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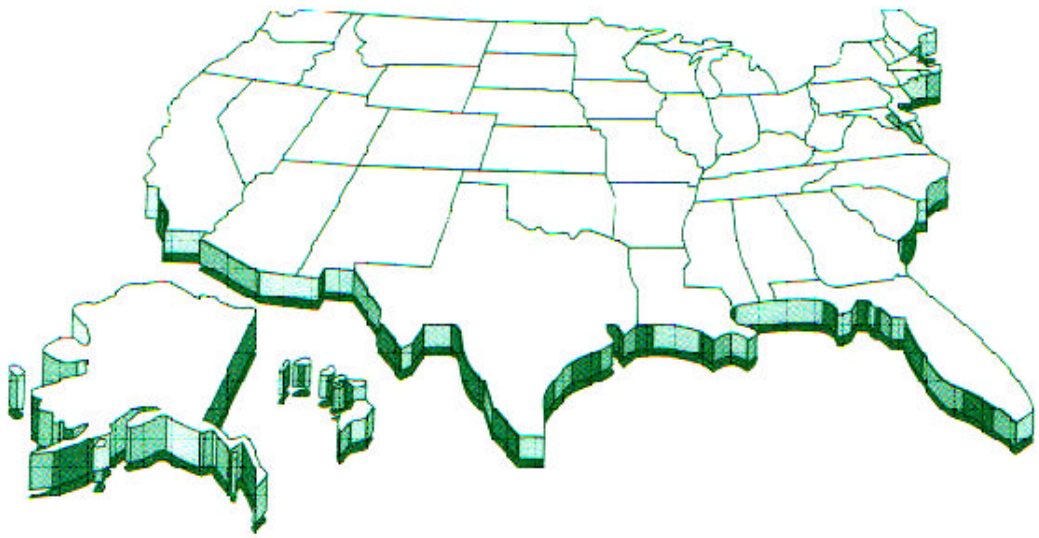
Atlas of Respiratory Disease Mortality, United States: 1982-1993



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Atlas of Respiratory Disease Mortality, United States: 1982-1993

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Division of Respiratory Disease Studies

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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August, 1998

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PREFACE

This *Atlas of Respiratory Disease Mortality, United States: 1982-1993* presents maps showing geographic distributions (by health service area) of mortality associated with selected respiratory conditions that together represent nearly all respiratory diseases. For categories of traditional occupational lung diseases mapped in this atlas (i.e., the pneumoconioses, including coal workers' pneumoconiosis, asbestosis, silicosis, byssinosis, and other and unspecified pneumoconioses), nearly all cases are attributable to hazardous occupational exposure. NIOSH has previously published maps showing geographic distributions (by county) of pneumoconiosis mortality in the United States [NIOSH 1996].* For other respiratory disease categories mapped in this atlas, cases frequently occur in the absence of hazardous occupational exposure, and smaller proportions of cases--much smaller for some disease categories--are therefore considered attributable to occupational exposure. Nevertheless, for each of the disease categories mapped in this atlas, occupational causes have been documented. The author hopes that the geographic patterns of respiratory mortality presented in this atlas will stimulate and aid further study of occupational etiologies of a variety of respiratory diseases, not just those traditionally referred to as occupational lung diseases.

*National Institute for Occupational Safety and Health. Work-Related Lung Disease Surveillance Report, 1996. DHHS (NIOSH) Publication No. 96-134.

ACKNOWLEDGMENTS

The author thanks Dr. Kathleen Kreiss for encouragement and for her decision to produce this atlas; Dr. John E. Parker for continuous support from conception to completion; Dr. Ki Moon Bang for advice; Ms. Helen Montagliani for formatting the text; Mr. John Wood for verifying the endless numbers that configured the maps; and Ms. Molly Pickett-Harner for editorial assistance.

The author also wishes thank the following individuals who reviewed and provided critical comments on draft components of this atlas: Drs. Ki Moon Bang, Robert M. Castellan, William L. Eschenbacher, Kathleen Kreiss, John E. Parker, Edward L. Petsonk, David N. Weissman, and Linda Williams Pickle.

Finally, the author expresses gratitude to colleagues at the National Center for Health Statistics, including Drs. Michael Mungiole and Charles Croner, for providing advice, the HSA boundary file for the mapping program, and other pertinent information.

CONTENTS

DATA AND METHODS

Mortality Data

Multiple cause of death tapes with Federal Information Processing Standard codes that identify minor civil divisions have been available to the public since 1982 from the National Center for Health Statistics (NCHS). While each tape holds all death registrations in the United States for a given year, each death record contains International Classification of Diseases 9th Revision (ICD-9) codes for up to 20 diseases listed on the death certificate, along with place of residence and demographic characteristics.

Beginning in 1987, the public use tapes do not contain geographic identifiers for decedents who were one of less than 3 individuals with any specified cause of death in a geographic area smaller than a state. Therefore, customized tapes with county codes for each death were obtained from NCHS for 1987 and subsequent years.

For this atlas, data for 1982 through 1993 were used, restricting decedents to U.S. residents 15 years of age and older. Seventeen disease categories were selected for mapping (Table 1). For each condition of interest, the number of deaths (with the condition as either underlying or contributing cause) was tabulated by four age groups: 15-34; 35-54; 55-74; and 75 years and older. For aggregate conditions (e.g., COPD), a death with codes for two or more diagnoses (e.g., bronchitis and emphysema) was counted as one.

Population Data

The U.S. population by county as of January 1, 1988 (the midpoint of the study period) was calculated using 1987 and 1988 records from the Bureau of the Census. Health service area (HSA) populations were aggregated from these county populations by age and used as denominators for death rates.

Geographic Unit

The basic geographic unit in this atlas is the HSA as defined based on travel patterns between counties by Medicare beneficiaries for

routine hospital care (Makuc, 1991).[**] A total of 3,141 counties configure 805 HSAs (Appendices I and II). To process the NCHS mortality data for this atlas, the county of residence for each decedent was converted to one of the 805 HSAs.

Age-Adjusted Death Rates

An age-adjusted death rate for each HSA from each condition of interest was calculated using the 1980 U.S. population as standard [Bureau of the Census].[***] The age-specific rates by HSA were computed by dividing the average annual number of deaths for each age group by the corresponding population as of January 1, 1988. Then those rates were applied to the standard population resulting in the expected number of deaths. The sum of expected deaths for each HSA was divided by the total standard population and the resulting quotient was multiplied by 1,000,000 to produce the age-adjusted rates. Therefore, the rates are per year over the 12-year period.

Mortality Rate Ratio

To compare the age-adjusted death rates of HSAs to the U.S. rate, a mortality rate ratio method was used: for each of the 17 disease categories, the age-adjusted death rate for each HSA was divided by the U.S. rate.

Graphical Display

To define ranges for mapping age-adjusted death rates, the rates were ordered and then categorized to five groups from the highest to the lowest according to the following distribution: 10 per cent, 20 per cent, 40 per cent, 20 per cent, and 10 per cent, respectively. For some conditions, there were considerable numbers of HSAs without any deaths recorded for the study period.

[**] Makuc DM, Haglund B, Ingram DD, et al. [1991]. Health service areas for the United States. National Center for Health Statistics. Vital Health Statistics 2 (112).

[***] Bureau of the Census [1981]. Census of population and housing, 1980: county population by age, sex, race, and Spanish origin. (Preliminary OMB-consistent modified race), Washington, D.C.

On rate ratio maps, HSAs with lower than or equal to the U.S. age-adjusted death rate have been assigned to the lowest category. HSAs with higher than U.S. rate were categorized into quartiles of the mortality distribution.

Double-hatched marks indicate that there were less than 20 deaths for the study period in that HSA. Rates and ratios for these hatched HSAs should be interpreted with caution.[****]

For a better visibility, a second New York City HSA map has been scaled as a larger than actual polygon outside of the city.

Atlas GIS version 3[*****] has been used with HSA boundary layers and maps developed by NCHS to generate all maps in this atlas.

[****]Vital Statistics of the United States, 1992. Volume II - Mortality, Part A. DHHS PHS, 1992.

[*****]A product of Strategic Mapping, Inc., Santa Clara, CA, 1995.

RESPIRATORY DISEASE CATEGORIES

Table 1 shows the respiratory disease categories selected for mapping in this atlas, corresponding ICD-9 rubrics and codes, and annual average number of deaths and U.S. rates for 1982-1993.

Table 1. Respiratory Disease Categories: Average Annual Number of Deaths and Age-Adjusted Death Rates, U.S. Residents 15 Years of Age and Older, 1982-1993.

Cause of Death Category	ICD-9 Rubric(s)	ICD-9 Code(s)	Annual Number of Deaths	Annual Rate per Million Population
Tuberculosis	Pulmonary tuberculosis Other respiratory tuberculosis	011 012	3,256	16.3
Sarcoidosis	Sarcoidosis	135	770	3.9
Lung cancer	Malignant neoplasm of trachea, bronchus, and lung	162	142,945	733.9
Pleural malignancy	Malignant neoplasm of pleura	163	513	2.6
Pneumonia	Viral pneumonia Pneumococcal pneumonia Other bacterial pneumonia Pneumonia due to other specified organisms Pneumonia in infectious diseases classified elsewhere Bronchopneumonia Pneumonia, organism unspecified	480 481 482 483 484 485 486	184,670	897.1
Chronic obstructive pulmonary disease	Bronchitis, not specified as acute or chronic Chronic bronchitis Emphysema Bronchiectasis Chronic airway obstruction, not elsewhere classified	490 491 492 494 496	175,822	878.0

Table 1. Respiratory Disease Categories: Average Annual Number of Deaths and Age-Adjusted Death Rates, U.S. Residents 15 Years of Age and Older, 1982 - 1993 (continued).

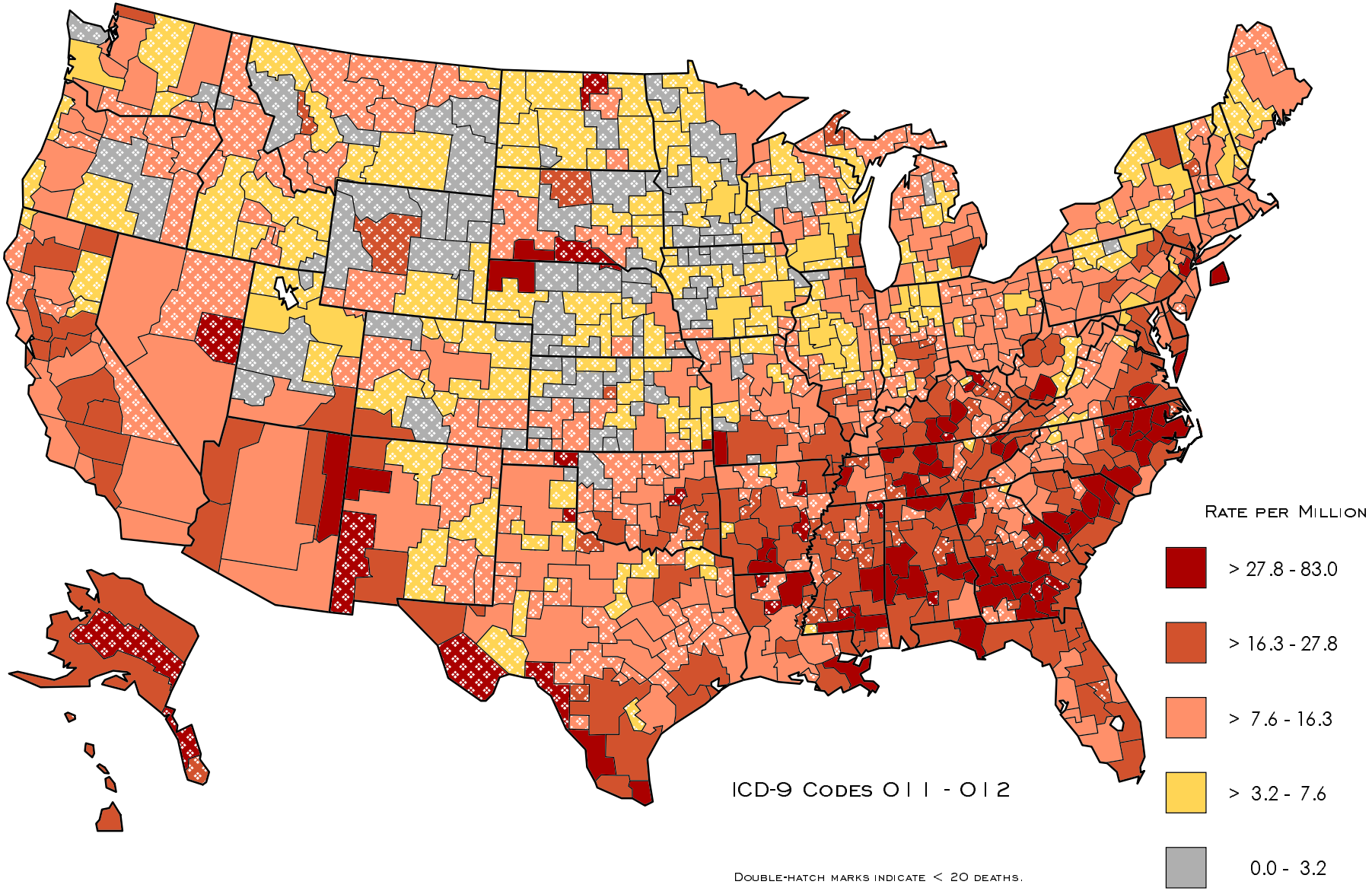
Cause of Death Category	ICD-9 Rubric(s)	ICD-9 Code(s)	Annual Number of Deaths	Annual Rate per Million Population
Asthma	Asthma	493	9,394	47.0
Hypersensitivity pneumonitis	Extrinsic allergic pneumonitis	495	29	0.1
Coal workers' pneumoconiosis	Coal workers' pneumoconiosis	500	2,261	11.2
Asbestosis	Asbestosis	501	733	3.7
Silicosis	Pneumoconiosis due to other silica or silicates	502	323	1.6
Other/unspecified pneumoconioses	Pneumoconiosis due to other inorganic dust Pneumoconiosis, unspecified	503 505	315	1.6
Byssinosis	Pneumonopathy due to inhalation of other dust	504	14	0.05
Toxic inhalation injury	Respiratory conditions due to chemical fumes and vapors	506	34	0.2
Pulmonary fibrosis	Postinflammatory pulmonary fibrosis	515	9,108	45.1
Other alveolar/ interstitial diseases	Other alveolar and parietoalveolar pneumonopathy	516	1,136	5.7
Pulmonary eosinophilia	Pulmonary eosinophilia	518.3	651	3.2

Mortality Maps
and
Disease Descriptions

Tuberculosis

Age-Adjusted Death Rates by HSA

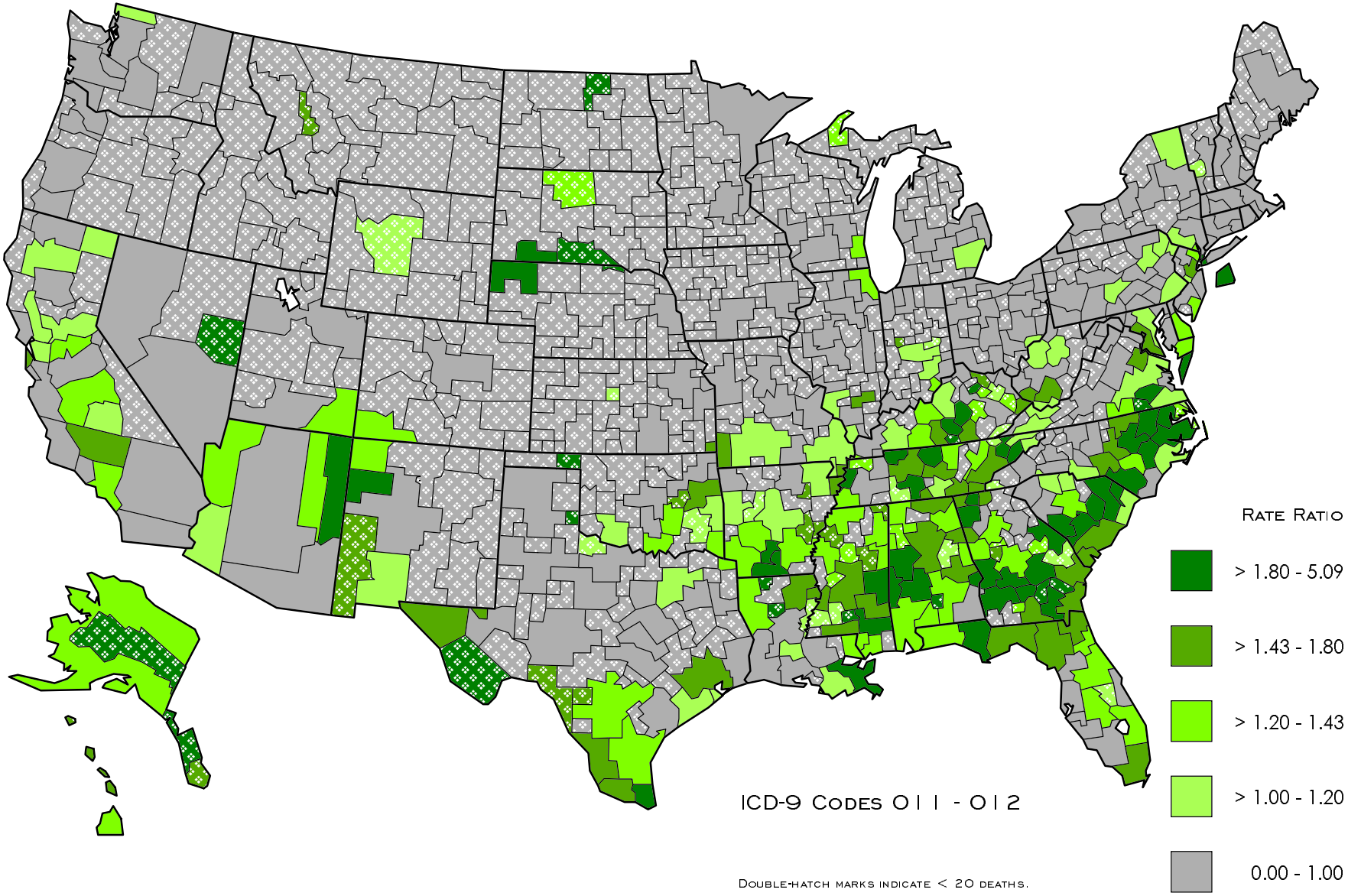
U.S. Residents 15 Years of Age and Older, 1982-1993



Tuberculosis

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Tuberculosis (ICD-9 Codes 011-012)

Pulmonary (ICD-9 code 011) and other respiratory (ICD-9 code 012) tuberculosis is caused by infection with *Mycobacterium tuberculosis*. Infected individuals produce airborne particles that contain tubercle bacilli when coughing, sneezing, and vocalizing. Primary tuberculosis infection, acquired by inhalation of infectious particles small enough (approximately 1-5 diameter) to be deposited in an alveolus [Hopewell 1988], usually requires prolonged exposure in proximity to an individual with active respiratory tuberculosis. In the United States, most active cases of pulmonary tuberculosis are the result of reactivation of previously quiescent infection, sometimes many years after primary infection has occurred.

Various risk factors for tuberculosis have been identified that either influence the likelihood of tuberculosis or serve as markers of increased risk: HIV infection and other forms of immunosuppression, malnutrition, gastrectomy, lower socioeconomic status, homelessness, and imprisonment [Markowitz 1994]. The relative risk of tuberculosis for nonwhites compared to whites has increased from 2.9 in 1953 to over 5.0 in 1992. From 1985 to 1992, the tuberculosis incidence rate increased 37.8 in black non-Hispanics, whereas it decreased by 11 percent among whites. In 1992, the minority population with the highest incidence of tuberculosis was Asian/Pacific Islanders with 46.6 cases per 100,000 population [Braden et al. 1996].

Tuberculosis has been recognized as an occupational hazard. Occupations identified at increased risk of tuberculosis have been classified as: 1) occupations (e.g., migrant farm work) that attract workers otherwise at high risk of tuberculosis; 2) occupations associated with silicosis (e.g., mining, sandblasting, and foundry work) that increases susceptibility to organisms; and 3) occupations that increase the chance of exposure (e.g., health care workers)[Bowden and McDiarmid 1994]. Among health care workers, nurses have the highest risk, 2 to 3 times that of physicians [Sepkowitz and Schluger 1996]. The increased risk of tuberculosis in he alth care workers has been well documented [Markowitz, 1994]. Proportionate mortality analyses have further confirmed an apparent increased risk of occupational exposure among health care workers and silica-exposed workers [NIOSH 1995].

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Sarcoidosis (ICD-9 Code 135)

Sarcoidosis (ICD-9 code 135) is a multi-system disease of unknown etiology with a marked predilection for the lung. However, any organ system or tissue can be involved, including the heart, skin, eyes, nervous system, liver, kidneys, etc. The hallmark of the disease is the histological finding of non-caseating granulomas in the affected tissue. The condition is diagnosed by excluding other pathological states that can present with similar histological findings, such as mycobacterial and fungal infections, hypersensitivity reactions of the lung, and chronic beryllium disease [Newman et al. 1997]. In fact, some of these other conditions may at times be misclassified as sarcoidosis. Such misclassifications might increase the apparent incidence of sarcoidosis and influence its geographic distribution.

Infectious agents have been etiologically implicated, but never confirmed as causative, in sarcoidosis. It is well known that certain racial and ethnic groups have higher incidence of the disease; there is a three-fold higher incidence for blacks compared to whites in the United States [Rybicki et al. 1997]. In addition, incidence rates vary substantially by country, including a high incidence of sarcoidosis in Scandinavia, suggesting either an ethnic or environmental component to the cause of the disease. Sarcoidosis often presents with chest x-ray findings of bilateral hilar adenopathy with or without parenchymal/interstitial markings. In many of these cases, the disease and the chest x-ray findings resolve over time, even without treatment. In a small percentage of patients, the disease progresses despite medical therapy. Death from sarcoidosis usually results from pulmonary and/or cardiac involvement.

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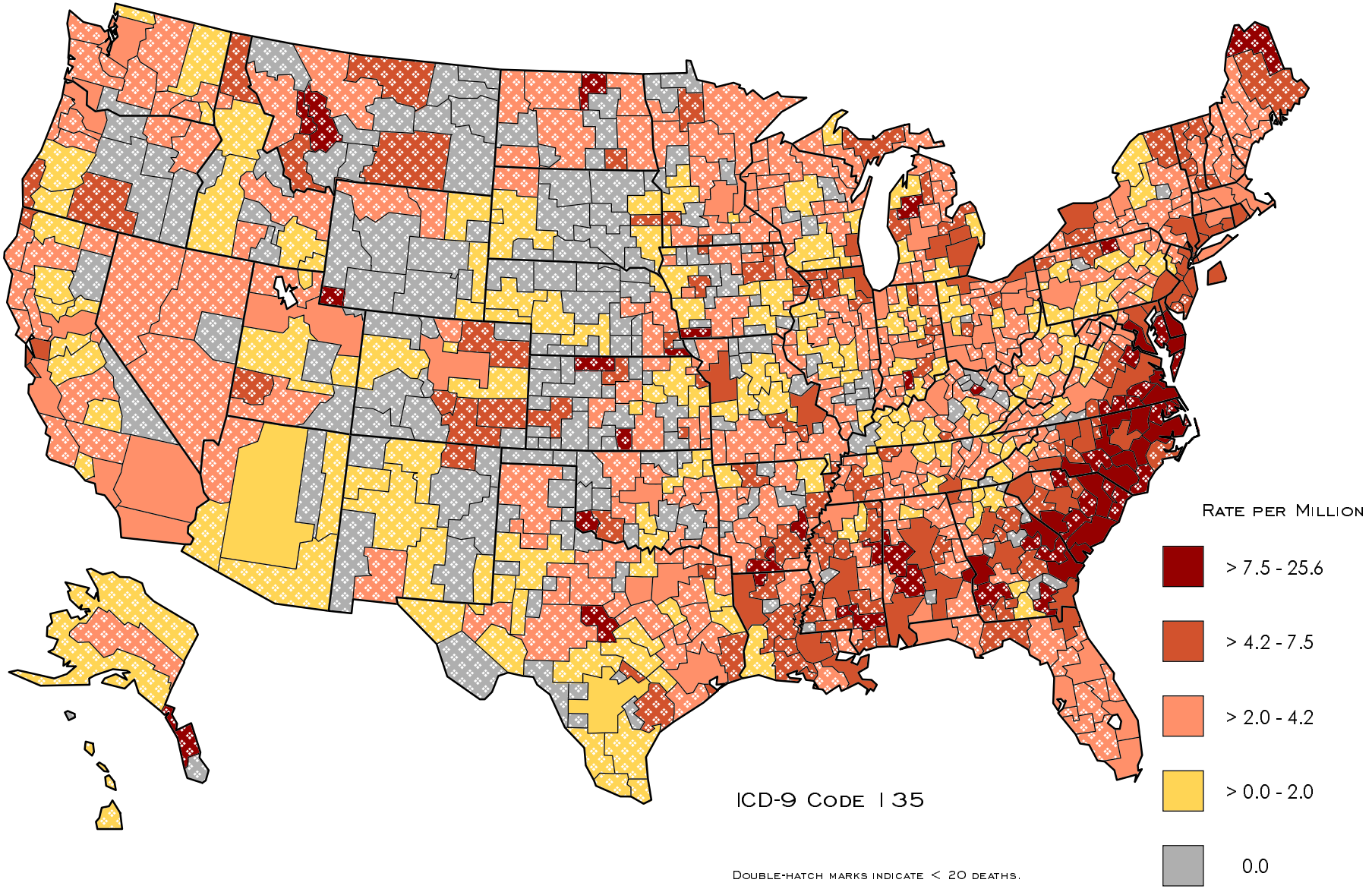
Sarcoidosis

