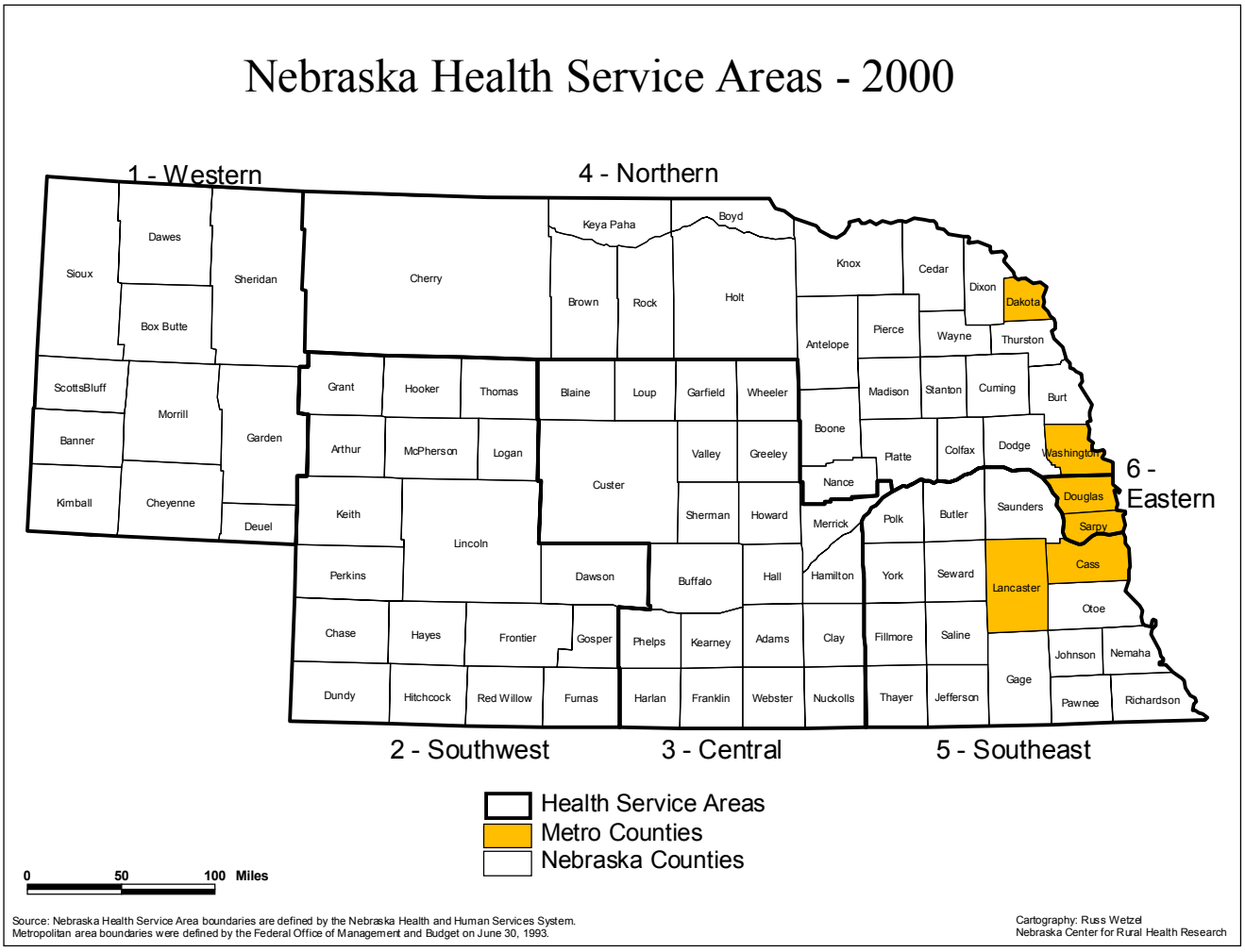
TOTAL CHARGE. Total charges represent the dollar amount charged for the hospitalization rather than the amount paid or the actual costs to provide the care. Physician charges are generally excluded from this amount.



Geographic Concepts

HEALTH SERVICE AREA. Health Service Areas are county groupings defined by the Nebraska Department of Health and Human Services in 1999. The map below depicts the boundaries of these areas with respect to county boundaries in the state.

METROPOLITAN COUNTIES. Metropolitan area boundaries and names are those defined by the Federal Office of Management and Budget (OMB) on June 30, 1993. In Nebraska, metropolitan boundaries correspond with county boundaries. There are six metropolitan counties in Nebraska: Cass, Dakota, Douglas, Lancaster, Sarpy, and Washington. Non-metropolitan counties are defined as all other counties not otherwise defined as metropolitan. See below.



Source: Nebraska Health Service Area boundaries are defined by the Nebraska Health and Human Services System.
Metropolitan area boundaries were defined by the Federal Office of Management and Budget on June 30, 1993.

Cartography: Russ Wetzel
Nebraska Center for Rural Health Research

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 the 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 annual 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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