Age-Adjusted Death Rates by HSA

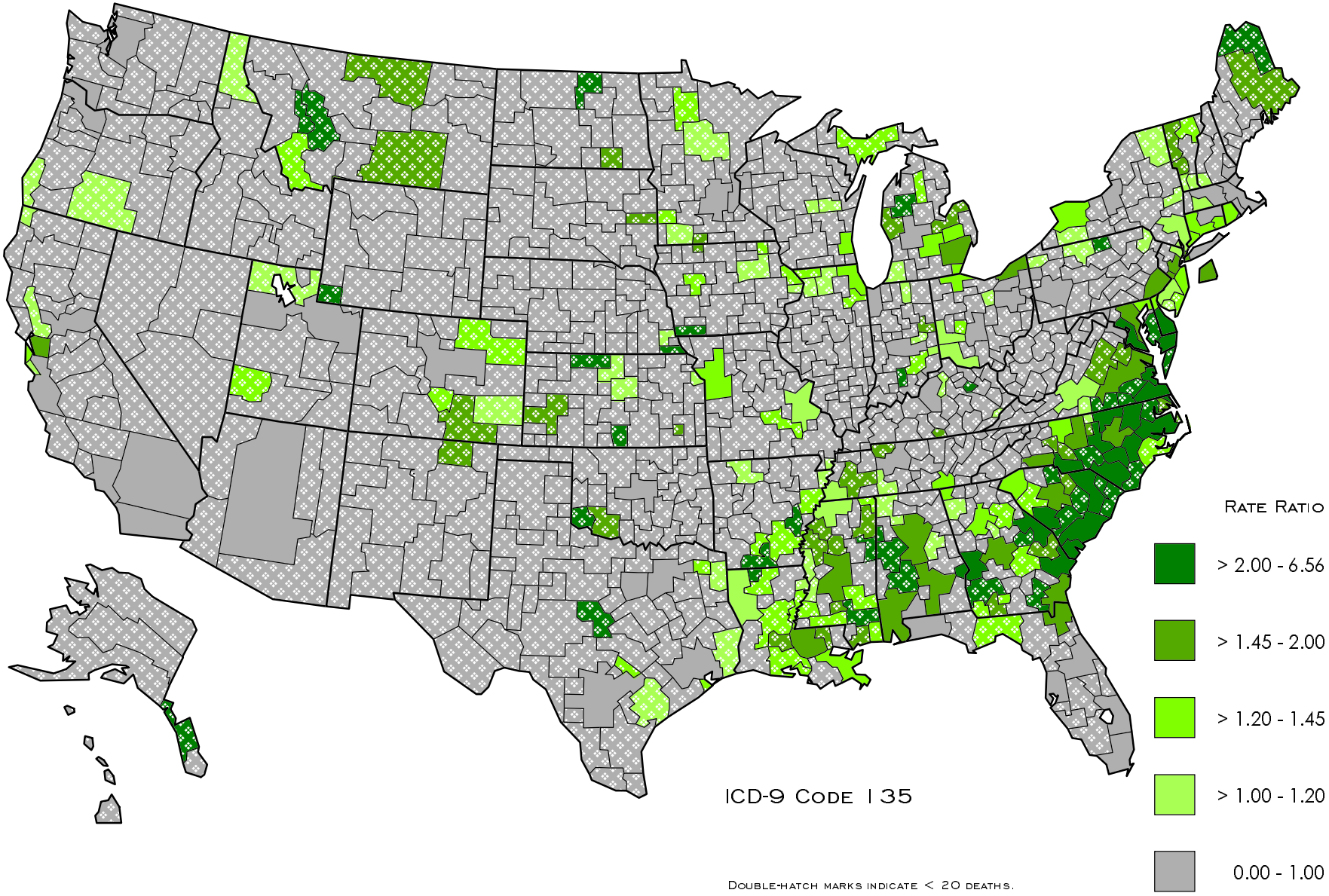
U.S. Residents 15 Years of Age and Older, 1982-1993



Sarcoidosis

Death Rates of Each HSA Compared with U.S. Rate

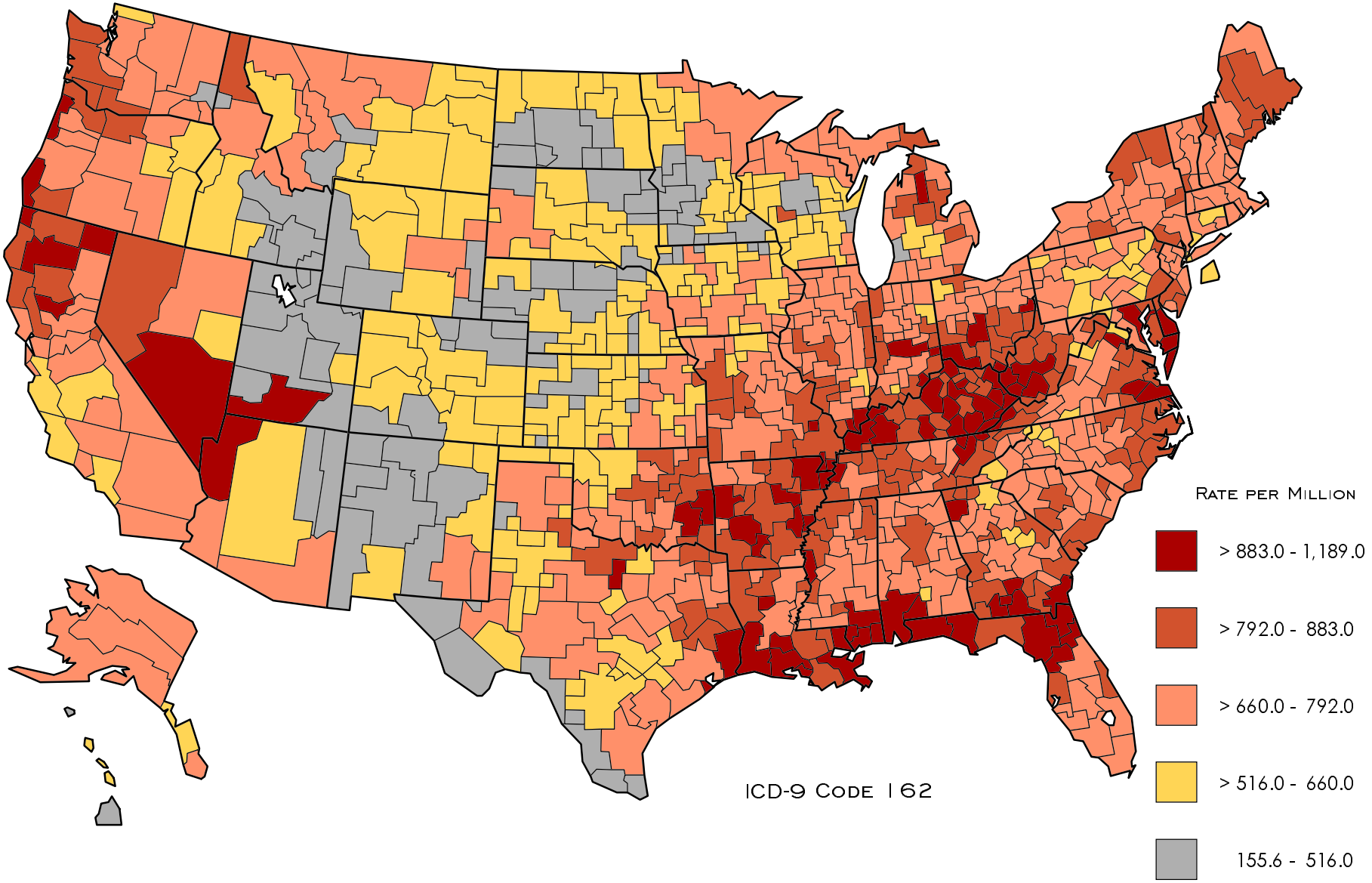
U.S. Residents 15 Years of Age and Older, 1982-1993



Lung Cancer

Age-Adjusted Death Rates by HSA

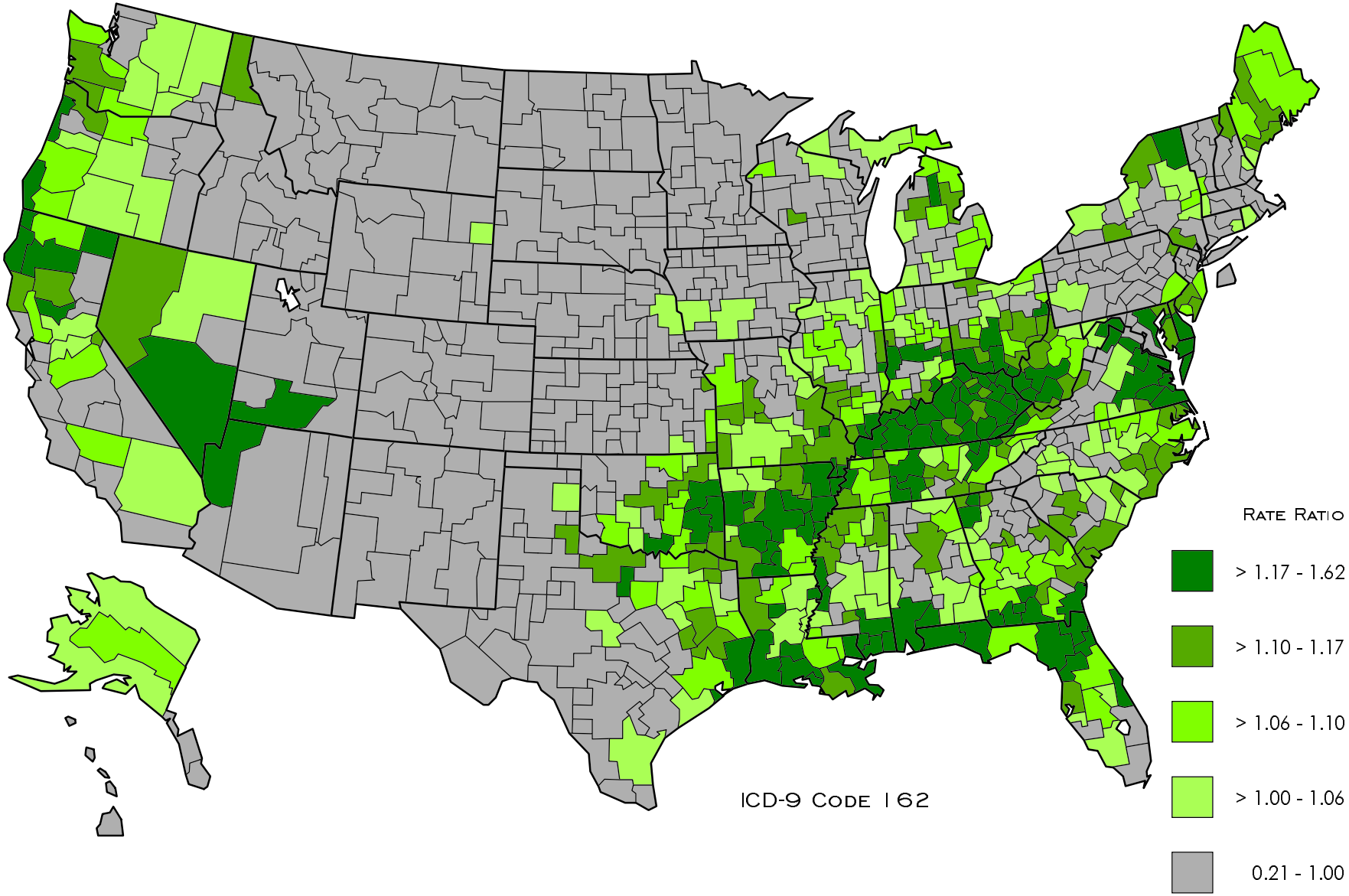
U.S. Residents 15 Years of Age and Older, 1982-1993



Lung Cancer

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Lung Cancer (ICD-9 Code 162)

Malignant neoplasms of trachea, bronchus, and lung (ICD-9 code 162) are caused primarily by cigarette smoking, but certain occupational and environmental exposures also represent well known causes. Occupational carcinogens causing lung cancer include arsenic, asbestos, chloromethyl ethers, chromium, polycyclic aromatic hydrocarbons, ionizing radiation, nickel, and vinyl chloride [Blot and Fraumeni 1996]. Silica was recently designated as a human carcinogen [IARC 1997], and occupational exposure to several other industrial exposures, including acrylonitrile and beryllium, have also been associated with lung cancer excess. Radon gas has been reported to increase the risk of lung cancer among underground miners, with risk quantitatively related to the inhalation of radon daughter products [Samet 1989]. It has been estimated that, in the United States in 1985, cigarette smoking accounted for 90 percent of lung cancer in males and nearly 80 percent in females [Surgeon General 1989]. Several studies have observed that, particularly among males, lung cancer is inversely related to socioeconomic status as measured by income or education level [Blot and Fraumeni 1996]. For example, British mortality data have revealed a two-fold difference in mortality between low and high social class [Registrar General 1978].

The estimated population attributable risk of lung cancer due to occupation was 9.2 percent based on hospital data from nine U.S. metropolitan areas [Morabia et al. 1992]. In another study, the estimated population attributable risk due to occupational exposures was between 4.6 percent and 9.2 percent after adjustment for smoking [Vineis and Simonato 1991].

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Pleural Malignancy (ICD-9 Code 163)

Malignant neoplasm of pleura (ICD-9 code 163) is a disease category that might be expected to include pleural malignant mesothelioma, a tumor type that is strongly associated with asbestos exposure. Although malignant mesothelioma is the most common primary malignant neoplasm of the pleura, in practice this ICD-9 code 163 is by no means entirely specific or sensitive with respect to identifying malignant mesothelioma deaths [Davis et al. 1992].

Amphibole fiber types, especially crocidolite, appear to be the most potent inducers of malignant mesothelioma. However, chrysotile exposure can also cause this disease [Ross and McDonald 1995]. Therefore, all occupational groups exposed to asbestos are at risk of developing asbestos-related pleural malignancy. Apart from crocidolite miners and millers, occupations with high risk include shipyard workers, insulation workers, and workers employed in construction trades. Approximately 85 percent of individuals with malignant mesothelioma have a history of asbestos exposure [Rom 1992].

Malignant mesothelioma is also caused by nonoccupational environmental exposure to asbestos and related fibers. High risk of mesothelioma has been documented among family members of asbestos workers [Anderson et al. 1979] and among the general population living in a region of Turkey where nonoccupational exposures to xeolite (erionite) fibers are prevalent [Wakeman and Lockey 1994].

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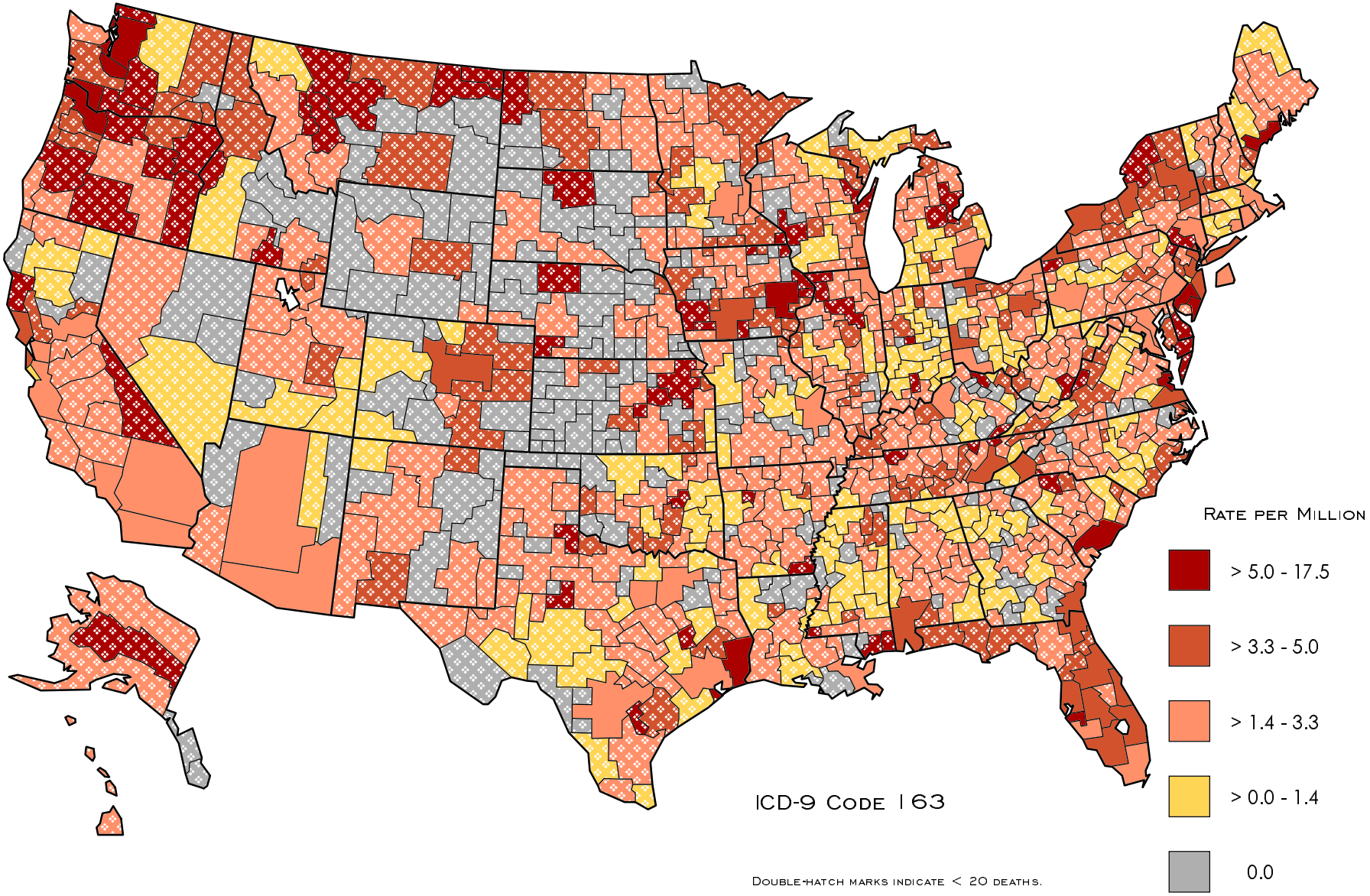
Pleural Malignancy

Age-Adjusted Death Rates by HSA

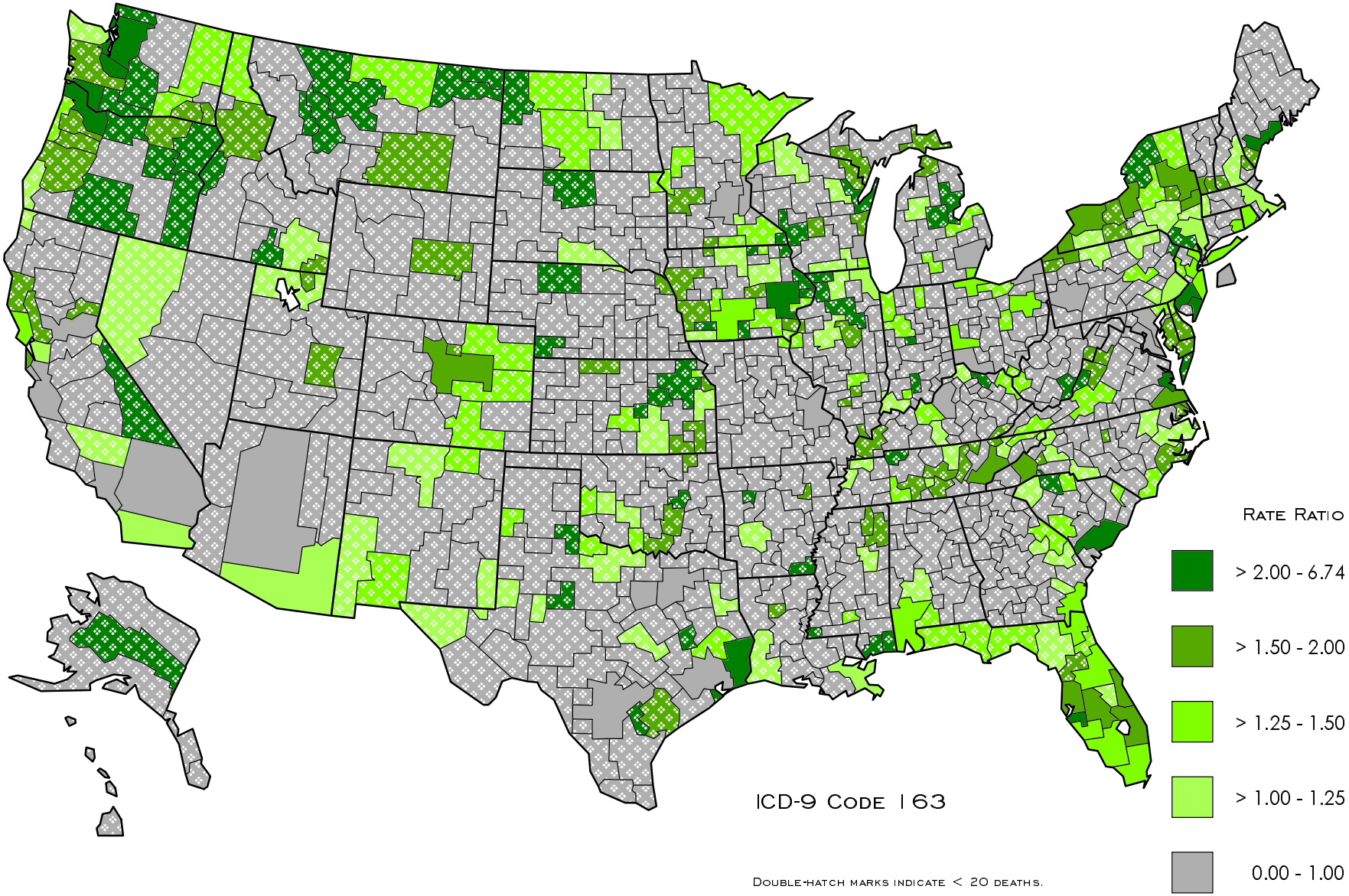
U.S. Residents 15 Years of Age and Older, 1982-1993



Pleural Malignancy

Death Rates of Each HSA Compared with U.S.

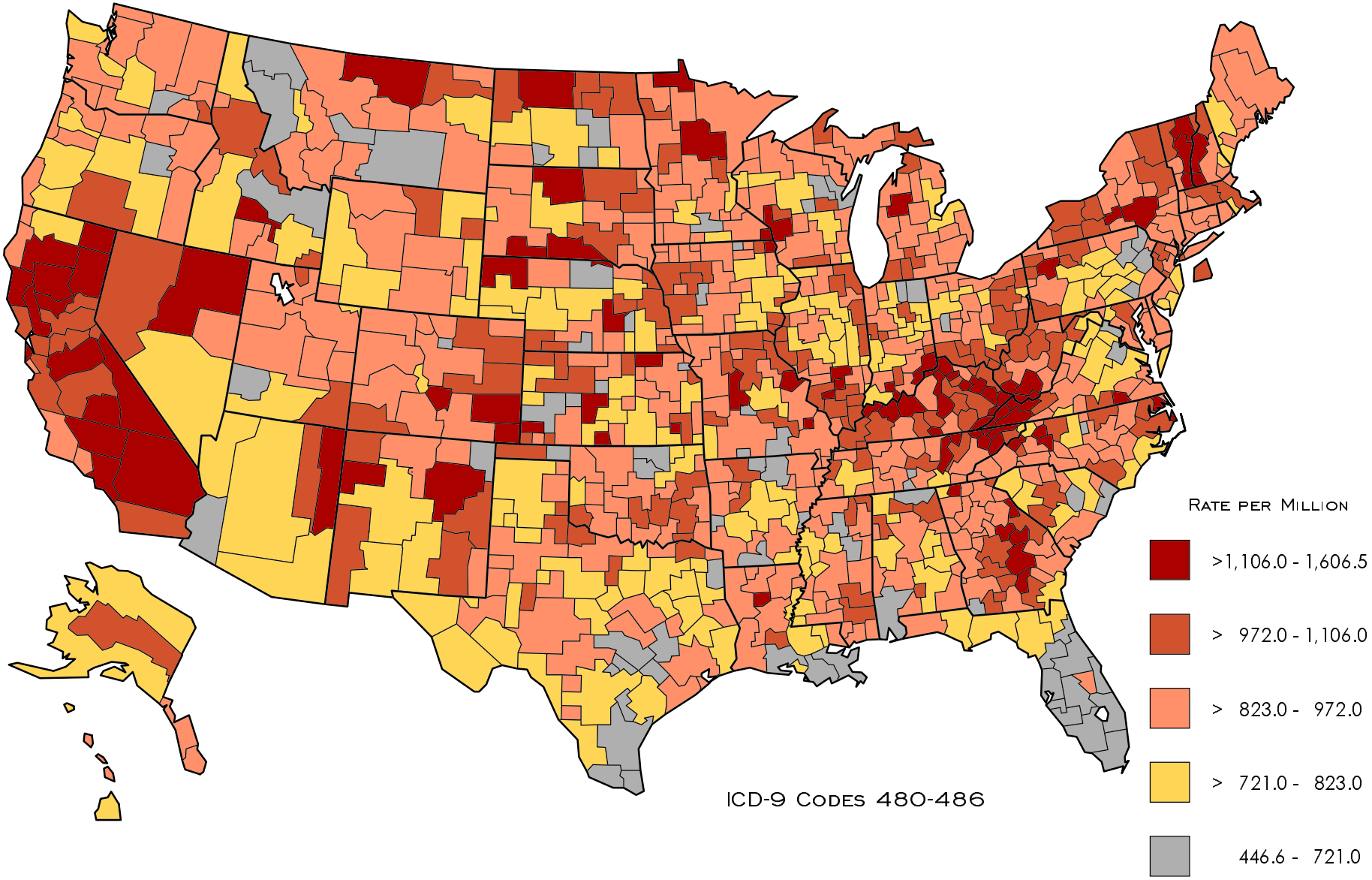
U.S. Residents 15 Years of Age and Older, 1982-1993



Pneumonia

Age-Adjusted Death Rates by HSA

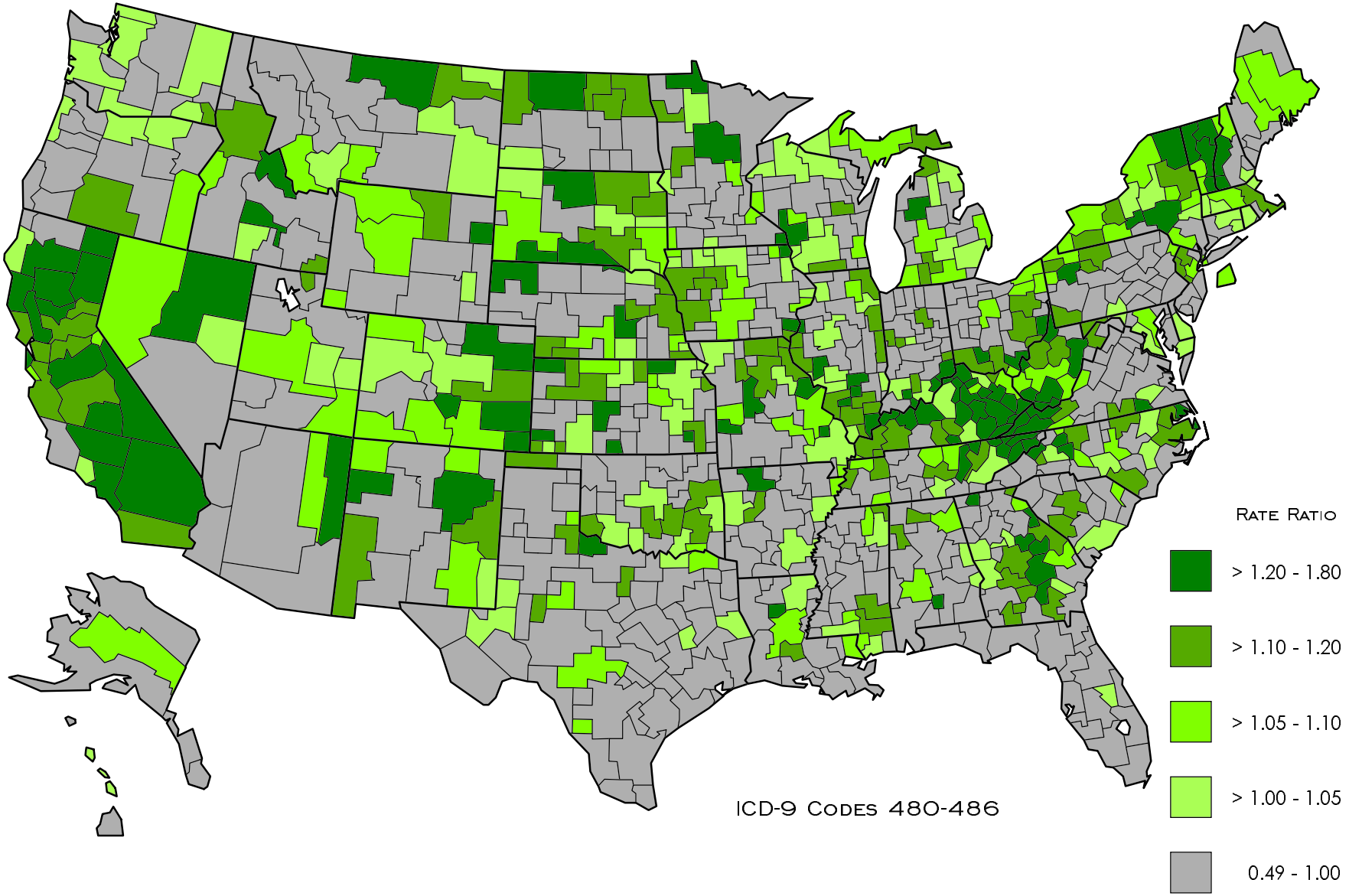
U.S. Residents 15 Years of Age and Older, 1982-1993



Pneumonia

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Pneumonia (ICD-9 Codes 480-486)

Infectious pneumonia (ICD-9 codes 480-486) and influenza together represent the sixth leading cause of death in the United States, with a mortality rate of 12.9 per 100,000 [NCHS 1997]. Nearly all deaths in this leading cause of death are attributed to infectious pneumonia, a feared complication of many acute illnesses and the most frequent cause of death due to infectious disease. The most common pathogen causing community-acquired pneumonia is *Streptococcus pneumoniae*, a bacterium for which an effective vaccine is available [Niederman 1987]. Other organisms commonly causing pneumonia include Legionella, mycoplasma, *Chlamydia psittaci*, and viruses [Fein et al. 1987]. Respiratory viruses cause pneumonia either as primary viral infection or as a result of secondary bacterial infection. Chronic obstructive lung disease, a condition that is highly prevalent among the elderly, is associated with a high risk of pneumonia [Koivula et al. 1994]. Risk factors for secondary bacterial pneumonia include advanced age and chronic disorders of the heart and kidneys, as well as of the lungs [Rose et al. 1987].

The problem of occupationally-associated pneumonia is substantial. Clusters of pneumonia caused by recently recognized pathogens have been reported in occupational settings (e.g., Legionnaires' disease in industrial workers and *Chlamydia pneumoniae* infection in military personnel) [Esposito 1992]. Some studies of welders have demonstrated that there is an increased risk of death due to pneumonia [McMillan and Pethybridge 1983]. It has long been recognized that clinically useful clues for diagnosing unusual pneumonias can be obtained from patient histories of occupational contact with animals [Gerberding 1996].

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Chronic Obstructive Pulmonary Disease (ICD-9 Codes 490-492, 494, 496)

Chronic obstructive pulmonary disease (COPD) includes chronic bronchitis (ICD-9 codes 490-491), emphysema (ICD-9 code 492), bronchiectasis (ICD-9 code 494), and chronic airway obstruction (ICD-9 code 496). These diseases are commonly characterized by irreversible airflow limitation. Some authorities include asthma (ICD-9 code 493) and hypersensitivity pneumonitis (ICD-9 code 495) in the COPD rubric, but these infrequent causes of death (see Table 1) are categorized separately in this atlas.

COPD has become a major public health concern. In 1995, it ranked as the fourth leading cause of death in the United States, accounting for over 100,000 deaths--nearly twice as many as in 1980 [NCHS 1997]. In 1994, an estimated 16 million individuals in the United States had the diagnosis of COPD, representing a 60 percent increase since 1982 [ALA 1996].

Although 80 to 90 percent of COPD cases are attributable to cigarette smoking [USDHHS 1984], the etiology of COPD is multifactorial. Additional risk factors include occupational exposures, air pollution, respiratory infection, and genetic factors. The relationship of COPD to workplace exposure is well documented for several occupational agents (e.g., coal mine dust, cotton dust, grain dust, etc.). More generally, estimates of the proportion of COPD attributable to occupational exposure based on community studies conducted in the United States range as high as 14 percent and 28 percent [Becklake 1994]. Investigations of the association of COPD with exposure to particulates in the general environment suggest that nonoccupational exposure to airborne particulate is also an important cause of preventable morbidity and mortality [Dockery et al. 1993; Sunyer et al. 1993].

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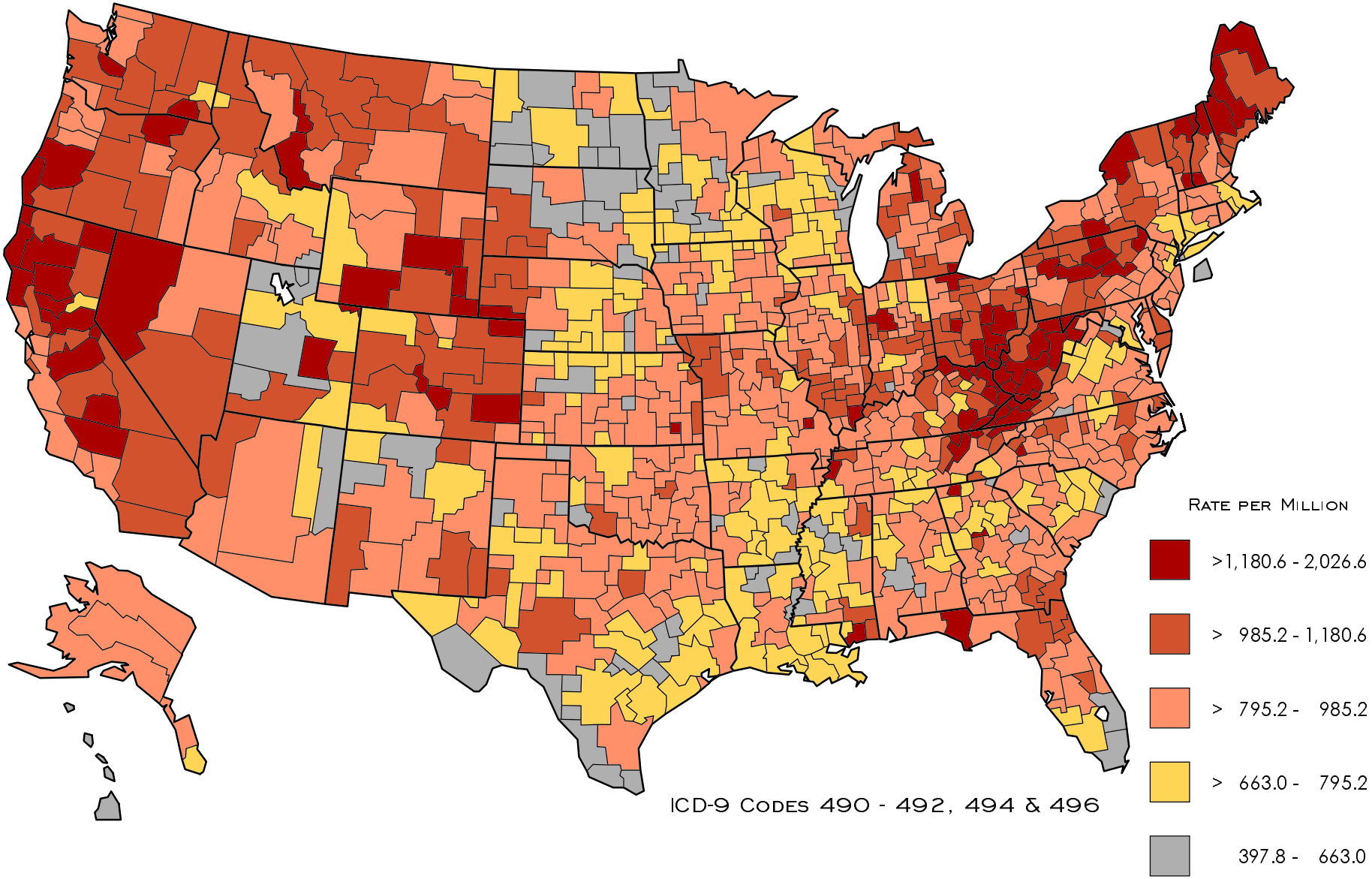
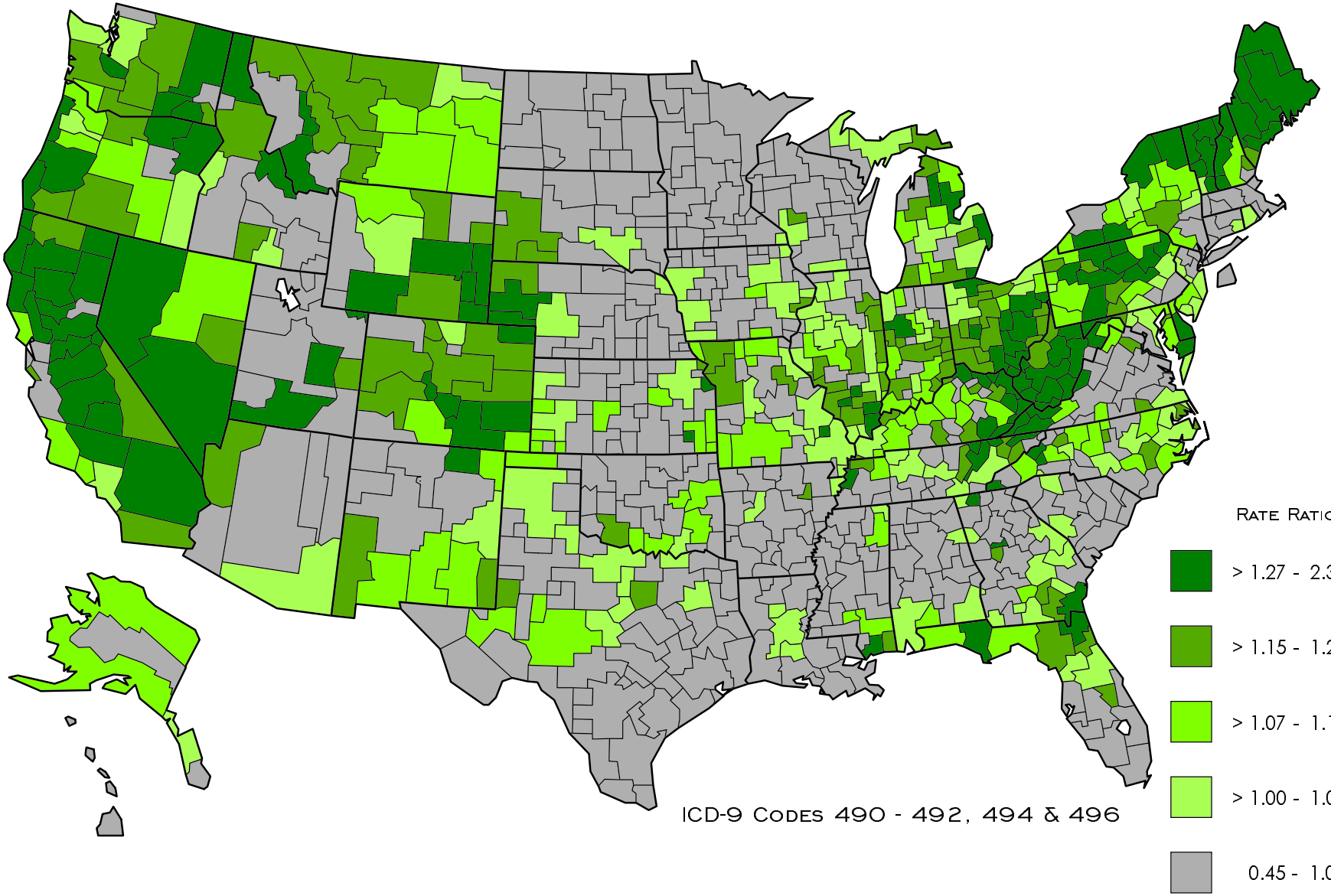
Chronic Obstructive Pulmonary Disease
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



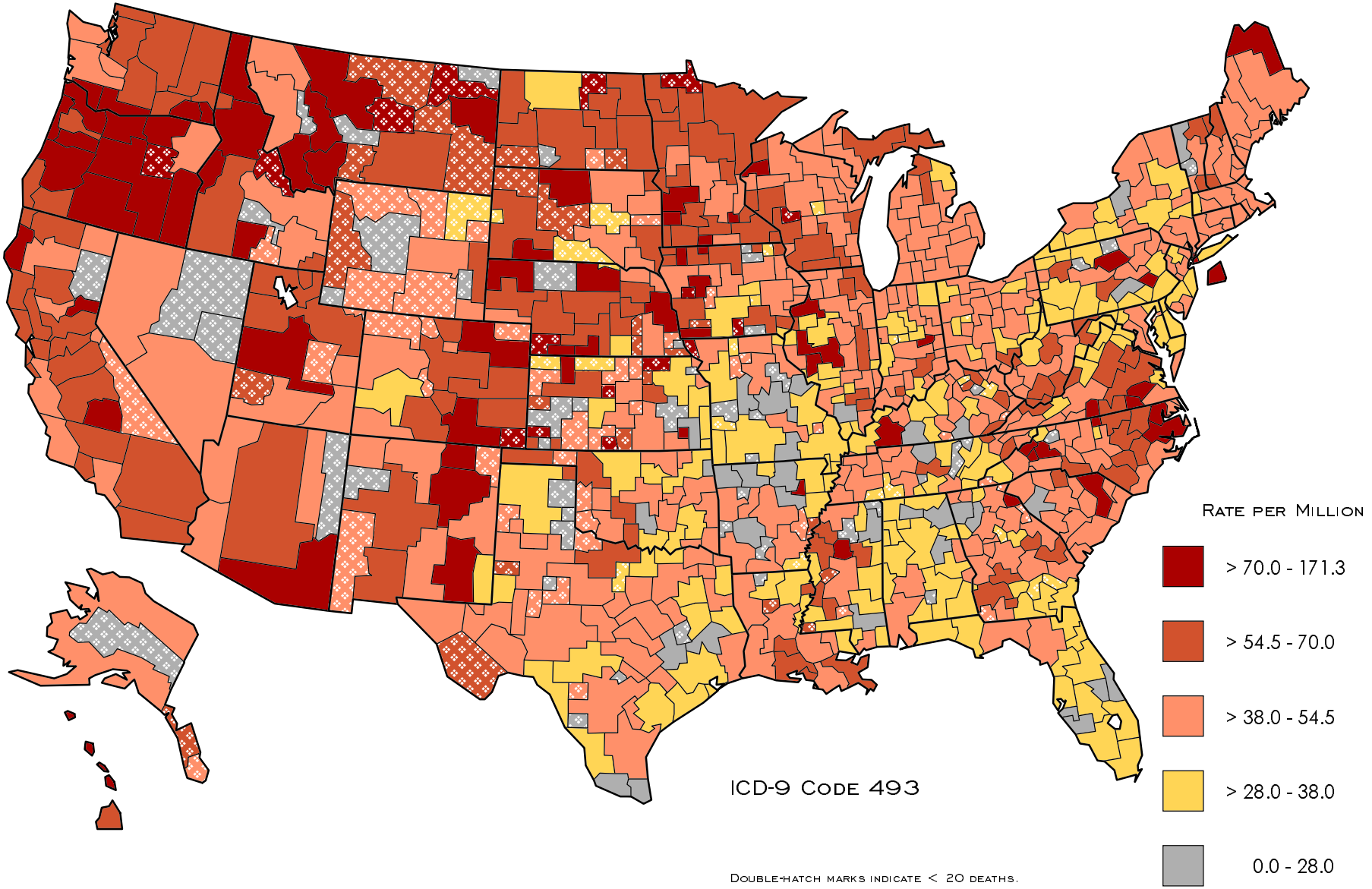
Chronic Obstructive Pulmonary Disease
Death Rates of Each HSA Compared with U.S. Rate
U.S. Residents 15 Years of Age and Older, 1982-1993



Asthma

Age-Adjusted Death Rates by HSA

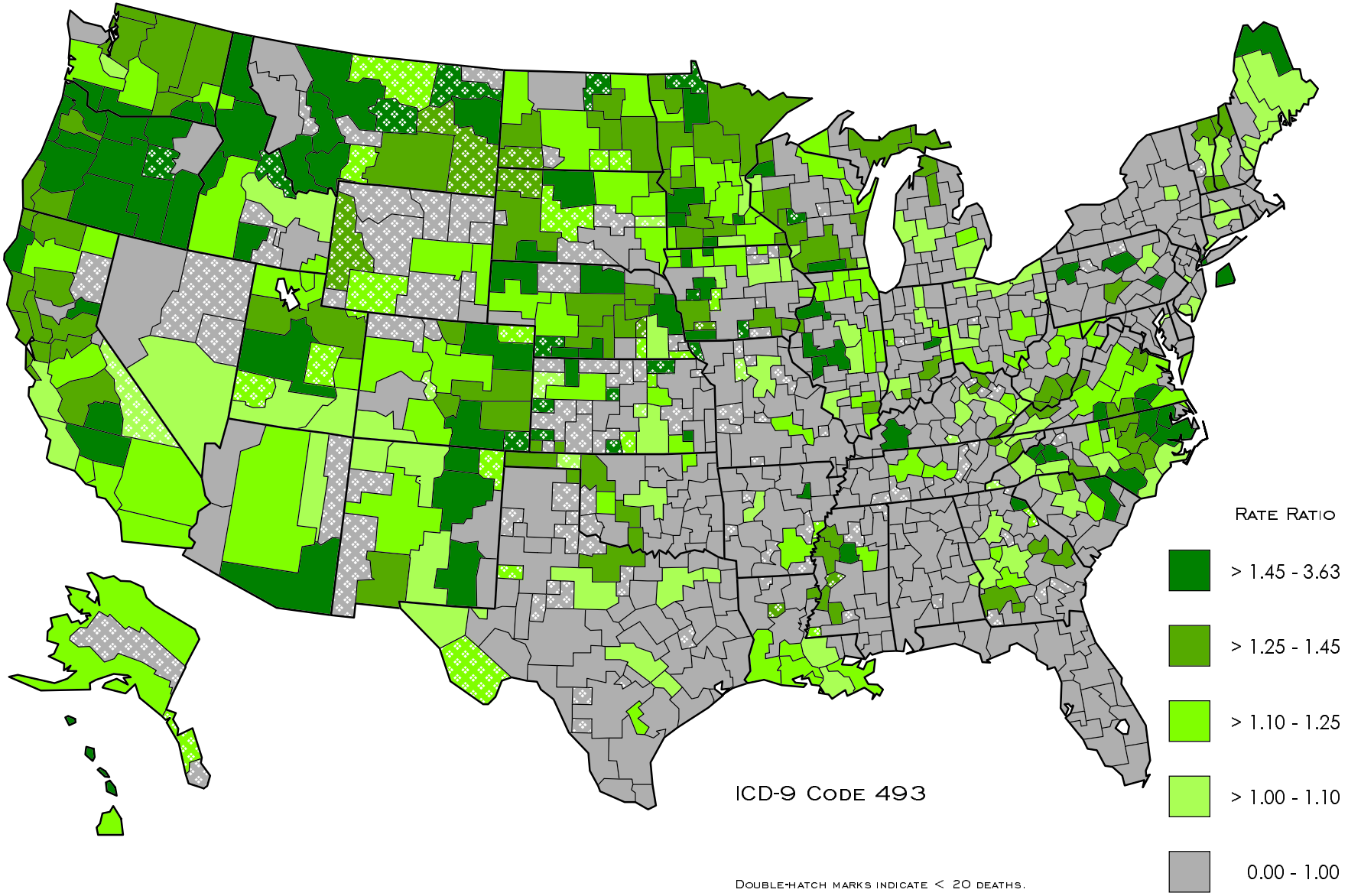
U.S. Residents 15 Years of Age and Older, 1982-1993



Asthma

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Asthma (ICD-9 Code 493)

Asthma (ICD-9 code 493) is a clinical condition characterized by variable airflow limitation and increased responsiveness of the tracheobronchial tree to a variety of stimuli [ATS 1987]. Asthma can be induced by occupational exposures to airborne antigens [Chan-Yeung 1994]. Asthma can also be aggravated in individuals with underlying asthma who are exposed to airborne irritants or bronchoconstrictive agents in the workplace [Wagner and Wegman 1998].

Asthma has been estimated to affect approximately 5 to 7 percent of the United States population [Brooks 1992]. The overall prevalence of occupational asthma in the United States is unknown, but occupational exposures may cause up to 15 percent of adult asthma [Blanc 1987], and 21-33 percent of adult asthma may be caused or significantly worsened by such exposures [Milton et al. 1998; Ng et al. 1994]. Asthma is the most frequently reported work-related respiratory disease in the United Kingdom [Ross et al. 1997].

Little is known about the geographic variation of asthma mortality. In addition to possible differences in exposure to occupational agents that cause asthma, geographic variation in asthma mortality may be due to urban-rural differences, humidity and climate conditions affecting both indoor and outdoor allergen exposures, ambient air pollution, nutrition, genetic predisposition, access to quality medical care, ethnic and socioeconomic factors [Sears 1997].

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Hypersensitivity Pneumonitis (ICD-9 Code 495)

Hypersensitivity pneumonitis (HP), also referred to by the British as extrinsic allergic alveolitis (ICD-9 code 495), is a group of immunologically-mediated lung diseases caused by inhalation of a wide variety of antigenic materials [Schuyler 1998]. Most cases are induced by particulate organic antigens, but some reported cases have been caused by soluble antigens and low molecular weight reactive chemicals such as isocyanates and trimellitic anhydride. At the present time, farmer's lung disease (caused by inhalation of thermophilic actinomycetes growing on moldy hay), bird fancier's disease (caused by bird proteins), HP associated with moisture and bioaerosols in buildings (caused by microbes contaminating humidifiers, dehumidifiers, and heating, ventilation, and air conditioning systems), and Japanese summer-type HP (caused by house dust contaminated with *Trichosporon cutaneum*) are the most commonly recognized forms of HP. The disease is often occupationally-related, and new types of HP continue to be reported as changing agricultural and industrial practices lead to new types of antigenic exposures. For example, HP has recently been recognized in machinists exposed to aerosolized metal working fluids that are microbially-contaminated [Kreiss and Cox-Ganser 1997].

HP has two different clinical presentations. In *acute HP*, shortness of breath, nonproductive cough, generalized aches, chills, headache, and malaise occur 2 to 9 hours after exposure. *Chronic HP* presents as progressively severe shortness of breath, nonproductive cough, weight loss, and loss of appetite over a period of months to years. Chest radiographs show evidence of interstitial lung disease. Lung biopsies show chronic interstitial inflammation, usually with poorly formed nonnecrotizing granulomas; bronchiolitis obliterans is present in 25-50 percent of cases.

The prevalence of HP varies widely depending on the population studied and the method of case definition. Using a stringent case definition, a large population-based study of over 1400 Wisconsin dairy farmers found disease prevalence to be 0.4 percent [Gruchow et al. 1981]. In contrast, a study of Scottish farmers estimated a prevalence rate of 2.3 percent to 8.6 percent based on symptom and exposure histories [Grant et al. 1972]. Unlike some other lung diseases, the risk of HP is substantially lower among cigarette smokers, perhaps due to smoking effects on lung immunity [Schuyler 1998].

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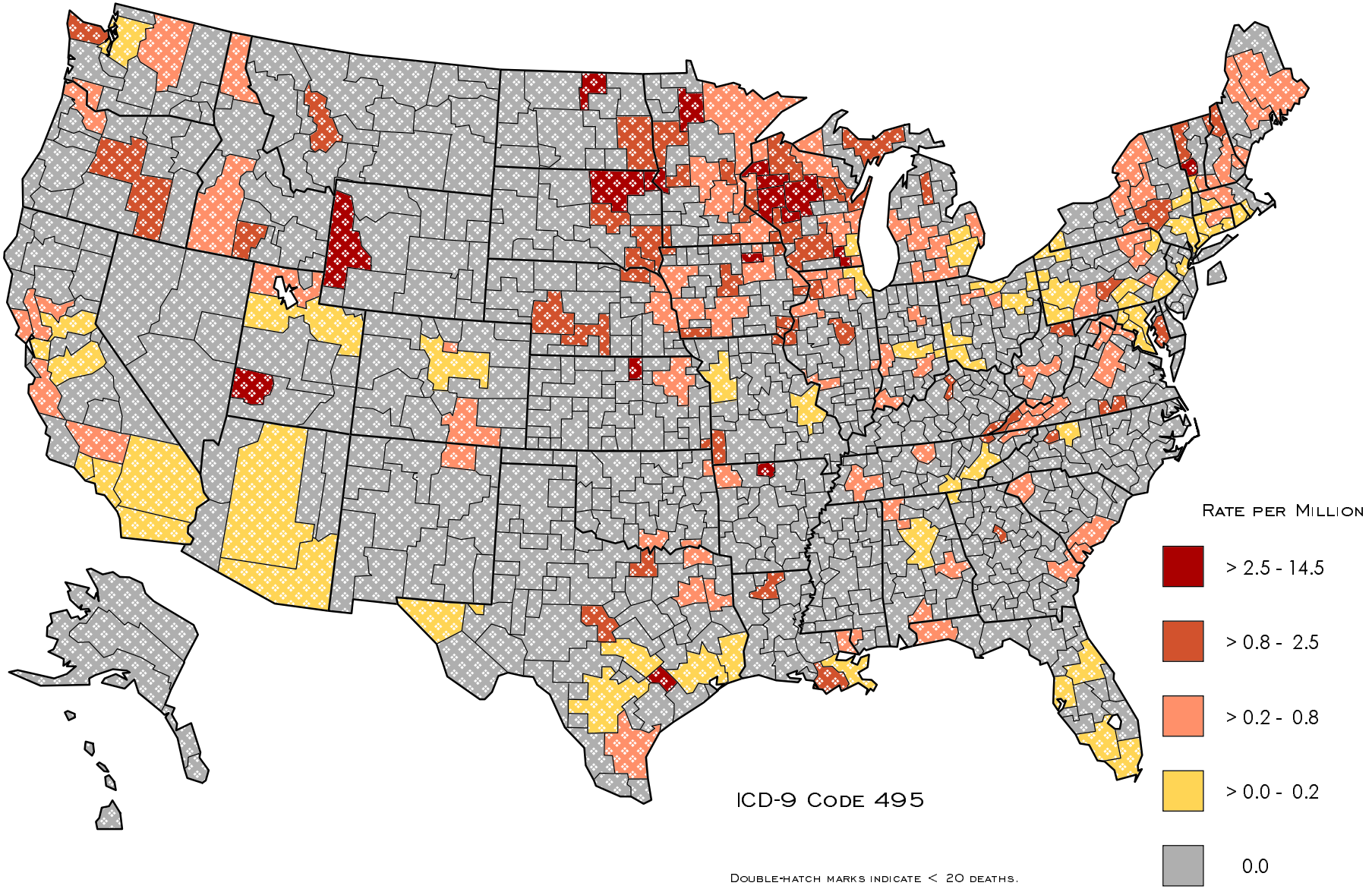
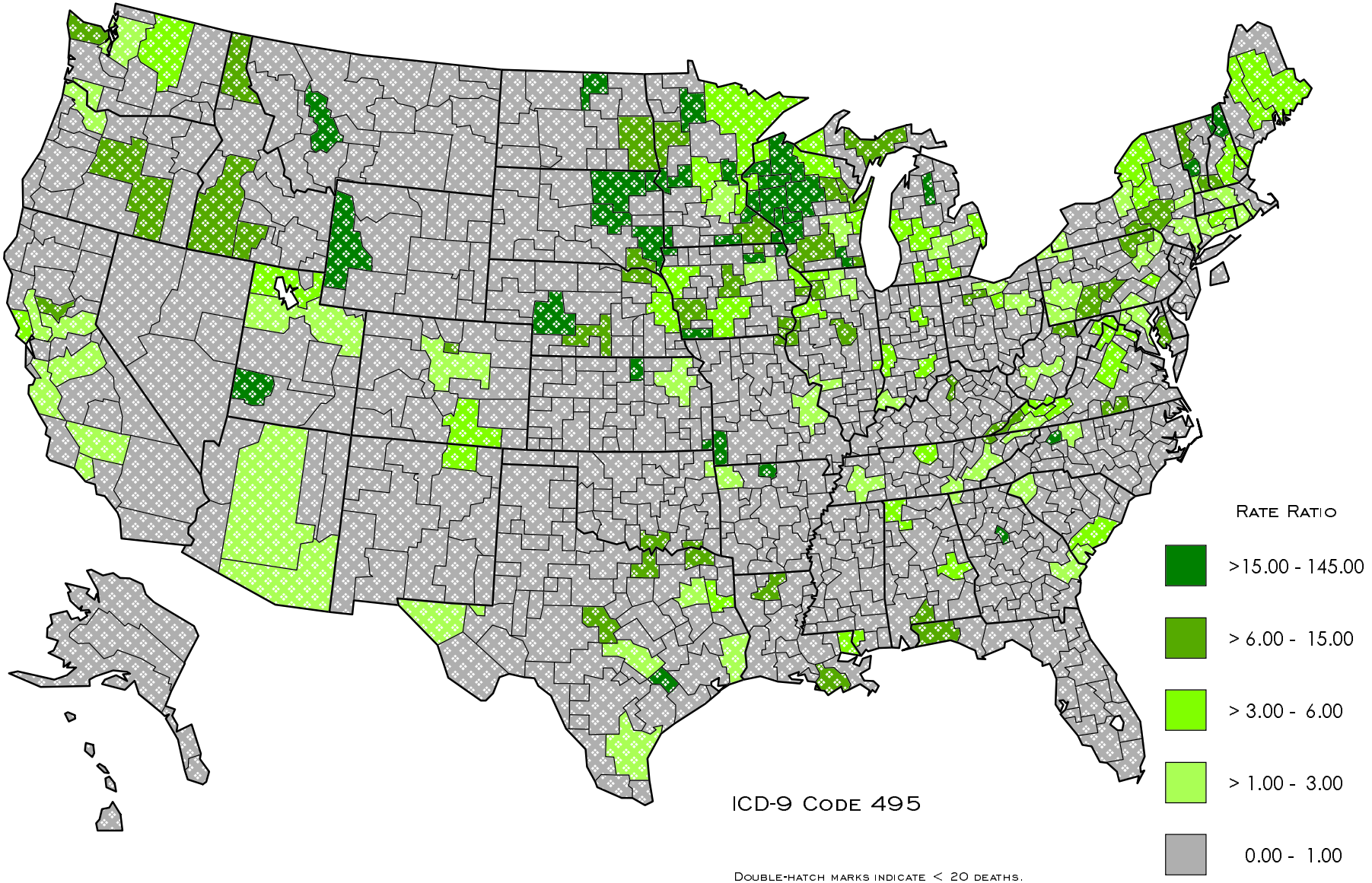
Hypersensitivity Pneumonitis
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



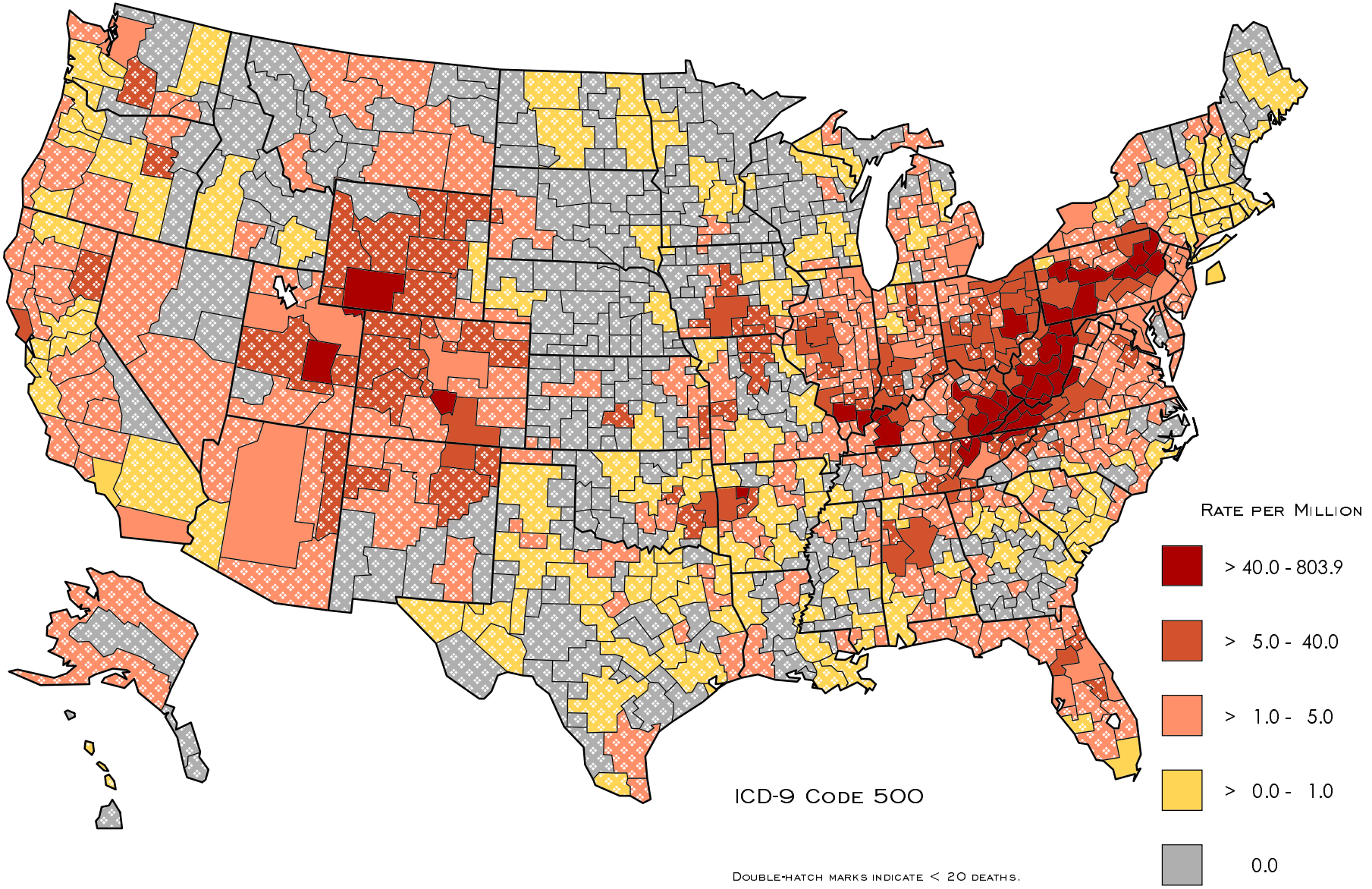
Hypersensitivity Pneumonitis

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



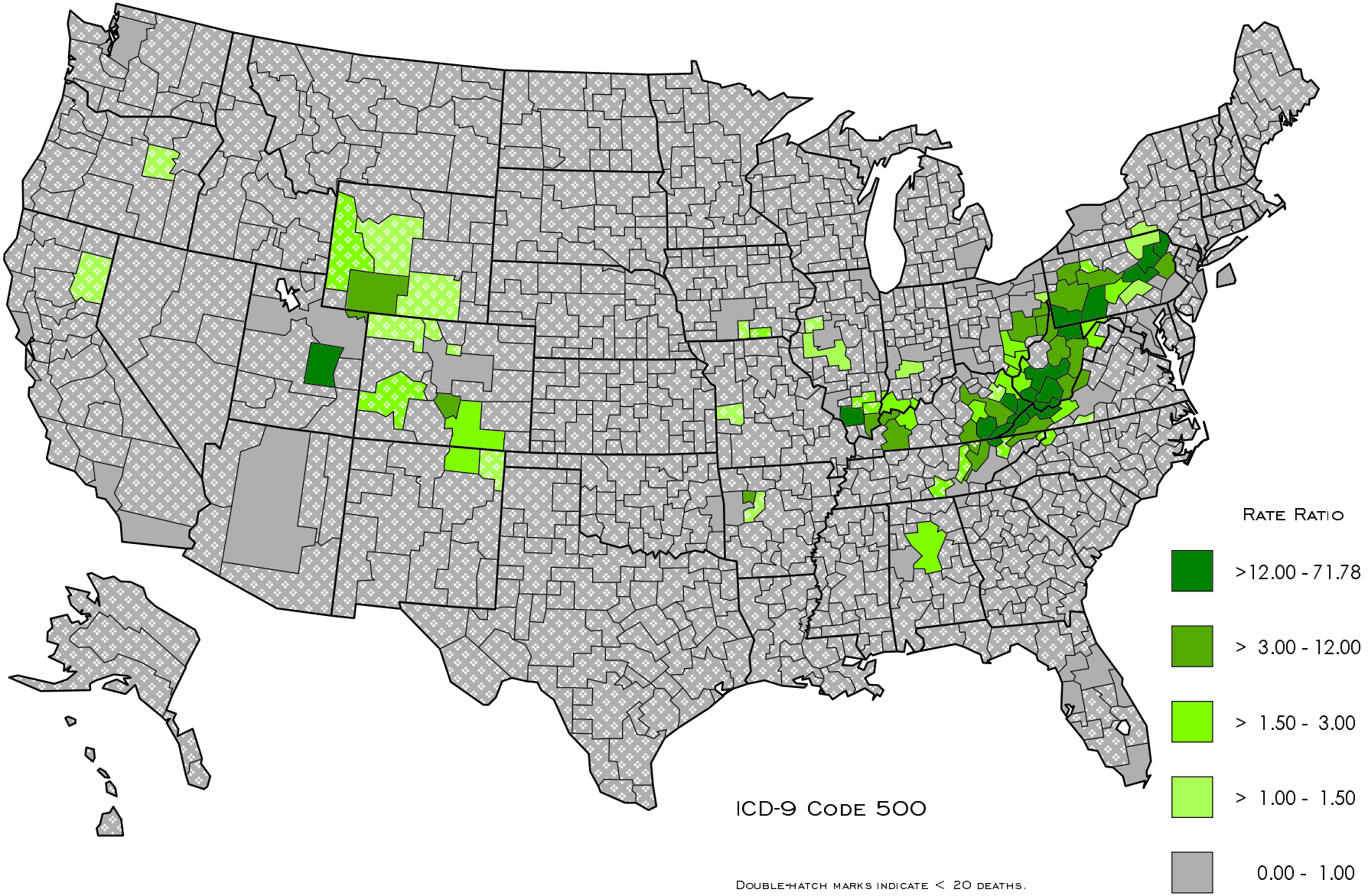
Coal Workers' Pneumoconiosis
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



Coal Workers' Pneumoconiosis

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Coal Workers' Pneumoconiosis (ICD-9 Code 500)

Coal workers' pneumoconiosis (CWP) (ICD-9 code 500) is an occupational lung disease resulting from the inhalation of coal or coal mine dust. In some individuals, this lung disease advances to progressive massive fibrosis (PMF), a severe fm of the disease associated with excess mortality [Atuhaire et al. 1985]. It is now known that exposure to coal mine dust can result in significant airway obstruction [Attfield et al. 1998], and evidence of airways obstruction appears to increase mortality for individuals exposed to coal mine dust [Ortmeyer et al. 1974]. Other factors that appear to increase mortality include increased exposure to respirable coal mine dust [Miller and Jacobsen 1985]. Coal rank is an important predictor of CWP development: the prevalence and incidence of CWP among coal miners increase significantly with coal rank in the United States and elsewhere [Attfield et al. 1998].

Of all the pneumoconioses, CWP is the most frequently listed on death certificates in the United States. Deaths with CWP account for nearly 60 percent of pneumoconiosis deaths over the last 25 years [NIOSH 1996]. CWP mortality has declined in recent decades, to less than 2000 deaths per year since 1990.

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Ortmeyer CE, Costello J, Morgan WKC, Swecker S, Peterson M [1974]. The mortality of Appalachian coal miners, 1963-1971. Arch Environ Health 29:67-72.

Asbestosis (ICD-9 Code 501)

Asbestosis (ICD-9 code 501) refers to the pulmonary fibrosis caused by inhaled asbestos [Rom 1992]. This disease typically requires exposure over an extended period of time, with appearance of the fibrosis occurring after a latent period measured in years.

Asbestos is a fibrous mineral occurring in two major commercially-useful types—amphibole and serpentine—which differ in chemical structure, resulting in variant physical and biologic properties. In the United States, 95 percent of commercial asbestos use has involved the serpentine asbestos known as chrysotile [Rom 1992]. Amphibole forms—crocidolite and amosite—account for only a small fraction of the asbestos used. The greatest risk of asbestosis has been associated with insulation work, but other important exposures relate to shipyard exposure, brake lining repair, and work in any facilities where asbestos or asbestos-containing materials are processed [Rom 1992]. The construction industry has been the major consumer of asbestos in the United States; more than 30 million tons of this mineral have been used in construction and manufacturing since the turn of the century [Craighead and Mossman 1982]. Among populations of asbestos-exposed workers, risk of asbestosis varies with intensity and duration of exposure, as well as time since first exposure. However, even among heavily exposed workers, usually no more than 50 percent have been found to have radiographic evidence of asbestosis [Rosenstock 1994].

Based on death certificates, the annual number of asbestosis deaths in the United States has increased from fewer than 100 to nearly 1000 during the 1968 to 1992 period (NIOSH 1996).

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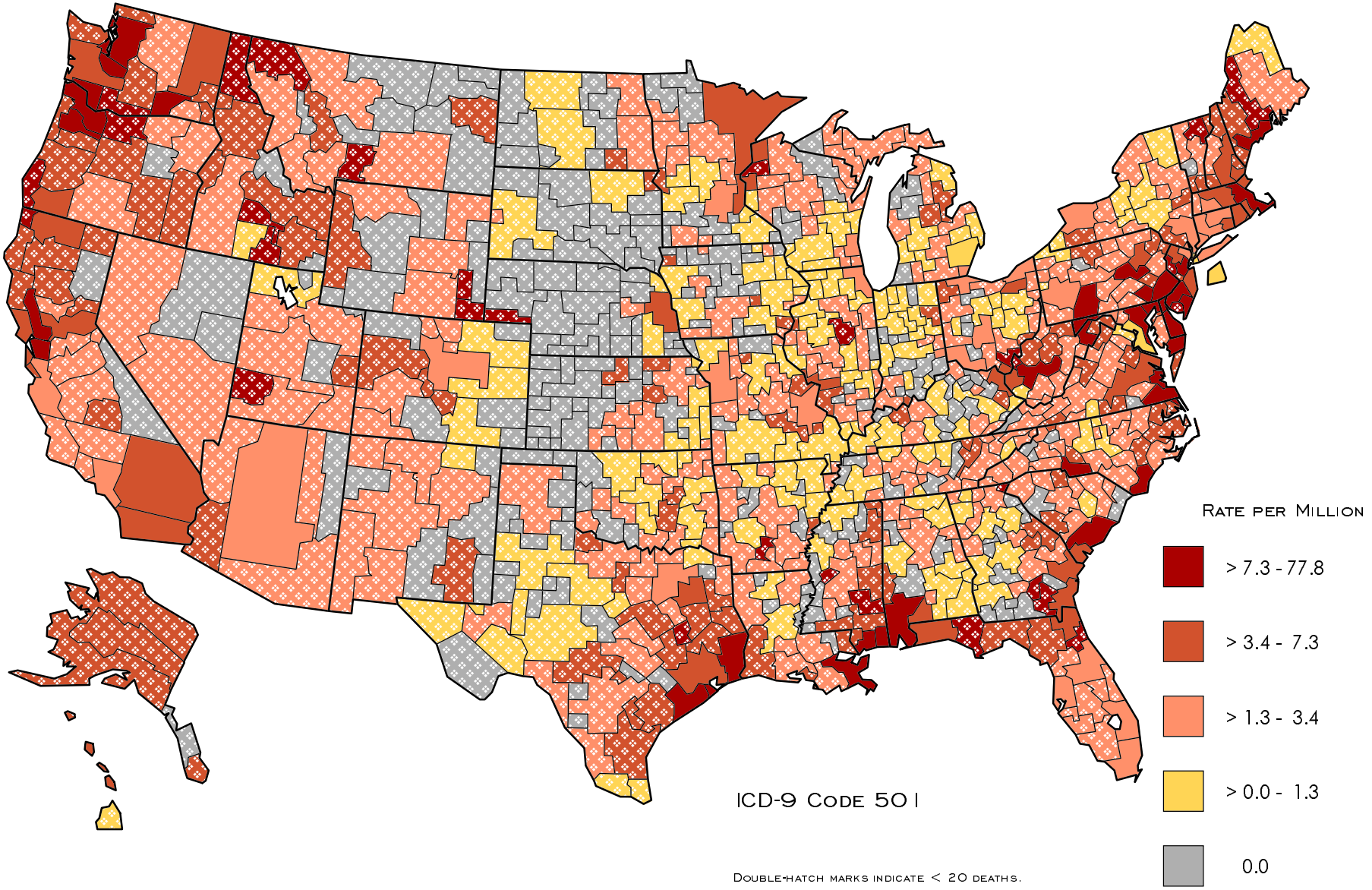
Asbestosis

Age-Adjusted Death Rates by HSA

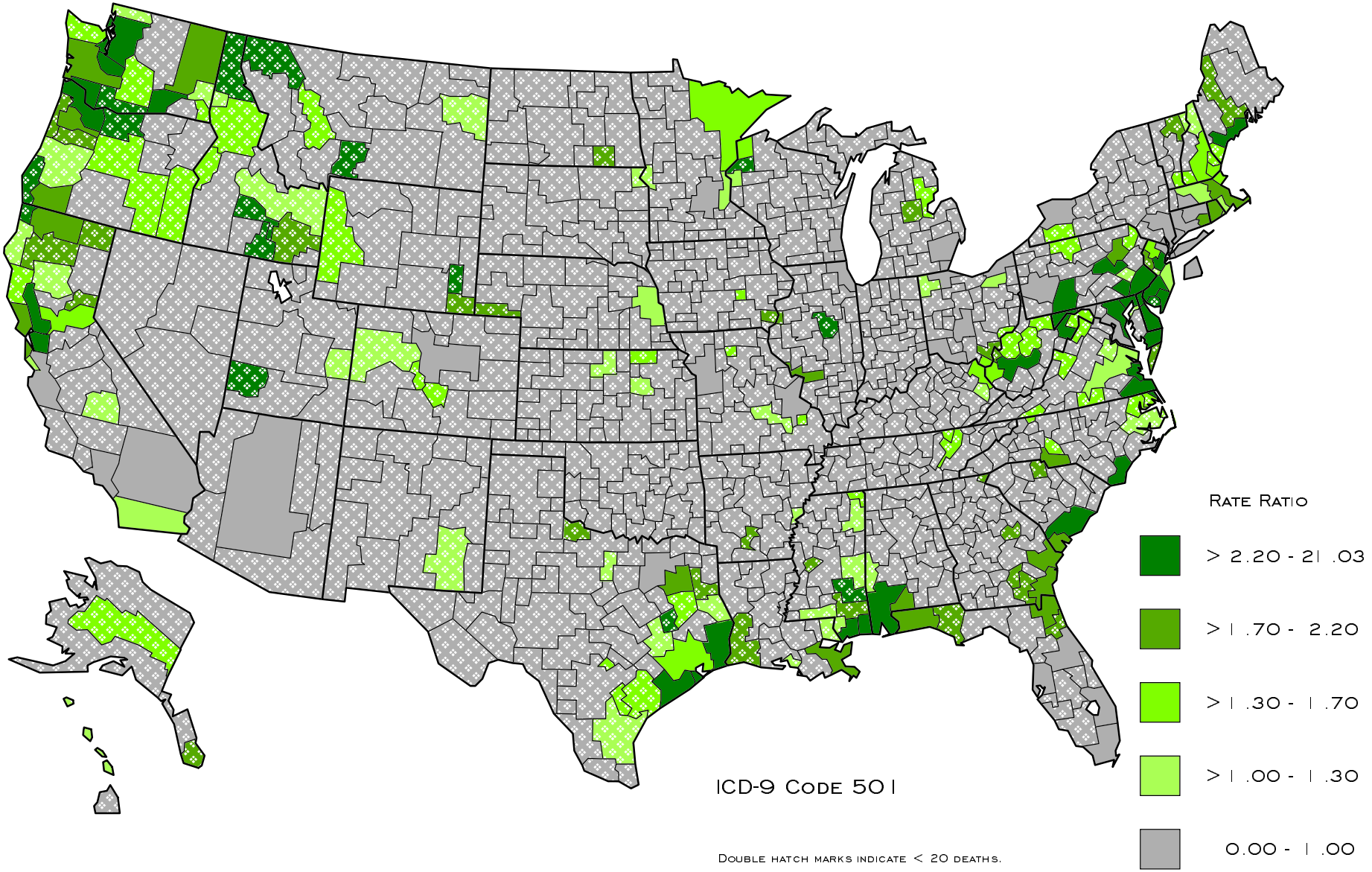
U.S. Residents 15 Years of Age and Older, 1982-1993



Asbestosis

Death Rates of Each HSA Compared with U.S. Rate

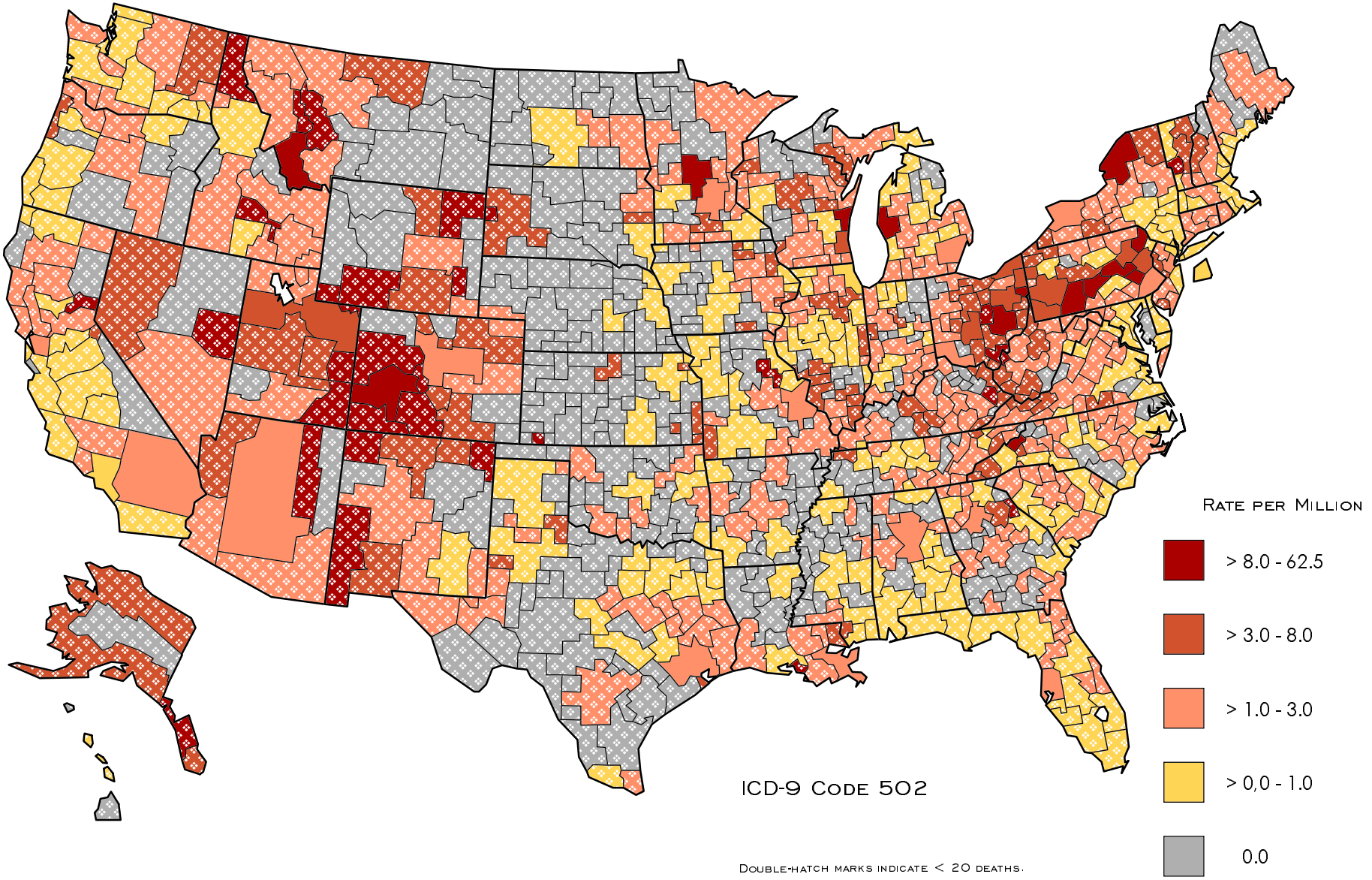
U.S. Residents 15 Years of Age and Older, 1982-1993



Silicosis

Age-Adjusted Death Rates by HSA

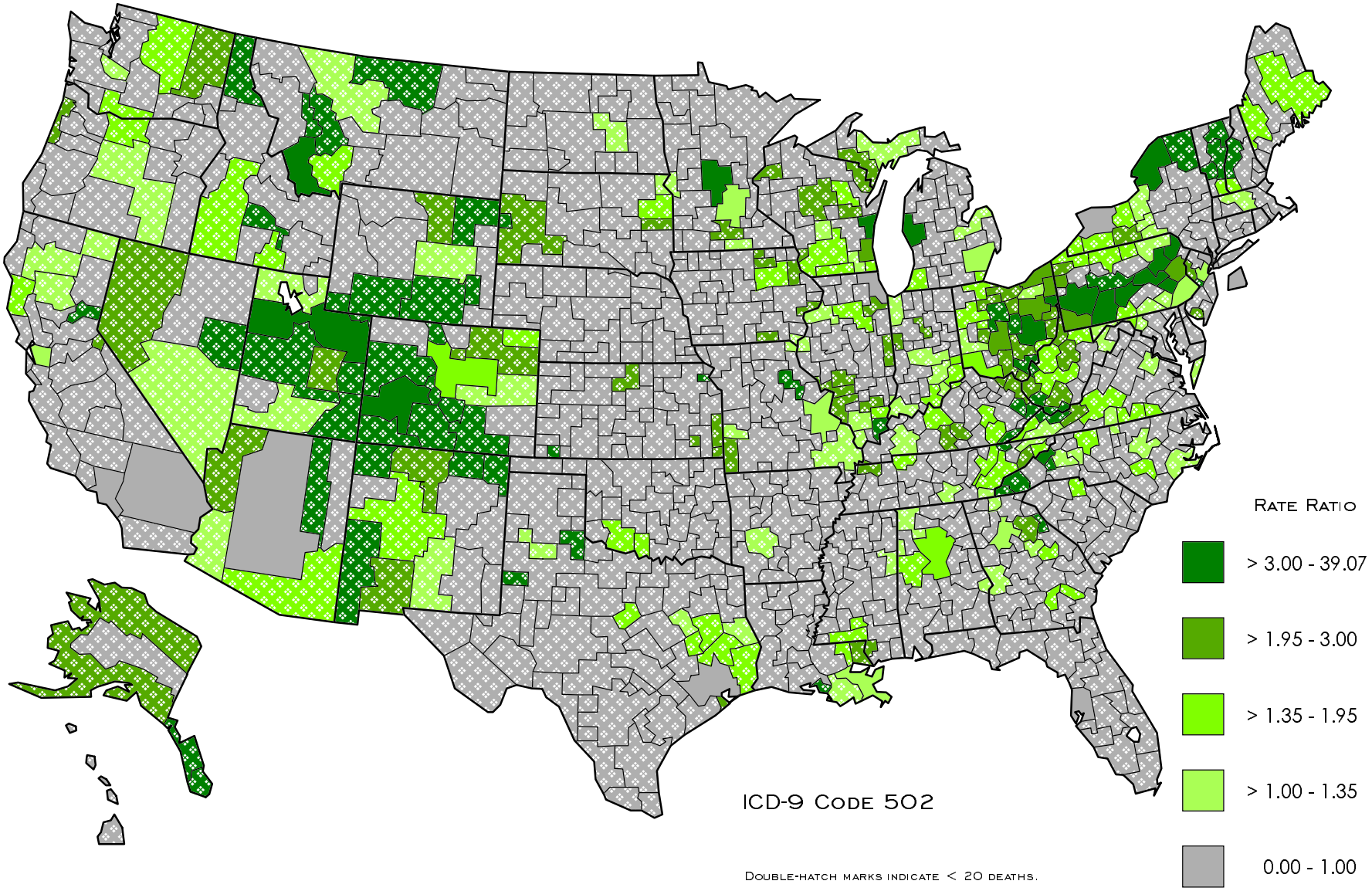
U.S. Residents 15 Years of Age and Older, 1982-1993



Silicosis

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Silicosis (ICD-9 Code 502)

Pneumoconiosis due to other silica or silicates (ICD-9 code 502) includes other conditions (e.g., talcosis) in addition to silicosis. Silicosis is a fibrotic disease of the lungs caused by the inhalation, retention, and pulmonary reaction to crystalline silica dust of respirable size (aerodynamic diameter of 0.5 to 5 microns). Quartz, the predominant mineral in the earth's crust is the major form of crystalline silica, or silicon dioxide. Occupational exposure to crystalline silica particles is associated with various industrial processes, including mining, quarrying, drilling, tunneling, and abrasive blasting with quartz-containing materials (sandblasting) [Beckett et al. 1997]. Silica exposure also poses a hazard to stonecutters and pottery, foundry, ground silica, and refractory workers [Beckett et al. 1997]. Because crystalline silica exposure is so widespread, and silica sand is an inexpensive and versatile component of many manufacturing processes, millions of workers remain at risk of silicosis. This serious and potentially fatal occupational lung disease remains prevalent throughout the world [Parker and Wagner 1998].

Chronic, accelerated, and acute forms of silicosis reflect differing exposure intensities, latency periods, and natural histories. The common chronic form usually follows one or more decades of exposure to respirable dust containing quartz and may progress to progressive massive fibrosis. The accelerated form follows shorter and heavier exposures and progresses more rapidly. The acute form may occur after intense exposures to high levels of respirable dust with high crystalline silica content for periods often measured in months rather than years [Banks et al. 1983]. Tuberculosis is a well-known and serious complication of silicosis [Snider 1978].

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Other/Unspecified Pneumoconiosis (ICD-9 Codes 503, 505)

Pneumoconiosis due to other inorganic dusts (ICD-9 code 503) and unspecified pnemoconiosis (ICD-9 code 505) includes chronic beryllium disease (also known as berylliosis), graphite fibrosis of the lung, bauxite fibrosis of the lung, and aluminosis, as well as any pneumoconioses not further specified on the death certificate. Numerous inorganic dusts have been associated with pneumoconioses.

Chronic beryllium disease is associated with airborne beryllium exposures during melting, casting, grinding, machining, and drilling beryllium products [Sprince and Kazemi 1992]. Current exposures to beryllium have occurred in beryllium-copper alloy production, refining, and reclamation from scrap metals [Cullen et al. 1987], beryllium machining or casting in aerospace application plants, ceramic manufacturing [Newman et al. 1989], and ceramic production [Rossman et al. 1988]. A genetic marker of susceptibility has been demonstrated in individuals with beryllium disease [Richeldi et al. 1993].

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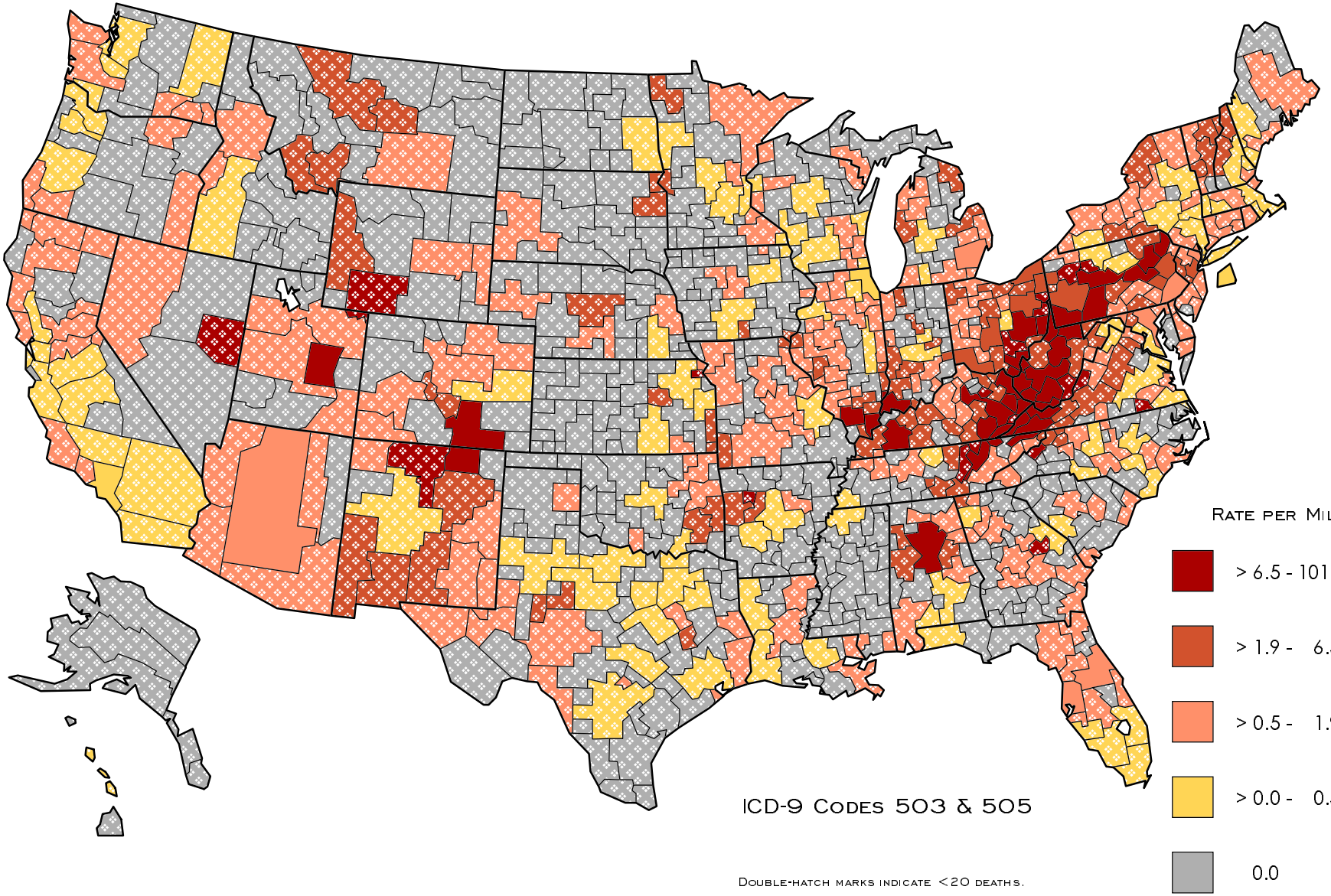
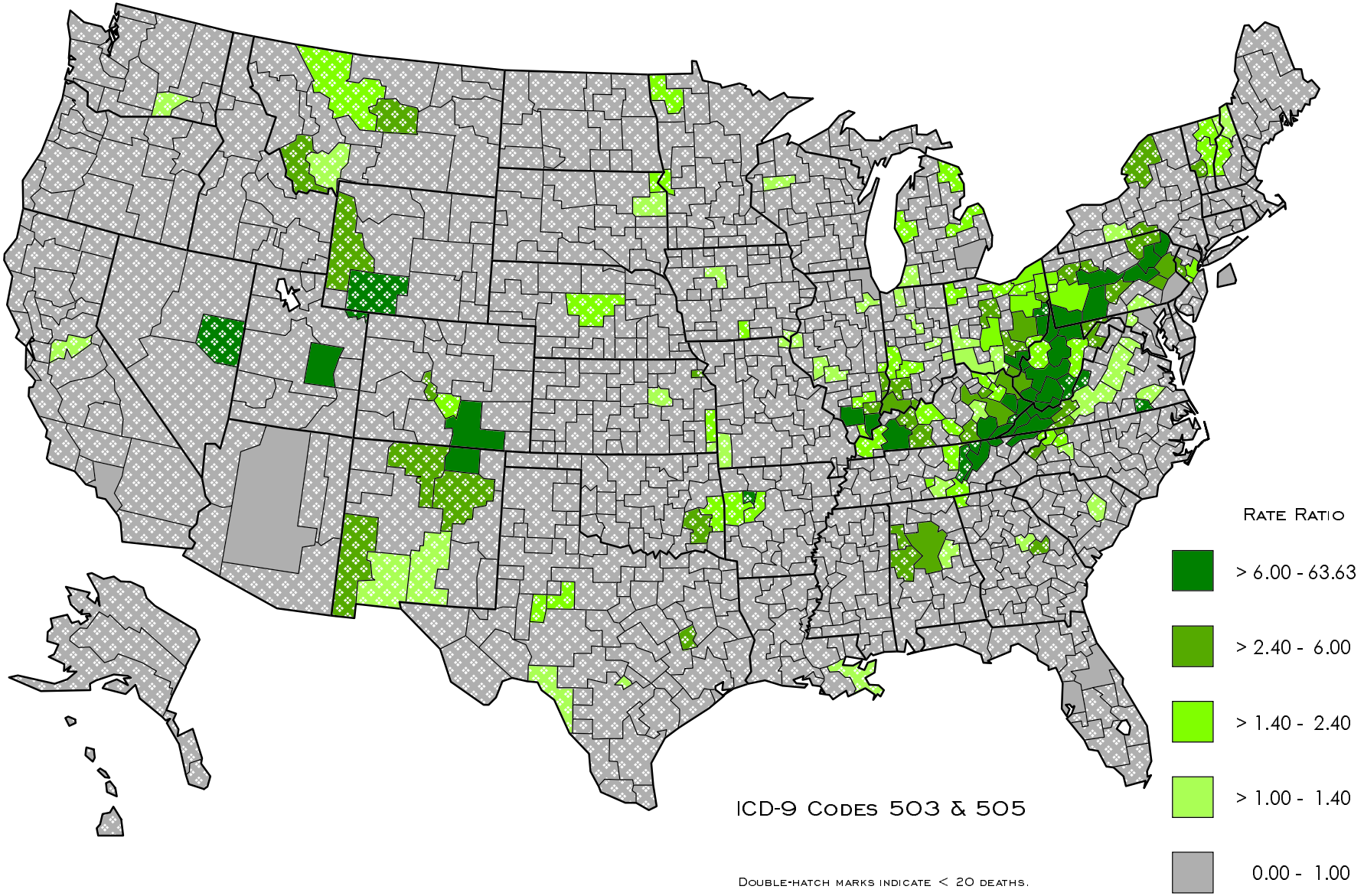
Other / Unspecified Pneumoconioses
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



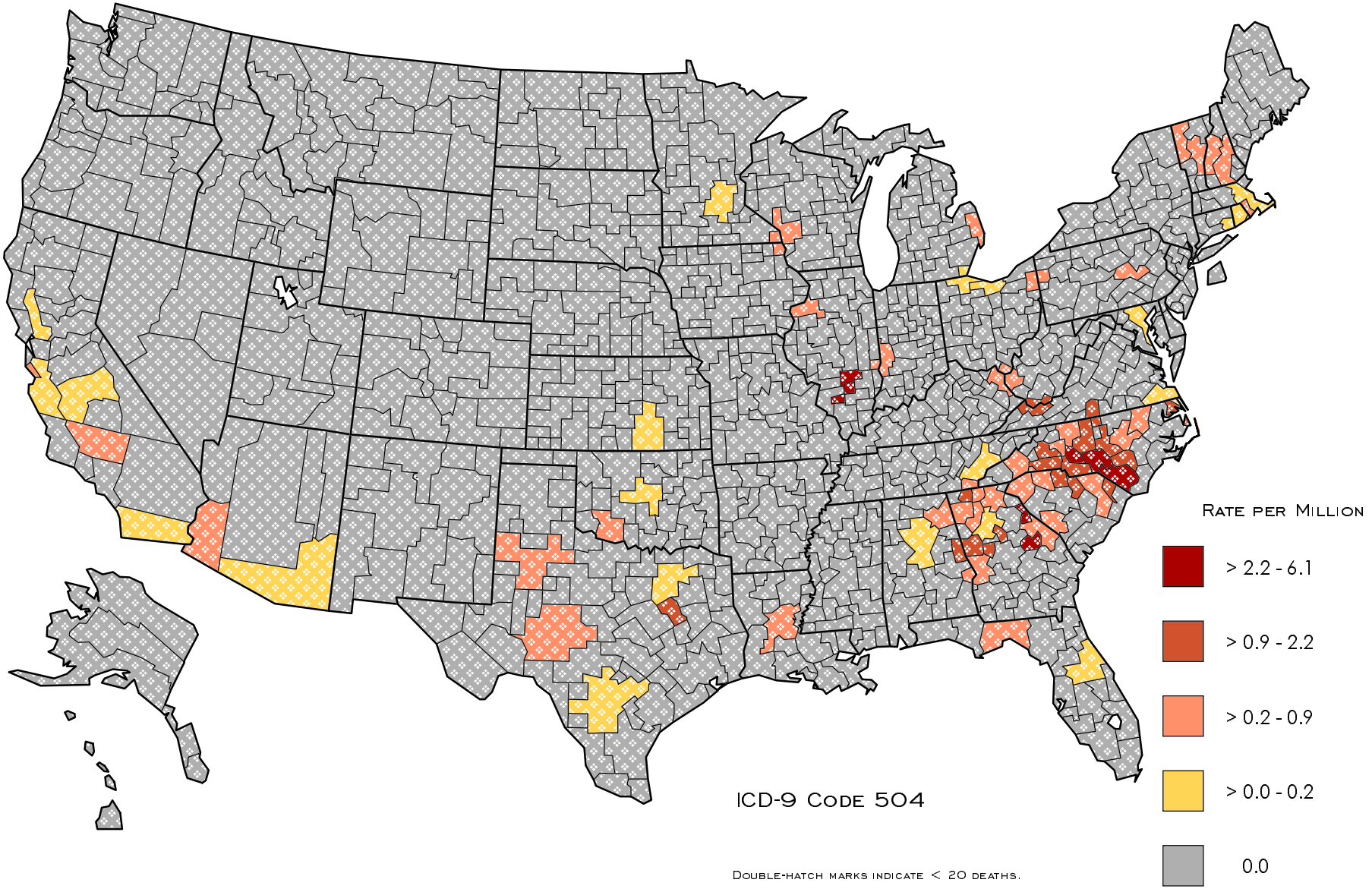
Other / Unspecified Pneumoconioses
Death Rates of Each HSA Compared to U.S. Rate
U.S. Residents 15 Years of Age and Older, 1982-1993



Byssinosis

Age-Adjusted Death Rates by HSA

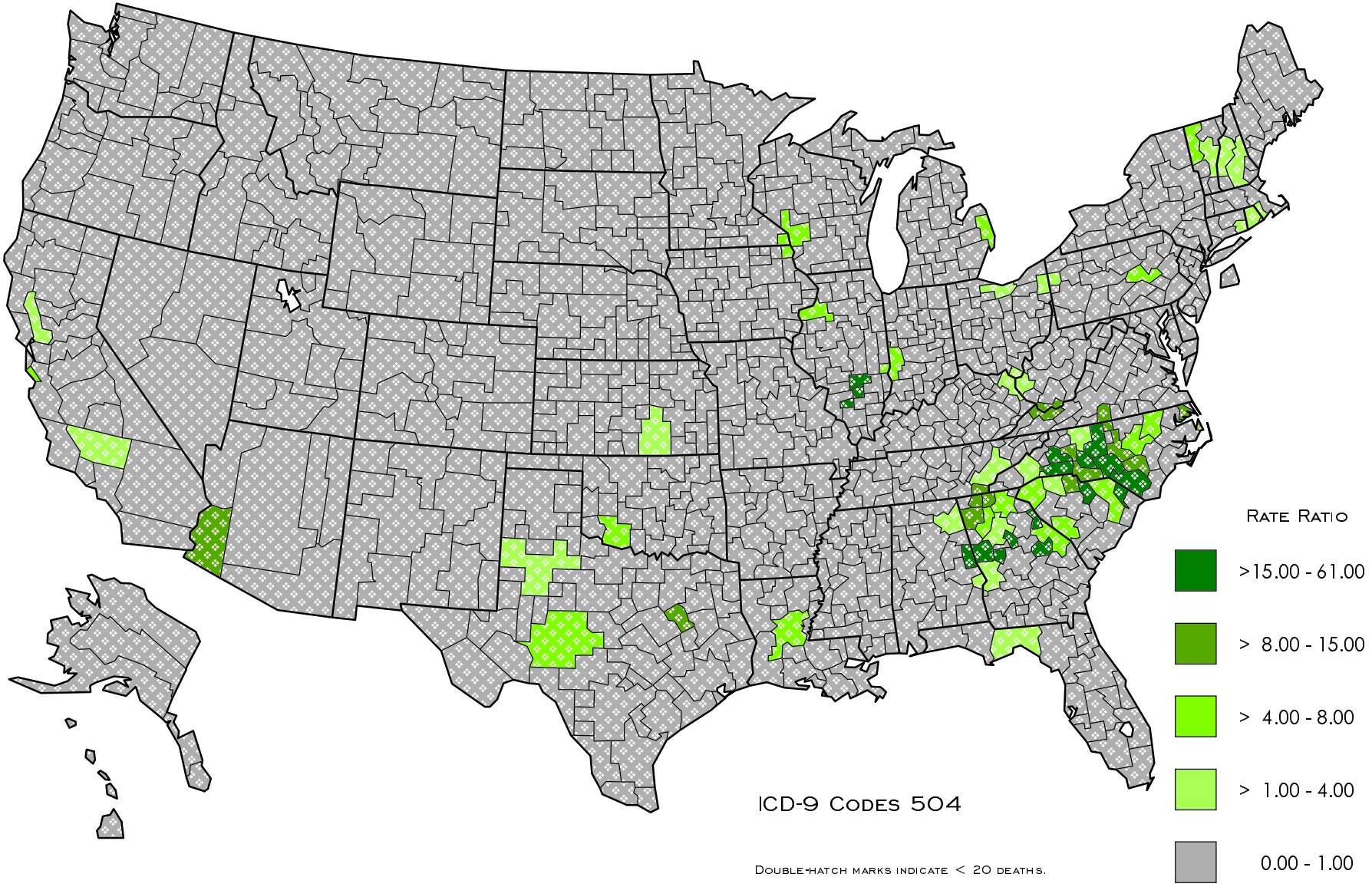
U.S. Residents 15 Years of Age and Older, 1982-1993



Byssinosis

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Byssinosis (ICD-9 Code 504)

Pneumonopathy due to inhalation of other dust (ICD-9 code 504) refers primarily to byssinosis, an airway disease caused by exposure to cotton dust, flax, hemp, or sisal dust [Christiani 1991]. Respiratory disease among processors of vegetable fiber for textiles was first recognized by Ramazzini, the father of occupational medicine, who described dust from retted flax as a major occupational health problem. The term "byssinosis" has been applied both to the acute, reversible response to cotton dust inhalation and to the permanent shortness of breath with impaired function that develops after years of exposure [Kilburn 1992]. When diagnosed in late stages of the disease, affected individuals may be diagnosed as chronic obstructive pulmonary disease [Christiani 1991].

Substantial evidence suggests that inhalation of gram-negative bacterial endotoxin may cause byssinosis [Castellan 1997]. In the cotton textile industry, the prevalence of byssinosis has generally been found to be highest among workers employed in the initial stages of cotton processing (e.g., opening, carding) in mills that process a coarse grade of cotton; generally, these areas are associated with higher concentrations of dust. In the United States, approximately 500,000 workers are at potential risk, with perhaps half this number in jobs with potential high exposure [Christiani 1991]. Control of occupational exposures to dust in the cotton textile industry has reduced the risk of disease substantially in the United States [Merchant 1983].

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Toxic Inhalation Injury (ICD-9 Code 506)

Respiratory conditions due to chemical fumes and vapors (ICD-9 code 506) may include upper airway inflammation, acute bronchitis, reactive airways dysfunction disorder, bronchiolitis, pneumonitis, and pulmonary edema, as well as chronic sequelae (e.g., pulmonary fibrosis, bronchiolitis obliterans, and emphysema) of chemical inhalation. One study identified occupational exposure as a cause of 39 percent of cases admitted to New Jersey hospitals with an ICD code of 506 [Kipen et al. 1991].

Examples of agents associated with these conditions include irritant gasses such as ammonia, chlorine, and oxides of nitrogen; asphyxiant gasses such as carbon monoxide and hydrogen cyanide; and fumes such as mercury, polytetrafluoroethylene, and cadmium oxide [Delclos and Carson 1996; Newman 1996; Lee et al. 1997; Sorahan et al. 1995]. Occupations at risk are identified in a wide range of manufacturing processes [Bates et al. 1992], as well as among farmers [May and Schenker 1996] and miners [Lapp 1996].

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May JL, Schenker MB [1996]. Agriculture. In: Harber P, Schenker M, Balmes J, eds. Occupational and environmental respiratory disease. St. Louis, MO: Mosby-Year Book, Inc., pp 617-636.
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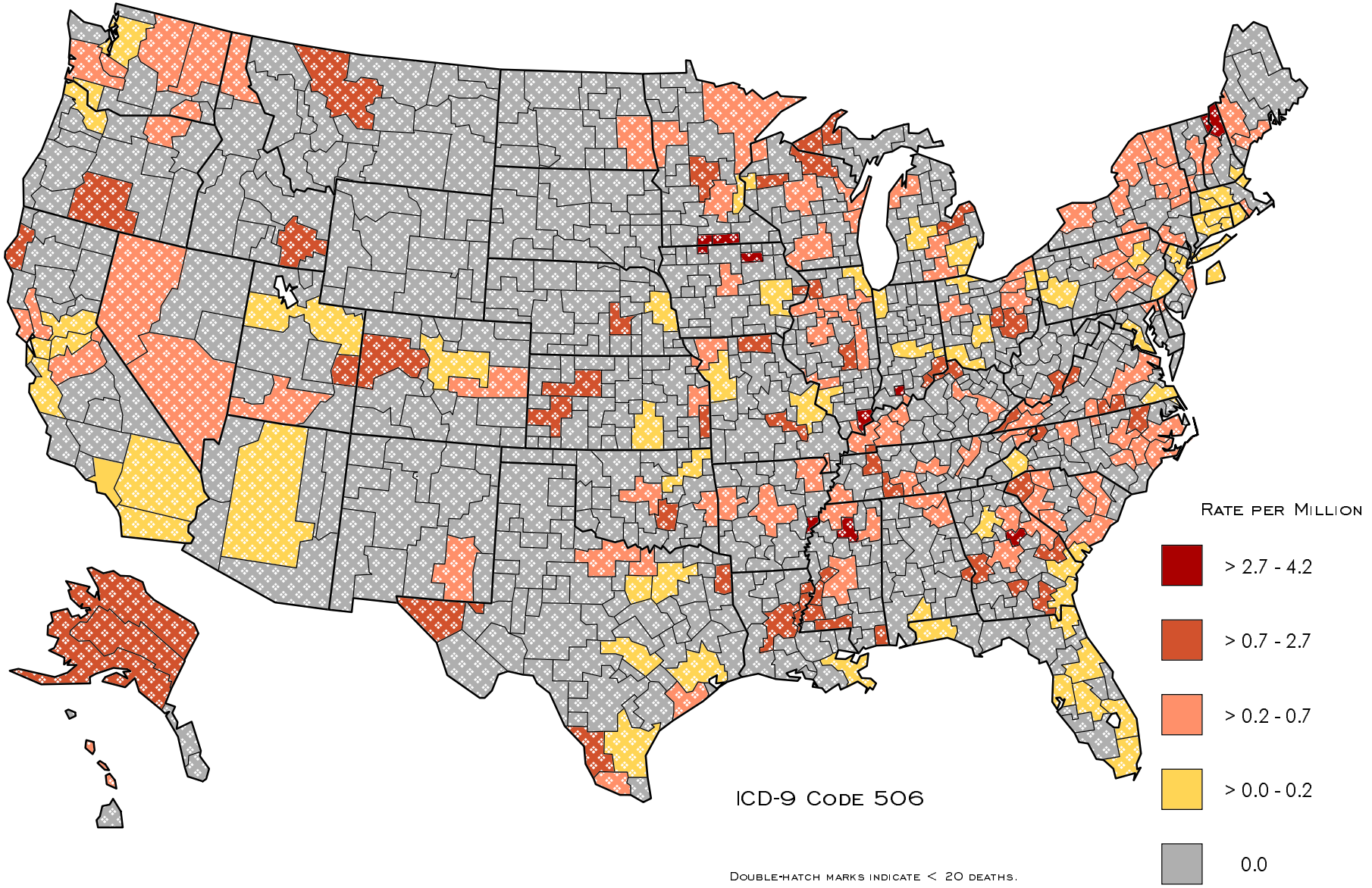
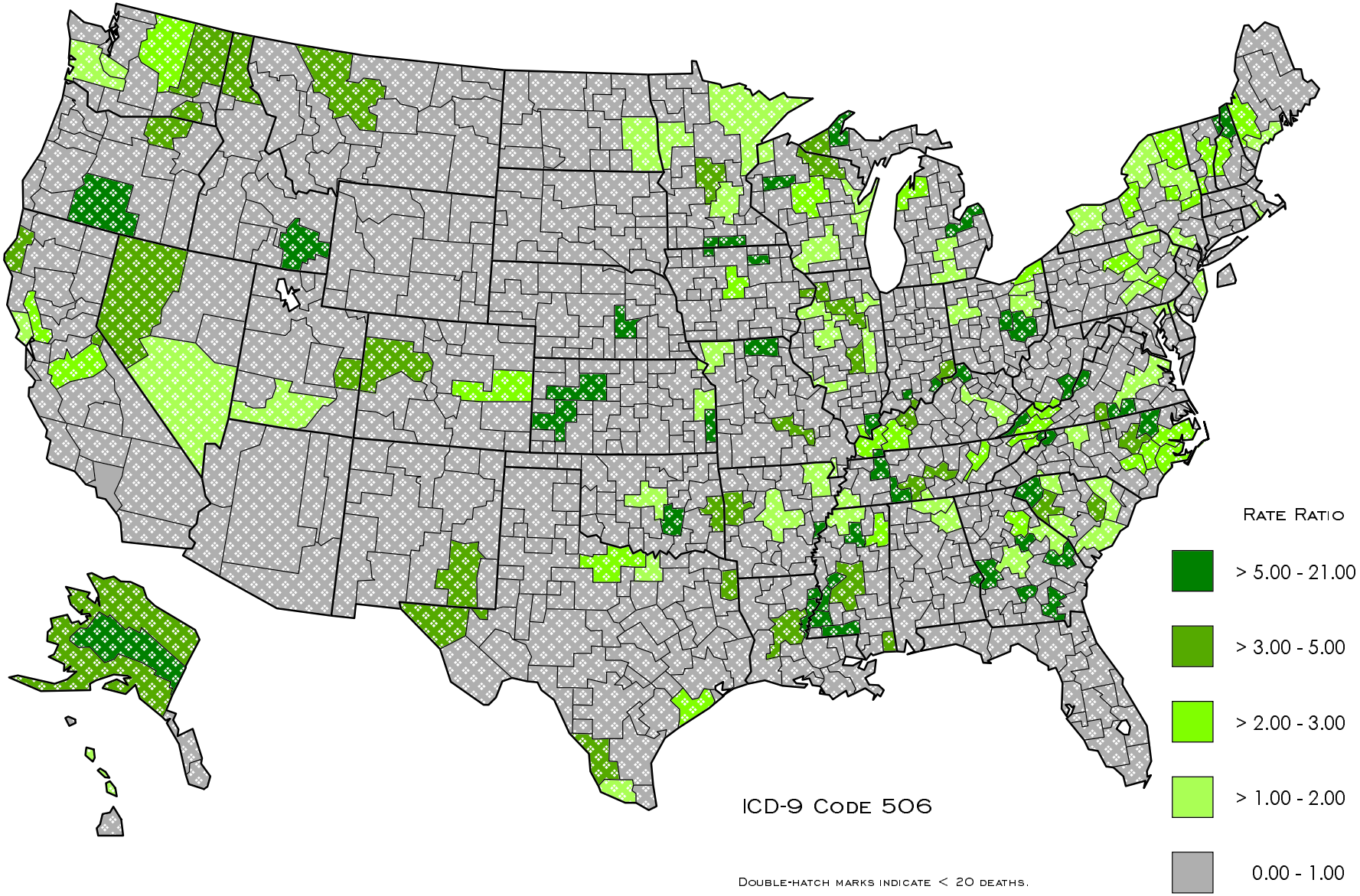
Toxic Inhalation Injury
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



Toxic Inhalation Injury

Death Rates of Each HSA Compared with U.S. Rate

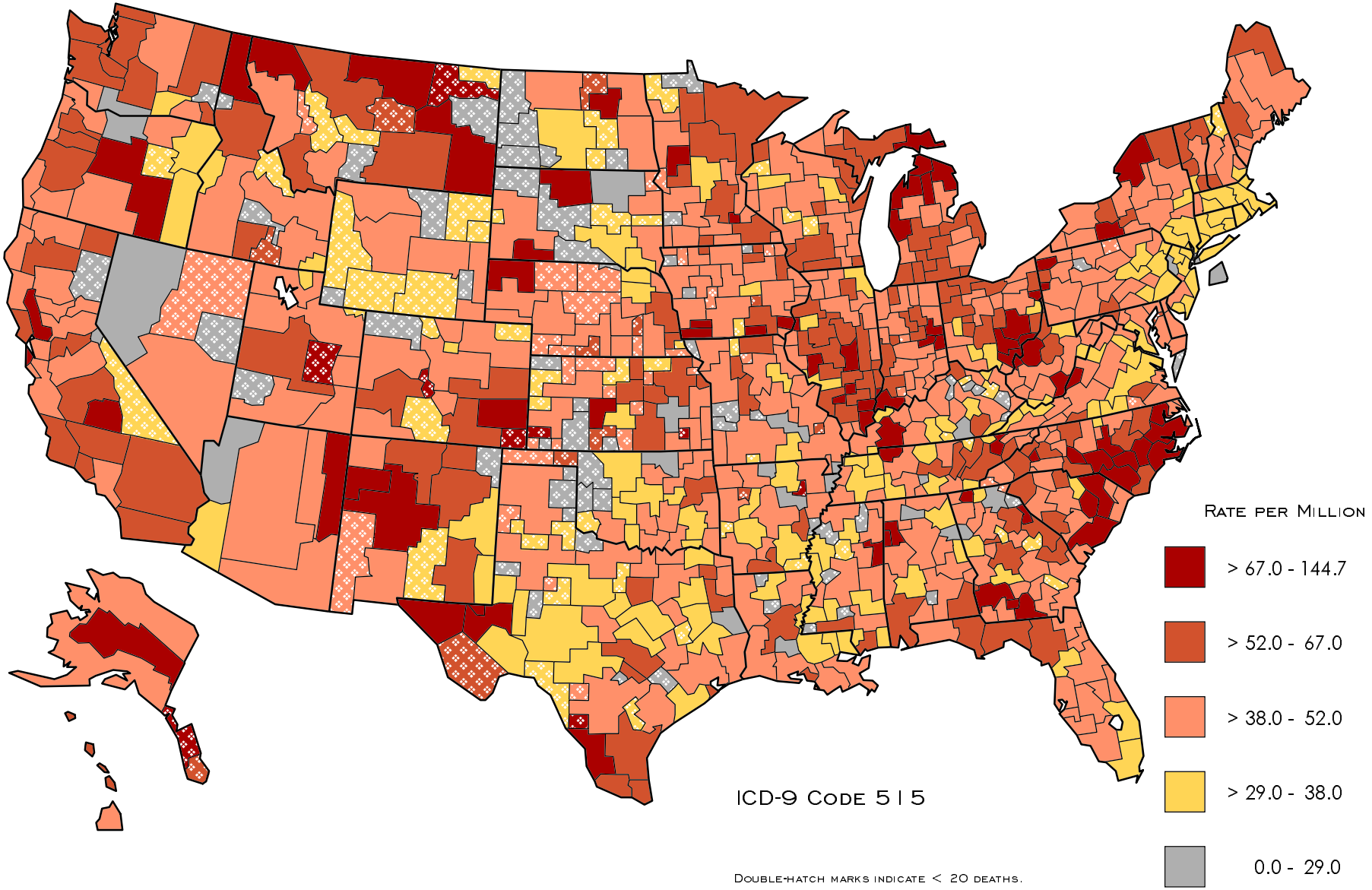
U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Fibrosis

Age-Adjusted Death Rates by HSA

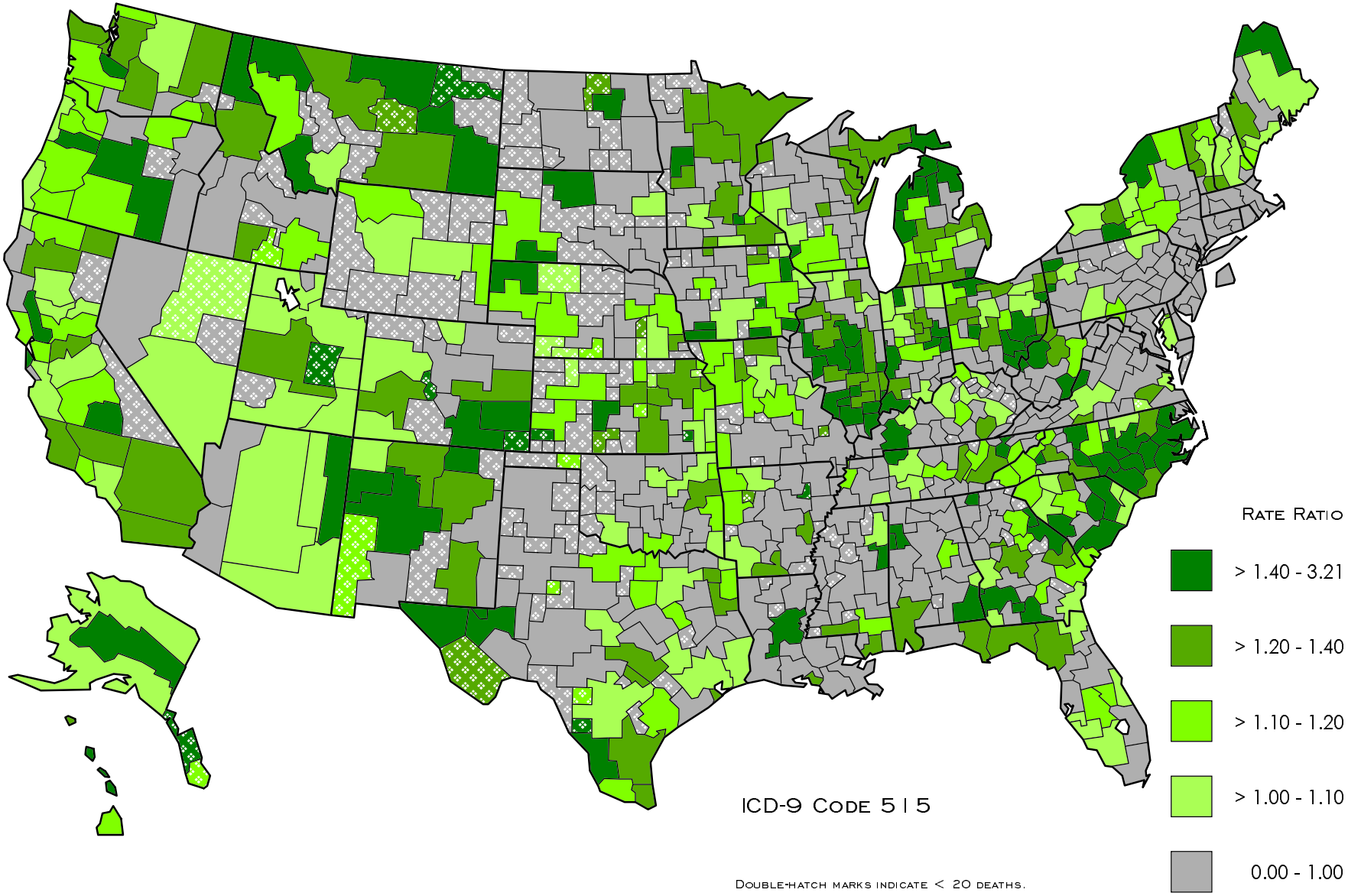
U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Fibrosis

Death Rates of HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Fibrosis (ICD-9 Code 515)

The term postinflammatory pulmonary fibrosis (ICD-9 code 515) is used for a group of chronic disabling lung disorders characterized by diffuse scarring of the lungs. These conditions are often of unknown cause, but may occur after severe lung injury due to infection or other known causes. The pathogenesis of these illnesses involves initiation and then continuation of an inflammatory process in the gas exchange regions of the lung, with resulting progressive tissue injury. Involvement of the immunological system in the production of pulmonary fibrosis is evident from the frequent association of these disorders with a variety of autoimmune manifestations [Raghu 1998].

Upon careful evaluation, some cases of pulmonary fibrosis are found to be a consequence of the inhalation of agents (e.g., asbestos, crystalline silica, or organic dusts) found in occupational settings. When a specific agent is recognized as the cause, the diagnostic terminology for the particular pneumoconiosis (e.g. asbestosis, silicosis) or hypersensitivity pneumonitis (e.g., farmer's lung) is generally preferred. However, in their later stages, illnesses caused by various inhaled agents may be difficult to distinguish, and thus may be clinically diagnosed as pulmonary fibrosis.

Pulmonary fibrosis of occupational origin may be associated with extrapulmonary manifestations of an immune type (e.g., Caplan's syndrome or scleroderma in silicosis) [Parker and Petsonk 1998]. In addition to hypersensitivity pneumonitis and the classical pneumoconioses, agents that have been associated with pulmonary fibrosis include a variety of silicate minerals and several metals [Short and Petsonk 1996]. In addition, individuals who have experienced a high level inhalation exposure to toxic or irritant agents can develop acute respiratory distress which, in some cases, progresses to bronchiolitis obliterans with pulmonary fibrosis [Schwartz and Blaski 1998].

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Other Alveolar/Interstitial Diseases (ICD-9 Code 516)

Alveolar and parietoalveolar pneumonopathy (ICD-9 code 516) is a heterogeneous diagnostic grouping that includes a number of rare lung conditions, including pulmonary alveolar proteinosis, idiopathic pulmonary hemosiderosis, pulmonary alveolar microlithiasis, and idiopathic fibrosing alveolitis (e.g., diffuse interstitial pulmonary fibrosis). Overlap with the postinflammatory pulmonary fibrosis (ICD-9 Code 515) is likely, particularly if the diseases present in their later stages when more specific clinical or pathologic patterns may no longer be recognizable.

Risk factors for most of these conditions are not well understood, although occupational associations have been reported. An inflammatory lung condition has recently been observed among workers producing nylon textile flock [Kern et al. 1997]. An outbreak of fatal pneumonitis with fibrotic sequelae was caused by a textile printing process in which spraying procedures which delivered a hazardous respirable aerosol [Moya et al. 1994]. Fibrosing alveolitis caused by exposure to hard metal dusts has also been recognized [De-Capitani et al 1993; Lison et l. 1996]. Diffuse, severe alveolar damage due to inhalation of amitrole-containing herbicide has been reported [Balkisson et al. 1992]. Acute silicosis can resemble pulmonary alveolar proteinosis [Davis 1996]. Unrecognized hypersensitivity pneumonitis, an interstitial lung condition most often caused by inhalation of organic dusts or aerosols, can present with alveolitis and progress to pulmonary fibrosis [Rose 1996; Malmberg et al. 1993].

References

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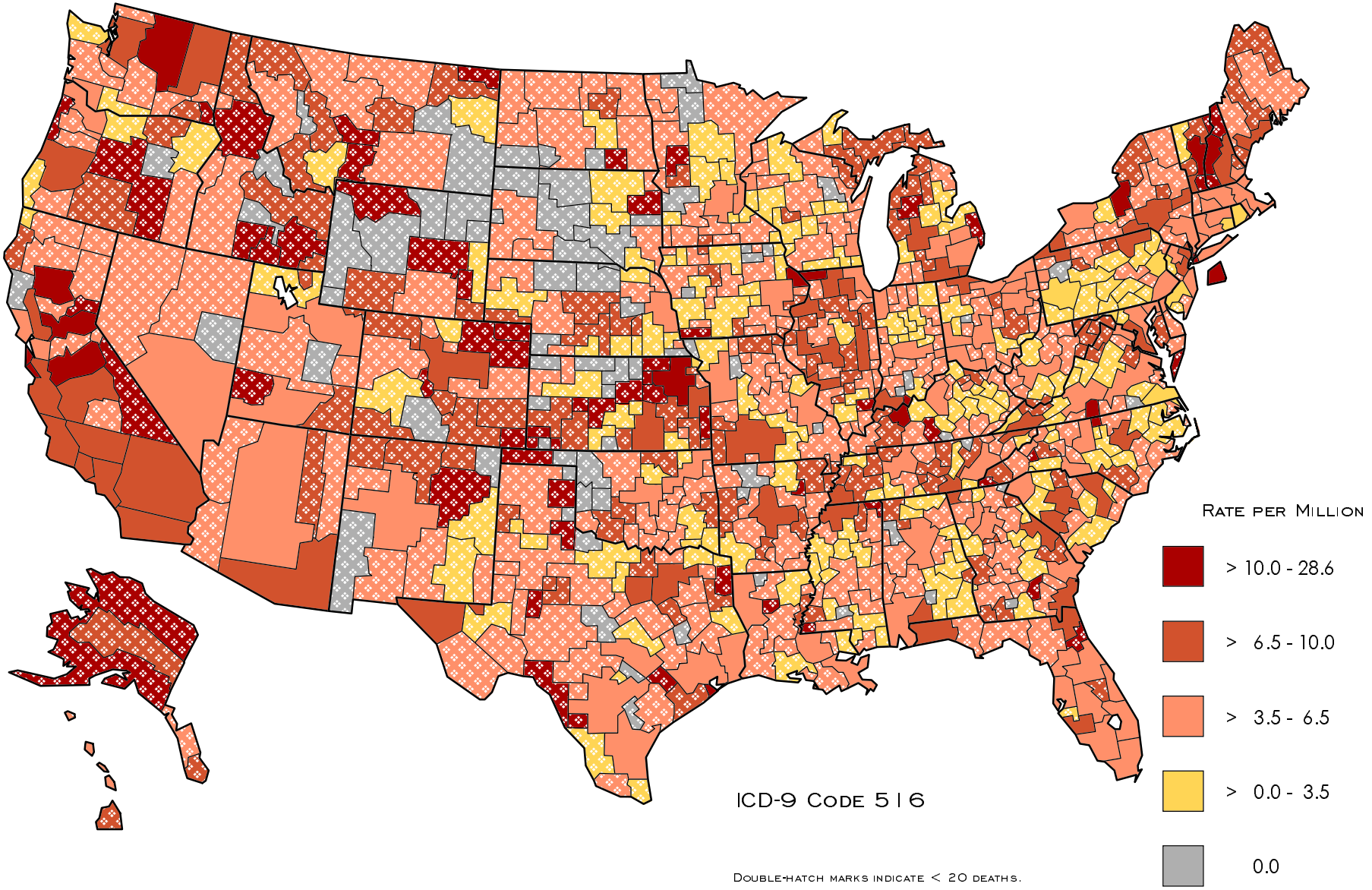
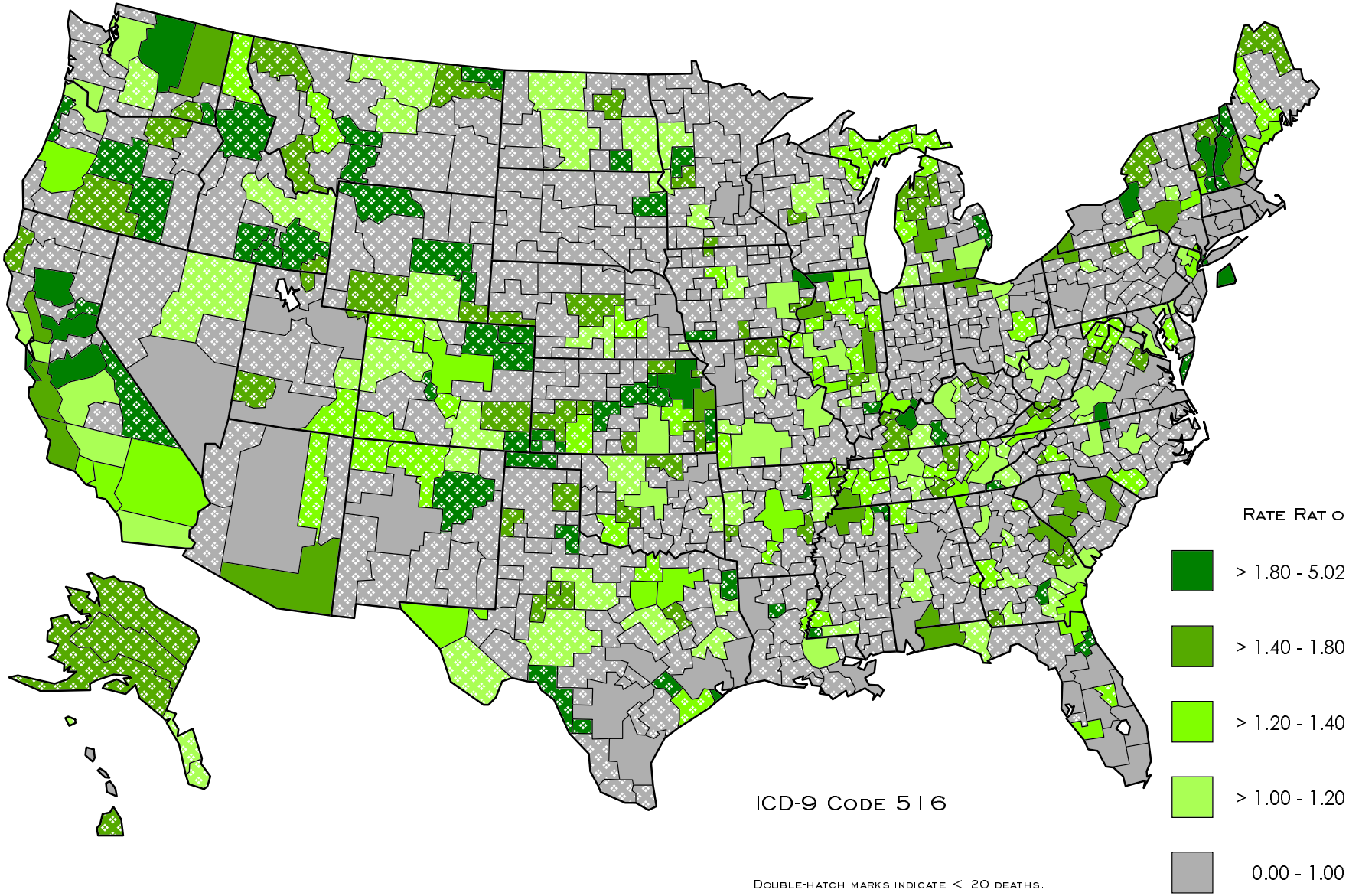
Other Alveolar / Interstitial Diseases
Age-Adjusted Death Rates by HSA
U.S. Residents 15 Years of Age and Older, 1982-1993



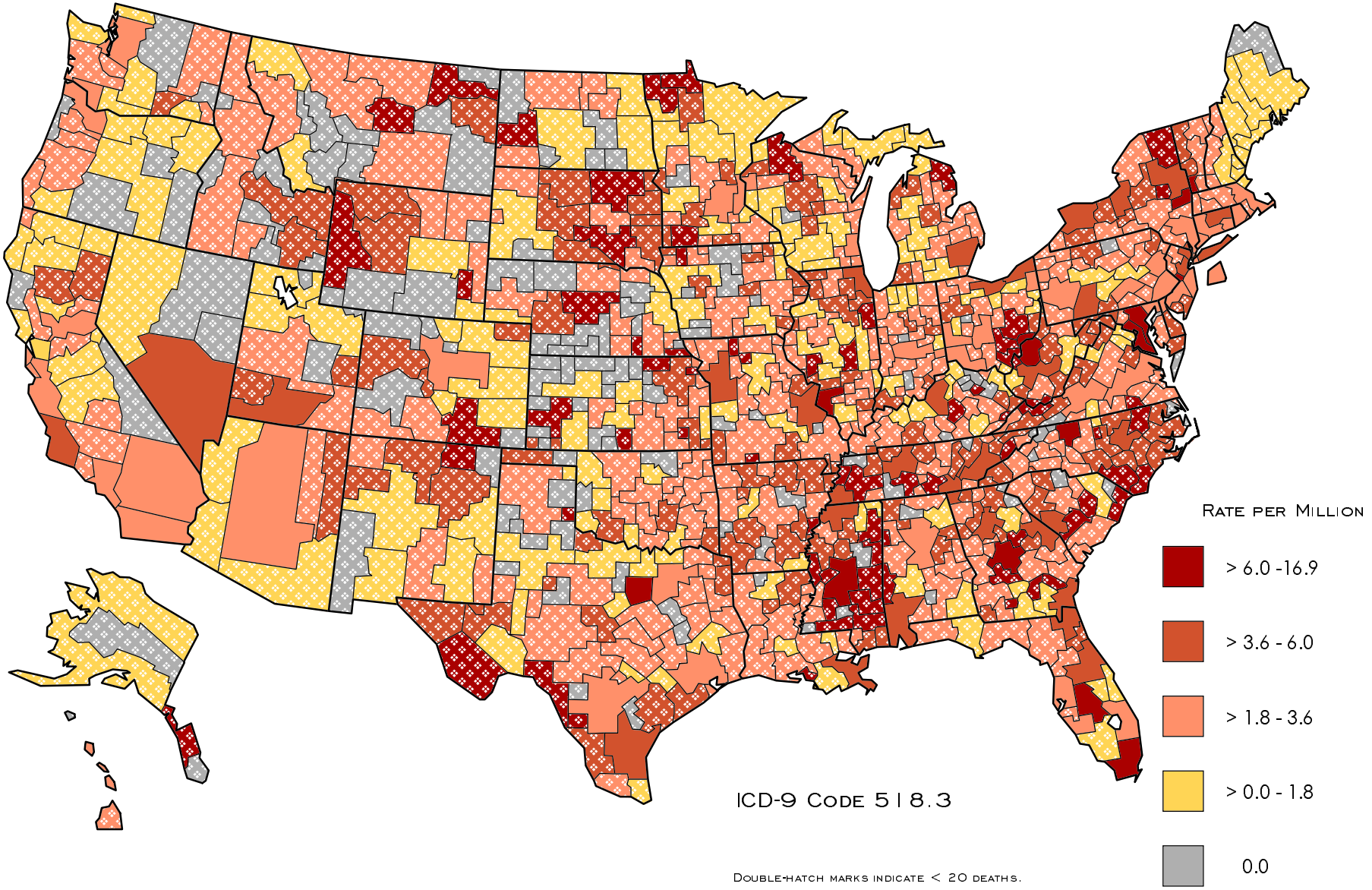
Other Alveolar / Interstitial Diseases
Death Rates of Each HSA Compared with U.S. Rate
U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Eosinophilia

Age-Adjusted Death Rates by HSA

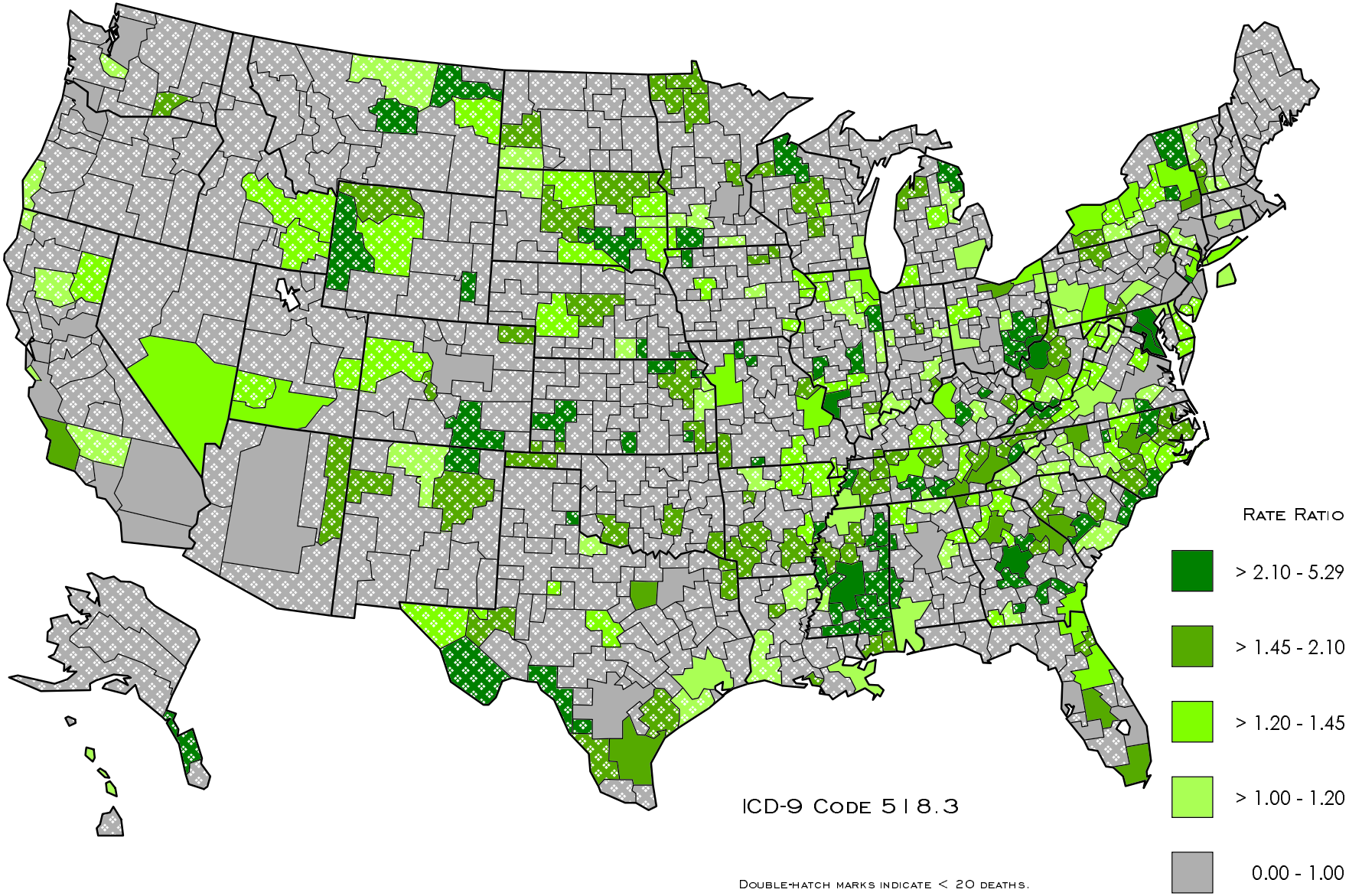
U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Eosinophilia

Death Rates of Each HSA Compared with U.S. Rate

U.S. Residents 15 Years of Age and Older, 1982-1993



Pulmonary Eosinophilia (ICD-9 Code 518.3)

Pulmonary eosinophilia (ICD-9 code 518.3) is a term used for a group of lung disorders associated with increased numbers of eosinophils in lung tissue and/or peripheral blood. Based upon clinical and pathologic features, a number of relatively distinct entities have been characterized within this group of lung disorders, including acute pulmonary eosinophilia, chronic eosinophilic pneumonia, tropical eosinophilia, asthma associated with pulmonary eosinophilia, allergic granulomatosis, allergic bronchopulmonary mycosis, hypereosinophilic syndrome, and eosinophilic granuloma of the lung [Rochester 1998].

Pulmonary eosinophilia has most commonly been associated with parasitic infections or allergic and hypersensitivity reactions. Pulmonary and/or peripheral blood eosinophilia has often been observed in the setting of hypersensitivity reactions to pharmaceuticals (e.g., penicillins, sulfonamides, captopril, chlorpropamide) [Smith 1990]. A recent study reported that acute viral infections can cause increased airways responsiveness to inhaled methacholine and pulmonary eosinophilic inflammation [Schwarze et al. 1997]. A number of occupational exposures have been associated with eosinophilia. Chronic inhalational exposure to nickel has been related to the development of asthma and pulmonary eosinophilia [Sunderman 1961]. Various inhaled organic agents can induce pulmonary eosinophilia, including grain and wood dusts, and animal, insect, and fungal allergens [Pepys 1986]. Increases in blood eosinophils have been reported in a group of rubber injection press operators [Thomas and Bascom 1985; Bascom et al. 1990].

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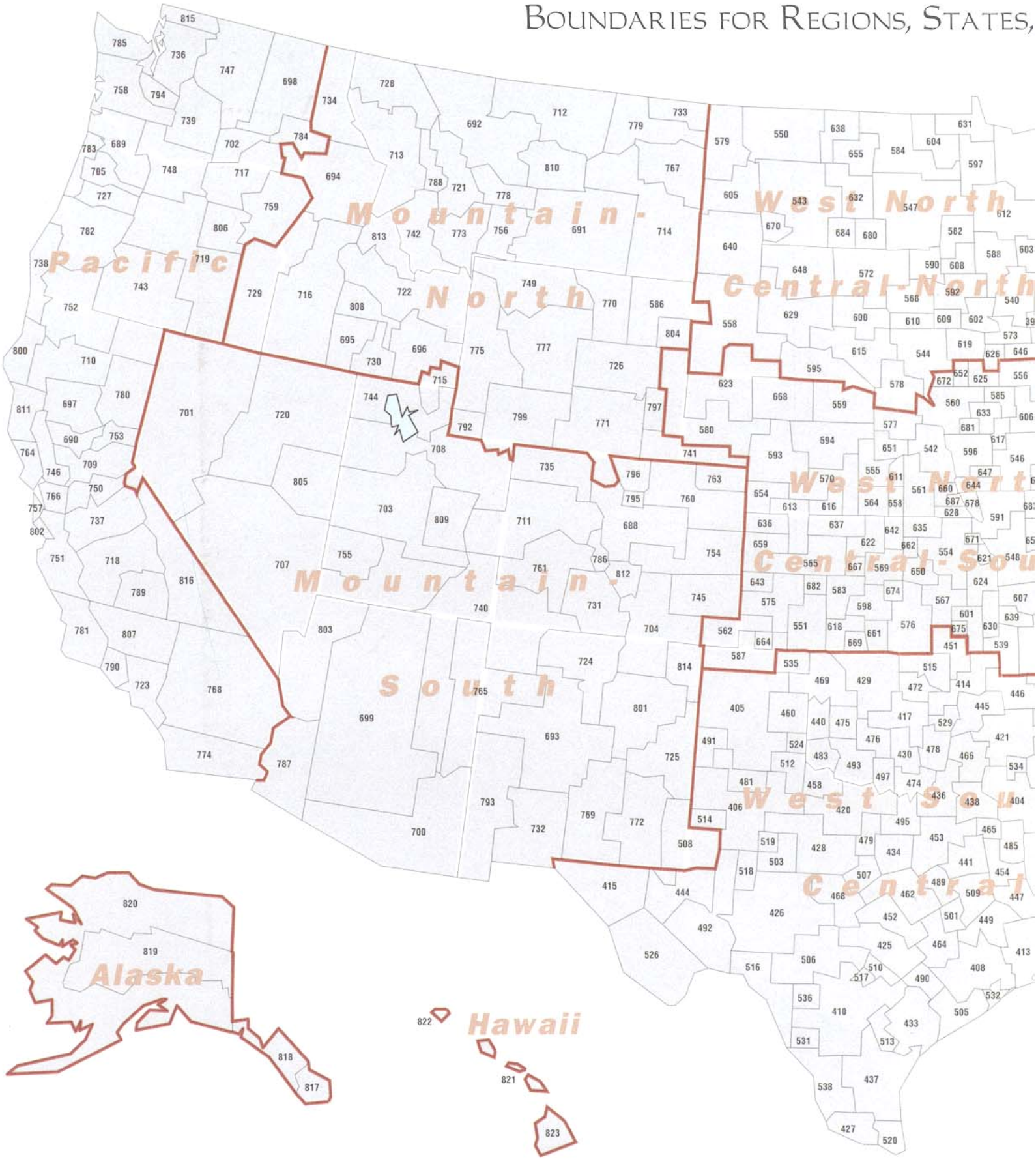
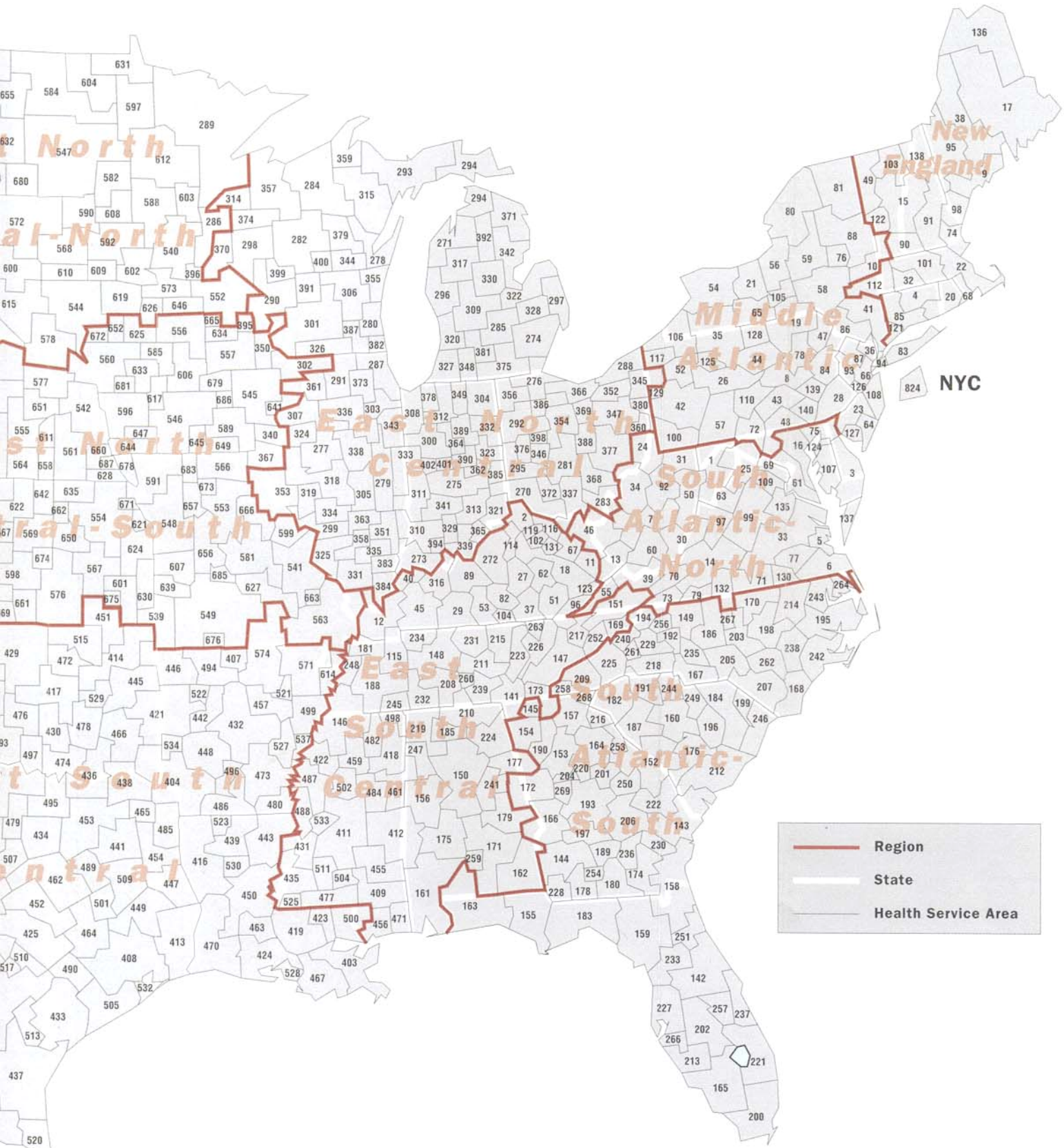
Appendix I
Health Service Area Boundary Map

Boundaries for Regions, States,



Courtesy of NCHS

ONS, STATES, AND HEALTH SERVICE AREAS



Appendix II
List of Health Service Areas

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
1	5	ALLEGANY (CUMBERLAND), MD - GARRETT, MD.
2	6	KENTON (COVINGTON), KY-CAMPBELL, KY
3	5	SUSSEX, DE - WICOMICO, MD
4	3	HARTFORD (HARTFORD), CT - WINDHAM, CT
5	6	NEWPORT NEWS CITY, VA - HAMPTON CITY, VA
6	7	NORFOLK/PORTSMOUTH CITY, VA - VIRGINIA BEACH CITY, VA
7	6	KANAWHA (CHARLESTON), WV - PUTNAM, WV
8	5	SCHUYLKILL, PA - MONTOUR, PA
9	4	CUMBERLAND (PORTLAND), ME - KNOX, ME
10	3	ALBANY (ALBANY), NY - RENSSELAER, NY
11	3	FLOYD, KY - JOHNSON, KY
12	11	MC CRACKEN, KY - GRAVES, KY
13	3	PIKE, KY - LOGAN, WV
14	9	ROANOKE (ROANOKE), VA - CAMPBELL, VA
15	5	GRAFTON, NH - WASHINGTON, VT
16	5	BALTIMORE (BALTIMORE), MD - ANNE ARUNDEL, MD
17	4	PENOBSCOT (BANGOR), ME - HANCOCK, ME
18	13	FAYETTE (LEXINGTON - FAYETTE), KY - PERRY, KY
19	5	BROOME (BINGHAMTON), NY - BRADFORD, PA
20	5	PROVIDENCE (PROVIDENCE), RI - NEW LONDON, CT
21	4	ONTARIO (GENEVA), NY - WAYNE, NY
22	7	MIDDLESEX, MA - SUFFOLK (BOSTON), MA
23	4	CAMDEN (CAMDEN), NJ - BURLINGTON, NJ
24	6	OHIO (WHEELING), WV - BELMONT, OH
25	8	FREDERICK, VA - BERKELEY, WV
26	3	CLEARFIELD, PA - CENTRE (STATE COLLEGE), PA
27	5	BOYLE, KY - LINCOLN, KY
28	5	PHILADELPHIA (PHILADELPHIA), PA - MONTGOMERY, PA
29	6	WARREN, KY - LOGAN, KY
30	4	ALLEGHANY, VA - GREENBRIER, WV
31	4	MONONGALIA, WV - MARION, WV
32	2	HAMPDEN (SPRINGFIELD), MA - HAMPSHIRE, MA
33	20	HENRICO (RICHMOND), VA - PRINCE EDWARD, VA
34	8	WOOD (PARKERSBURG), WV - WASHINGTON, OH
35	5	CATTARAUGUS, NY - MC KEAN, PA
36	4	BERGEN, NJ - HUDSON (JERSEY CITY), NJ
37	3	PULASKI, ,KY - WAYNE, KY
38	3	KENNEBEC, ME - SOMERSET, ME
39	5	MERCER, WV - TAZEWELL, VA
40	2	HENDERSON (HENDERSON), KY - UNION, KY
41	4	WESTCHESTER (YONKERS), NY - DUTCHESS, NY
42	6	ALLEGHENY (PITTSBURGH), PA - WESTMORELAND, PA
43	4	DAUPHIN (HARRISBURG), PA - CUMBERLAND, PA
44	2	LYCOMING (WILLIAMSPORT), PA - CLINTON, PA
45	7	HOPKINS, KY - CHRISTIAN (HOPKINSVILLE), KY
46	9	CABELL (HUNTINGTON), WV - BOYD, KY
47	2	LACKAWANNA (SCRANTON), PA - WAYNE, PA
48	3	YORK (YORK), PA - FREDERICK, MD
49	4	CHITTENDEN (BURLINGTON), VT - FRANKLIN, VT
50	4	RANDOLPH, WV - BARBOUR, WV
51	4	WHITLEY, KY - LAUREL, KY
52	3	VENANGO, PA - CLARION, PA
53	4	BARREN, KY - MONROE, KY
54	7	ERIE (BUFFALO), NY - MONROE, NY
55	3	WISE, VA - LEE, VA
56	3	ONONDAGA (SYRACUSE), NY - CAYUGA, NY
57	4	CAMBRIA, PA - BLAIR (ALTOONA), PA
58	4	OTSEGO, NY - DELAWARE, NY
59	3	ONEIDA (UTICA), NY - HERKIMER, NY
60	4	RALEIGH, WV - FAYETTE, WV
61	5	WASHINGTON, D.C. - MONTGOMERY, MD
62	4	MADISON, KY - ROCKCASTLE, KY
63	3	ROCKINGHAM, VA - PAGE, VA
64	2	ATLANTIC (ATLANTIC CITY), NJ - CAPE MAY, NJ
65	3	STEUBEN, NY - CHEMUNG (ELMIRA), NY
66	4	ESSEX (NEWARK), NJ - UNION, NJ
67	4	ROWAN, KY - MORGAN, KY
68	2	BRISTOL (NEW BEDFORD), MA - NEWPORT, RI
69	4	ALEXANDRIA CITY, VA - ARLINGTON - ALEXANDRIA (ARLINGTON), V
70	4	MONTGOMERY, VA - PULASKI, VA
71	3	HALIFAX, VA - MECKLENBURG, VA
72	3	FRANKLIN, PA - WASHINGTON (HAGER), MD
73	3	GRAYSON, VA - ALLEGHANY, NC
74	2	ESSEX (LYNN), MA - ROCKINGHAM, NH

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
75	3	NEW CASTLE (WILMINGTON), DE - HARFORD, MD
76	2	MONTGOMERY (AMSTERDAM), NY - FULTON, NY
77	4	DINWIDDIE (PETERSBURG), VA - PRINCE GEORGE, VA
78	3	LUZERNE (WILKES - BARRE), PA - COLUMBIA, PA
79	2	HENRY, VA - PATRICK, VA
80	3	ST. LAWRENCE, NY - JEFFERSON, NY
81	3	CLINTON, NY - FRANKLIN, NY
82	4	TAYLOR, KY - RUSSELL, KY
83	3	NASSAU, NY - SUFFOLK, NY
84	4	LEHIGH (ALLE), PA - NORTHAMPTON, PA
85	3	NEW HAVEN (NEW HAVEN), CT - LITCHFIELD, CT
86	3	ORANGE (NEWBURGH), NY - SULLIVAN, NY
87	2	MORRIS (PARSIPPANY - TROY HILLS TOWNSHIP), NJ - SUSSEX, NJ
88	5	SCHENECTADY (SCHENECTADY), NY - WARREN, NY
89	5	HARDIN, KY - GRAYSON, KY
90	2	CHESHIRE, NH - WINDHAM, VT
91	4	HILLSBOROUGH (MANCHESTER), NH - MERRIMACK, NH
92	6	HARRISON, WV - LEWIS, WV
93	2	WARREN (PHILLIPSBURG), NJ - HUNTERDON, NJ
94	5	NEW YORK, NY - KINGS (NEW YORK), NY
95	3	ANDROSCOGGIN (LEWISTON), ME - OXFORD, ME
96	3	BELL, KY - CLAIBORNE, TN
97	3	AUGUSTA, VA - ROCKBRIDGE, VA
98	2	YORK, ME - STRAFFORD (ROCHESTER), NH
99	10	ALBEMARLE (CHARLOTTESVILLE), VA - CULPEPER, VA
100	3	WASHINGTON, PA - FAYETTE, PA
101	2	WORCESTER (WORCESTER), MA - FRANKLIN, MA
102	2	BOURBON (PARIS), KY - NICHOLAS, KY
103	3	ORLEANS, VT - CALEDONIA, VT
104	2	CUMBERLAND, KY - CLINTON, KY
105	2	CORTLAND, NY - TOMPKINS, NY
106	3	ERIE (ERIE), PA - CHAUTAUQUA, NY
107	4	TALBOT, MD - DORCHESTER, MD
108	2	OCEAN (BRICK TOWNSHIP), NJ - MONMOUTH, NJ
109	2	PRINCE WILLIAM (DALE CITY), VA - FAUQUIER, VA
110	3	MIFFLIN, PA - HUNTINGDON, PA
112	3	BERKSHIRE (PITTSFIELD), MA - COLUMBIA, NY
114	3	FRANKLIN, KY - OWEN, KY
115	4	CALLOWAY, KY - CARROLL, TN
116	3	MASON, KY - FLEMING, KY
117	1	CRAWFORD, PA
119	2	HARRISON, KY - ROBERTSON, KY
121	1	FAIRFIELD (BRIDGEPORT), CT
122	1	RUTLAND, VT
123	1	LETCHER, KY
124	1	KENT, MD
125	1	ELK, PA
126	1	MERCER (TRENTON), NJ
127	1	CUMBERLAND (VINELAND), NJ
128	1	TIOGA, PA
129	1	LAWRENCE, PA
130	2	GREENSVILLE, VA - BRUNSWICK, VA
131	2	MONTGOMERY, KY - BATH, KY
132	2	PITTSYLVANIA (DANVILLE), VA - CASWELL, NC
135	4	SPOTSYLVANIA, VA - CAROLINE, VA
136	1	AROOSTOOK, ME
137	2	NORTHAMPTON, VA - ACCOMACK, VA
138	2	COOS, NH - ESSEX, VT
139	1	BERKS (READING), PA
140	1	LANCASTER (LANCASTER), PA
141	6	HAMILTON (CHATTANOOGA), TN - CATOOSA, GA
142	6	ORANGE (ORLANDO), FL - VOLUSIA, FL
143	9	CHATHAM (SAVANNAH), GA - BEAUFORT, SC
144	9	DOUGHERTY (ALBANY), GA - EARLY, GA
145	2	WHITFIELD, GA - MURRAY, GA
146	9	SHELBY (MEMPHIS), TN - PANOLA, MS
147	8	KNOX (KNOXVILLE), TN - BLOUNT, TN
148	7	DAVIDSON (NASHVILLE - DAVIDSON), TN - DICKSON, TN
149	5	FORSYTH (WINSTON - SALEM), NC - SURRY, NC
150	8	JEFFERSON (BIRMINGHAM), AL - WALKER, AL
151	6	SULLIVAN (KINGSPORT), TN - WASHINGTON, VA
152	12	RICHMOND (SOUTH AUGUSTA), GA - AIKEN, SC
153	9	FULTON (ATLANTA), GA - DE KALB, GA
154	5	FLOYD, GA - BARTOW, GA
155	6	BAY (PANAMA CITY), FL - JACKSON, FL

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
156	4	TUSCALOOSA (TUSCALOOSA), AL - PICKENS, AL
157	8	HALL, GA - UNION, GA
158	9	DUVAL (JACKSONVILLE), FL - GLYNN, GA
159	10	ALACHUA (GAINESVILLE), FL - COLUMBIA, FL
160	4	RICHLAND (COLUMBIA), SC - LEXINGTON, SC
161	5	MOBILE (MOBILE), AL - BALDWIN, AL
162	7	HOUSTON (DOTHAN), AL - COFFEE, AL
163	6	ESCAMBIA (PENSACOLA), FL - OKALOOSA, FL
164	8	CLARKE (ATHENS), GA - BARROW, GA
165	4	LEE (CAPE CORAL), FL - COLLIER, FL
166	9	MUSCOGEE (COLUMBUS), GA - RUSSELL, AL
167	3	MECKLENBURG (CHARLOTTE), NC - UNION, NC
168	3	NEW HANOVER (WILMINGTON), NC - BRUNSWICK, NC
169	3	WASHINGTON (JOHNSON CITY), TN - CARTER, TN
170	5	DURHAM (DURHAM), NC - VANCE, NC
171	7	MONTGOMERY (MONTGOMERY), AL - COVINGTON, AL
172	6	TROUP (LA GRANGE), GA - COWETA, GA
173	4	BRADLEY, TN - GILMER, GA
174	4	WARE, GA - BACON, GA
175	4	DALLAS, AL - MARENGO, AL
176	4	ORANGEBURG, SC - BAMBERG, SC
177	4	CALHOUN (ANNISTON), AL - CARROLL, GA
178	3	THOMAS, GA - GRADY, GA
179	4	LEE (AUBURN), AL - ELMORE, AL
180	6	LOWNDES, GA - COOK, GA
181	3	OBION, TN - WEAKLEY, TN
182	4	GREENVILLE (GREENVILLE), SC - ANDERSON, SC
183	8	LEON (TALLAHASSEE), FL - MADISON, FL
184	5	FLORENCE (FLORENCE), SC - DARLINGTON, SC
185	2	MORGAN (DECATUR), AL - LAWRENCE, AL
186	4	GUILFORD (GREENSBORO), NC - ROCKINGHAM, NC
187	5	GREENWOOD, SC - LAURENS, SC
188	8	MADISON (JACKSON), TN - GIBSON, TN
189	4	TIFT, GA - BEN HILL, GA
190	5	COBB (MARIETTA), GA - CHEROKEE, GA
191	4	SPARTANBURG (SPARTANBURG), SC - UNION, SC
192	2	IREDELL (STATESVILLE), NC - ALEXANDER, NC
193	11	BIBB (MACON), GA - HOUSTON, GA
194	3	WATAUGA, NC - ASHE, NC
195	6	PITT, NC - BEAUFORT, NC
196	3	SUMTER, SC - CLARENDON, SC
197	5	SUMTER, GA - CRISP, GA
198	4	WAKE (RALEIGH), NC - WILSON, NC
199	2	MARION, SC - DILLON, SC
200	3	DADE (MIAMI), FL - BROWARD, FL
201	3	BALDWIN, GA - PUTNAM, GA
202	3	POLK (LAKELAND), FL - HIGHLANDS, FL
203	4	ORANGE (CHAPEL HILL), NC - HARNETT, NC
204	2	SPALDING (GRIFFIN), GA - BUTTS, GA
205	4	MOORE, NC - RICHMOND, NC
206	8	LAURENS, GA - DODGE, GA
207	4	ROBESON, NC - COLUMBUS, NC
208	4	MAURY, TN - GILES, TN
209	4	MACON, NC - JACKSON, NC
210	4	MADISON (HUNTSVILLE), AL - JACKSON, AL
211	5	RUTHERFORD (MURFREESBORO), TN - WARREN, TN
212	5	CHARLESTON (CHARLESTON), SC - COLLETON, SC
213	3	SARASOTA (SARASOTA), FL - CHARLOTTE, FL
214	4	EDGECOMBE, NC - HALIFAX, NC
215	6	PUTNAM, TN - OVERTON, TN
216	3	STEPHENS, GA - FRANKLIN, GA
217	4	HAMBLEN (MORRI), TN - JEFFERSON, TN
218	4	GASTON (GASTONIA), NC - CLEVELAND, NC
219	4	LAUDERDALE (FLORENCE), AL - COLBERT, AL
220	2	NEWTON (COVINGTON), GA - JASPER, GA
221	4	PALM BEACH (WEST PALM BEACH), FL - ST. LUCIE, FL
222	4	BULLOCH, GA - EMANUEL, GA
223	3	CUMBERLAND, TN - FENTRESS, TN
224	4	ETOWAH (GADSDEN), AL - MARSHALL, AL
225	5	BUNCOMBE (ASHEVILLE), NC - HENDERSON, NC
226	5	ANDERSON (OAK RIDGE), TN - ROANE, TN
227	4	PINELLAS, FL - HILLSBOROUGH (TAMPA), FL
228	3	DECATUR, GA - SEMINOLE, GA
229	3	CATAWBA (HICKORY), NC - BURKE, NC
230	2	WAYNE, GA - APPLING, GA
231	5	SUMNER (HENDERSONVILLE), TN - WILSON, TN

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
232	3	LAWRENCE, TN - WAYNE, TN
233	2	MARION (OCALA), FL - CITRUS, FL
234	3	MONTGOMERY (CLARKSVILLE), TN - HOUSTON, TN
235	3	CABARRUS (CONCORD), NC - ROWAN, NC
236	3	COFFEE, GA - JEFF DAVIS, GA
237	2	BREVARD (PALM BAY), FL - INDIAN RIVER, FL
238	4	LENOIR, NC - WAYNE, NC
239	4	COFFEE, TN - FRANKLIN, TN
240	3	AVERY, NC - MITCHELL, NC
241	3	TALLADEGA, AL - CLAY, AL
242	5	CRAVEN, NC - CARTERET, NC
243	4	HERTFORD, NC - CHOWAN, NC
244	2	YORK (ROCK HILL), SC - CHESTER, SC
245	2	HARDIN, TN - MC NAIRY, TN
246	2	HORRY, SC - GEORGETOWN, SC
247	2	MARION, AL - FAYETTE, AL
248	3	DYER, TN - LAUDERDALE, TN
249	2	KERSHAW, SC - LANCASTER, SC
250	2	WASHINGTON, GA - JEFFERSON, GA
251	2	ST. JOHNS (ST. AUGUSTINE), FL - PUTNAM, FL
252	2	GREENE, TN - COCKE, TN
253	2	ELBERT, GA - WILKES, GA
254	1	COLQUITT, GA
256	1	WILKES, NC
257	1	OSCEOLA (KISSIMMEE), FL
258	2	CHEROKEE, NC - CLAY, NC
259	1	BUTLER, AL
260	1	BEDFORD, TN
261	1	MC DOWELL, NC
262	2	CUMBERLAND (FAYETTEVILLE), NC - SAMPSON, NC
263	1	SCOTT, TN
264	4	PASQUOTANK, NC - CAMDEN, NC
266	1	MANATEE (BRADENTON), FL
267	1	ALAMANCE (BURLINGTON), NC
268	1	RABUN, GA
269	3	UPSON, GA - LAMAR, GA
270	7	HAMILTON (CINCINNATI), OH - BUTLER, OH
271	6	GRAND TRAVERSE, MI - MANISTEE, MI
272	9	JEFFERSON (LOUISVILLE), KY - SHELBY, KY
273	6	VANDERBURGH (EVANSVILLE), IN - GIBSON, IN
274	5	WAYNE (DETROIT), MI - OAKLAND, MI
275	7	MARION (INDIANAPOLIS), IN - HENDRICKS, IN
276	5	LUCAS (TOLEDO), OH - MONROE, MI
277	5	PEORIA (PEORIA), IL - TAZEWELL, IL
278	4	BROWN (GREEN BAY), WI - DOOR, WI
279	5	CHAMPAIGN (CHAMPAIGN), IL - COLES, IL
280	4	MILWAUKEE (MILWAUKEE), WI - WAUKESHA, WI
281	5	FRANKLIN (COLUMBUS), OH - DELAWARE, OH
282	5	WOOD, WI - MARATHON (WAUSAU), WI
283	4	GALLIA, OH - MASON, WV
284	6	ONEIDA, WI - GOGEBIC, MI
285	4	INGHAM (LANSING), MI - SHIAWASSEE, MI
286	5	RAMSEY (ST. PAUL), MN - POLK, WI
287	4	COOK (CHICAGO), IL - DU PAGE, IL
288	4	CUYAHOGA (CLEVELAND), OH - LAKE, OH
289	8	ST. LOUIS (DULUTH), MN - DOUGLAS, WI
290	6	LA CROSSE (LA CROSSE), WI - MONROE, WI
291	4	WINNEBAGO (ROCKFORD), IL - LEE, IL
292	6	ALLEN (LIMA), OH - MERCER, OH
293	5	MARQUETTE, MI - DELTA, MI
294	5	EMMET, MI - CHEBOYGAN, MI
295	4	MONTGOMERY (DAYTON), OH - GREENE, OH
296	4	MUSKEGON (MUSKEGON), MI - MASON, MI
297	2	ST. CLAIR (PORT HURON), MI - SANILAC, MI
298	5	EAU CLAIRE (EAU CLAIRE), WI - CHIPPEWA, WI
299	4	MADISON (ALTON), IL - JERSEY, IL
300	5	TIPPECANOE (LAFAYETTE), IN - CLINTON, IN
301	7	DANE (MADISON), WI - SAUK, WI
302	4	DUBUQUE (DUBUQUE), IA - STEPHENSON, IL
303	2	WILL (JOLIET), IL - GRUNDY, IL
304	6	ALLEN (FORT WAYNE), IN - WHITLEY, IN
305	4	MACON (DECATUR), IL - SHELBY, IL
306	5	WINNEBAGO (OSHKOSH), WI - FOND DU LAC, WI
307	4	ROCK ISLAND (MOLINE), IL - HENRY, IL
308	4	LAKE (GARY), IN - PORTER, IN
309	5	KENT (GRAND RAPIDS, MI - MONTCALM, MI

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
310	6	KNOX, IN - DAVIESS, IN
311	6	VIGO (TERRE HAUTE), IN - SULLIVAN, IN
312	4	ST. JOSEPH (SOUTH BEND), IN - MARSHALL, IN
313	4	BARTHOLOMEW, IN - JACKSON, IN
314	2	WASHBURN, WI - BURNETT, WI
315	5	DICKINSON, MI - MARINETTE, WI
316	5	DAVIESS (OWENSBORO), KY - OHIO, KY
317	4	WEXFORD, MI - OSCEOLA, MI
318	8	SANGAMON (SPRINGFIELD), IL - MC DONOUGH, IL
319	3	MORGAN, IL - GREENE, IL
320	2	OTTAWA (HOLLAND), MI - ALLEGAN, MI
321	7	JEFFERSON (MADISON), IN - DEARBORN, IN
322	3	SAGINAW (SAGINAW), MI - HURON, MI
323	3	DELAWARE (MUNCIE), IN - RANDOLPH, IN
324	2	KNOX, IL - WARREN, IL
325	4	ST. CLAIR (BELLEVILLE), IL - RANDOLPH, IL
326	3	ROCK (JANESVILLE), WI - GREEN, WI
327	3	BERRIEN (BENTON HARBOR), MI - VAN BUREN, MI
328	2	GENESEE (FLINT), MI - LAPEER, MI
329	2	LAWRENCE, IN - ORANGE, IN
330	4	MIDLAND (MIDLAND), MI - ISABELLA, MI
331	4	WILLIAMSON, IL - JACKSON, IL
332	4	WELLS, IN - JAY, IN
333	4	VERMILION, IL - EDGAR, IL
334	2	MONTGOMERY, IL - MACOUPIN, IL
335	2	JEFFERSON, IL - WAYNE, IL
336	4	LA SALLE, IL - BUREAU, IL
337	4	SCIOTO, OH - ROSS, OH
338	3	MC LEAN (BLOOMINGTON), IL - DE WITT, IL
339	4	FLOYD (NEW ALBANY), IN - HARRISON, IN
340	3	DES MOINES, IA - HENRY, IA
341	4	MONROE (BLOOMINGTON), IN - GREENE, IN
342	5	BAY (BAY CITY), MI - OGEMAW, MI
343	2	KANKAKEE (KANKAKEE), IL - IROQUOIS, IL
344	2	OUTAGAMIE (APPLETON), WI - WAUPACA, WI
345	3	MAHONING (YOUNG), OH - MERCER, PA
346	2	CLARK (SPRINGFIELD), OH - CHAMPAIGN, OH
347	5	STARK (CANTON), OH - TUSCARAWAS, OH
348	2	KALAMAZOO (KALAMAZOO), MI - ST. JOSEPH, MI
349	2	ELKHART (ELKHART), IN - KOSCIUSKO, IN
350	3	CRAWFORD, WI - CLAYTON, IA
351	4	RICHLAND, IL - CLAY, IL
352	3	SUMMIT (AKRON), OH - MEDINA, OH
353	6	ADAMS, IL - MARION, MO
354	5	MARION, OH - CRAWFORD, OH
355	3	SHEBOYGAN (SHEBOYGAN), WI - MANITOWOC, WI
356	4	WILLIAMS, OH - DEFIANCE, OH
357	4	ASHLAND, WI - PRICE, WI
358	2	MARION, IL - WASHINGTON, IL
359	3	HOUGHTON, MI - BARAGA, MI
360	2	JEFFERSON (STEUBENVILLE), OH - HARRISON, OH
361	3	CLINTON, IA - WHITESIDE, IL
362	2	HENRY (NEW CASTLE), IN - HANCOCK, IN
363	2	EFFINGHAM, IL - FAYETTE, IL
364	3	HOWARD (KOKOMO), IN - CASS, IN
365	2	CLARK (JEFFERSONVILLE), IN - SCOTT, IN
366	4	LORAIN (LORAIN), OH - ERIE, OH
367	3	LEE, IA - HANCOCK, IL
368	4	FAIRFIELD (LANCASTER), OH - ATHENS, OH
369	2	RICHLAND (MANSFIELD), OH - ASHLAND, OH
370	3	ST. CROIX, WI - GOODHUE, MN
371	4	ALPENA, MI - PRESQUE ISLE, MI
372	2	CLINTON, OH - HIGHLAND, OH
373	3	KANE (AURORA), IL - DE KALB, IL
374	2	BARRON, WI - RUSK, WI
375	4	JACKSON (JACKSON), MI - LENAWEE, MI
376	2	MIAMI (PIQUA), OH - SHELBY, OH
377	6	MUSKINGUM, OH - GUERNSEY, OH
378	2	LA PORTE, IN - STARKE, IN
379	3	SHAWANO, WI - LANGLADE, WI
380	3	COLUMBIANA, OH - HANCOCK (WEIRTON), WV
381	2	CALHOUN (BATTLE CREEK), MI - BARRY, MI
382	2	RACINE (RACINE), WI - KENOSHA, WI
383	2	WHITE, IL - HAMILTON, IL
384	4	SALINE, IL - HARDIN, IL
385	3	WAYNE, IN - FAYETTE, IN

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
386	2	HANCOCK, OH - SENECA, OH
387	2	JEFFERSON, WI - WALWORTH, WI
388	2	LICKING (NEWARK), OH - KNOX, OH
389	3	GRANT, IN - WABASH, IN
390	2	MADISON (ANDERSON), IN - HAMILTON, IN
391	2	JUNEAU, WI - ADAMS, WI
392	3	CRAWFORD, MI - OTSEGO, MI
394	1	DUBOIS, IN
395	1	WINNESHIEK, IA
396	1	RICE, MN
398	1	LOGAN, OH
399	1	JACKSON, WI
400	1	PORTAGE, WI
401	1	BOONE (LEBANON), IN
402	1	MONTGOMERY, IN
403	7	ORLEANS (NEW ORLEANS), LA - JEFFERSON, LA
404	9	BOWIE (TEXARKANA), TX - MILLER, AR
405	15	POTTER (AMARILLO), TX - MOORE, TX
406	13	LUBBOCK (LUBBOCK), TX - LAMB, TX
407	2	BAXTER, AR - MARION, AR
408	8	HARRIS (HOUSTON), TX - MONTGOMERY, TX
409	5	FORREST, MS - COVINGTON, MS
410	12	BEXAR (SAN ANTONIO), TX - GUADALUPE, TX
411	8	HINDS (JACKSON), MS - RANKIN, MS
412	7	LAUDERDALE, MS - NEWTON, MS
413	6	JEFFERSON (BEAUMONT), TX - ORANGE, TX
414	6	TULSA (TULSA), OK - CREEK, OK
415	4	EL PASO (EL PASO), TX - CULBERSON, TX
416	7	CADDO (SHREVEPORT), LA - WEBSTER, LA
417	5	OKLAHOMA (OKLAHOMA CITY), OK - POTTAWATOMIE, OK
418	5	LEE, MS - PRENTISS, MS
419	8	EAST BATON ROUGE (BATON ROUGE), LA - ASCENSION, LA
420	8	WICHITA (WICHITA FALLS), TX - YOUNG, TX
421	8	SEBASTIAN (FORT SMITH), AR - CRAWFORD, AR
422	3	COAHOMA, MS - QUITMAN, MS
423	2	TANGIPAHOA, LA - ST. HELENA, LA
424	5	LAFAYETTE (LAFAYETTE), LA - IBERIA, LA
425	6	TRAVIS (AUSTIN), TX - WILLIAMSON, TX
426	12	TOM GREEN (SAN ANGELO), TX - MC CULLOCH, TX
427	2	HIDALGO (MCALLEN), TX - STARR, TX
428	9	TAYLOR (ABILENE), TX - JONES, TX
429	7	GARFIELD (ENID), OK - KINGFISHER, OK
430	4	CLEVELAND (NORMAN), OK - GARVIN, OK
431	3	WARREN, MS - MADISON, LA
432	9	PULASKI (LITTLE ROCK), AR - SALINE, AR
433	7	VICTORIA (VICTORIA), TX - LAVACA, TX
434	5	TARRANT (FORT WORTH), TX - JOHNSON, TX
435	5	ADAMS, MS - CONCORDIA, LA
436	4	GRAYSON (SHERMAN), TX - BRYAN, OK
437	9	NUECES (CORPUS CHRISTI), TX - SAN PATRICIO, TX
438	4	LAMAR, TX - RED RIVER, TX
439	4	LINCOLN, LA - UNION, LA
440	2	BECKHAM, OK - ROGER MILLS, OK
441	4	SMITH (TYLER), TX - HENDERSON, TX
442	2	POPE, AR - YELL, AR
443	7	OUACHITA (MONROE), LA - RICHLAND, LA
444	5	ECTOR (ODESSA), TX - WARD, TX
445	5	MUSKOGEE, OK - CHEROKEE, OK
446	4	WASHINGTON (FAYETTEVILLE), AR - BENTON, AR
447	4	NACOGDOCHES, TX - SHELBY, TX
448	5	GARLAND, AR - HOT SPRING, AR
449	4	ANGELINA, TX - WALKER, TX
450	6	RAPIDES (ALEXANDRIA), LA - LA SALLE, LA
451	5	WASHINGTON, OK - MONTGOMERY, KS
452	4	BELL (KILLEEN), TX - MILAM, TX
453	8	DALLAS (DALLAS), TX - COLLIN, TX
454	4	GREGG (LONGVIEW), TX - RUSK, TX
455	4	JONES, MS - WAYNE, MS
456	3	HARRISON (BILOXI), MS - HANCOCK, MS
457	3	WHITE, AR - CLEBURNE, AR
458	3	WILBARGER, TX - HARDEMAN, TX
459	3	LAFAYETTE, MS - CALHOUN, MS
460	4	GRAY, TX - WHEELER, TX
461	4	LOWNDES, MS - CLAY, MS
462	6	MC LENNAN (WACO), TX - HILL, TX
463	2	ST. LANDRY, LA - EVANGELINE, LA

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
464	5	BRAZOS (BRYAN), TX - WASHINGTON, TX
465	4	TITUS, TX - CAMP, TX
466	3	PITTSBURG, OK - PUSHMATAHA, OK
467	3	LAFOURCHE, LA - TERREBONNE (HOUMA), LA
468	4	BROWN, TX - COLEMAN, TX
469	5	WOODWARD, OK - ELLIS, OK
470	5	CALCASIEU (LAKE CHARLES), LA - BEAUREGARD, LA
471	2	JACKSON (PASCAGOULA), MS - GEORGE, MS
472	3	PAYNE, OK - PAWNEE, OK
473	6	JEFFERSON (PINE BLUFF), AR - BRADLEY, AR
474	4	CARTER, OK - MARSHALL, OK
475	2	CUSTER, OK - WASHITA, OK
476	2	GRADY, OK - CADDO, OK
477	4	PIKE, MS - MARION, MS
478	4	PONTOTOC, OK - SEMINOLE, OK
479	2	PALO PINTO, TX - JACK, TX
480	2	CHICOT, AR - ASHLEY, AR
481	3	HALE, TX - FLOYD, TX
482	3	UNION, MS - TIPPAH, MS
483	3	JACKSON, OK - GREER, OK
484	4	OKTIBBEHA, MS - WEBSTER, MS
485	3	HARRISON (MARSHALL), TX - CASS, TX
486	3	UNION, AR - COLUMBIA, AR
487	4	LEFLORE, MS - BOLIVAR, MS
488	3	WASHINGTON, MS - SHARKEY, MS
489	2	NAVARRO, TX - FREESTONE, TX
490	2	COLORADO, TX - FAYETTE, TX
491	2	DEAF SMITH, TX - PARMER, TX
492	5	MIDLAND (MIDLAND), TX - PECOS, TX
493	4	COMANCHE (LAWTON), OK - KIOWA, OK
494	4	BOONE, AR - CARROLL, AR
495	3	DENTON (DENTON), TX - COOKE, TX
496	2	OUACHITA, AR - DALLAS, AR
497	2	STEPHENS, OK - JEFFERSON, OK
498	2	ALCORN, MS - TISHOMINGO, MS
499	4	CRITTENDEN (WEST MEMPHIS), AR - ST. FRANCIS, AR
500	3	ST. TAMMANY (SLIDELL), LA - WASHINGTON, LA
501	2	MADISON, TX - LEON, TX
502	3	GRENADA, MS - MONTGOMERY, MS
503	3	NOLAN, TX - MITCHELL, TX
504	2	LAWRENCE, MS - JEFFERSON DAVIS, MS
505	3	BRAZORIA (LAKE JACKSON), TX - WHARTON, TX
506	7	KERR, TX - GILLESPIE, TX
507	2	ERATH, TX - COMANCHE, TX
508	3	LEA, NM - ANDREWS, TX
509	3	CHEROKEE, TX - ANDERSON, TX
510	2	HAYS (SAN MARCOS), TX - CALDWELL, TX
511	2	LINCOLN, MS - COPIAH, MS
512	3	CHILDRESS, TX - HALL, TX
513	2	BEE, TX - KARNES, TX
514	2	TERRY, TX - YOAKUM, TX
515	2	KAY (PONCA CITY), OK - OSAGE, OK
516	3	VAL VERDE, TX - MAVERICK, TX
517	1	COMAL (NEW BRAUNFELS), TX
518	2	HOWARD, TX - GLASSCOCK, TX
519	1	SCURRY, TX
520	2	CAMERON (BROWNSVILLE), TX - WILLACY, TX
521	1	JACKSON, AR
522	1	JOHNSON, AR
523	1	CLAIBORNE, LA
524	1	COLLINGSWORTH, TX
525	1	WILKINSON, MS
526	3	BREWSTER, TX - JEFF DAVIS, TX
527	2	ARKANSAS, AR - MONROE, AR
528	1	ST. MARY, LA
529	2	OKMULGEE, OK - OKFUSKEE, OK
530	1	WINN, LA
531	1	DIMMIT, TX
532	1	GALVESTON (GALVESTON), TX
533	1	YAZOO, MS
534	1	POLK, AR
535	1	BEAVER, OK
536	1	UVALDE, TX
537	1	PHILLIPS, AR
538	3	WEBB (LAREDO), TX - JIM HOGG, TX
539	5	JASPER (JOPLIN), MO - NEWTON, MO

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
540	9	HENNEPIN (MINNEAPOLIS), MN - ANOKA, MN
541	8	ST. LOUIS, MO - ST. LOUIS CITY, MO
542	9	DOUGLAS (OMAHA), NE - DODGE, NE
543	9	BURLEIGH (BISMARCK), ND - MCLEAN, ND
544	11	MINNEHAHA (SIOUX FALLS), SD - LAKE, SD
545	8	LINN (CEDAR RAPIDS), IA - JOHNSON, IA
546	11	POLK (DES MOINES), IA - MARION, IA
547	13	CASS (FARGO), ND - WILKIN, MN
548	10	JACKSON (KANSAS CITY), MO - CLAY, MO
549	15	GREENE (SPRINGFIELD), MO - BARRY, MO
550	6	WARD, ND - BOTTINEAU, ND
551	5	FORD, KS - CLARK, KS
552	8	OLMSTED (ROCHESTER), MN - WINONA, MN
553	7	BOONE (COLUMBIA), MO - RANDOLPH, MO
554	9	SHAWNEE (TOPEKA), KS - RILEY, KS
555	5	HALL, NE - HAMILTON, NE
556	6	CERRO GORDO, IA - KOSSUTH, IA
557	6	BLACK HAWK (WATERLOO), IA - FAYETTE, IA
558	6	PENNINGTON (RAPID CITY), SD - MEADE, SD
559	4	HOLT, NE - BROWN, NE
560	9	WOODBURY (SIOUX CITY), IA - BUENA VISTA, IA
561	6	LANCASTER (LINCOLN), NE - GAGE, NE
562	3	BACA, CO - GRANT, KS
563	14	CAPE GIRARDEAU, MO - BUTLER, MO
564	4	ADAMS, NE - NUCKOLLS, NE
565	6	ELLIS, KS - GRAHAM, KS
566	6	ADAIR, MO - SCOTLAND, MO
567	4	LYON, KS - GREENWOOD, KS
568	5	CODINGTON, SD - GRANT, SD
569	4	SALINE, KS - ELLSWORTH, KS
570	7	BUFFALO, NE - DAWSON, NE
571	7	CRAIGHEAD, AR - GREENE, AR
572	7	BROWN, SD - DAY, SD
573	4	BLUE EARTH, MN - WATONWAN, MN
574	8	INDEPENDENCE, AR - HOWELL, MO
575	6	FINNEY, KS - SCOTT, KS
576	6	SEDGWICK (WICHITA), KS - HARVEY, KS
577	5	MADISON, NE - ANTELOPE, NE
578	6	YANKTON, SD - BON HOMME, SD
579	3	WILLIAMS, ND - DIVIDE, ND
580	8	SCOTT BLUFF, NE - GOSHEN, WY
581	8	COLE, MO - CALLAWAY, MO
582	2	OTTER TAIL, MN - GRANT, MN
583	4	BARTON, KS - RUSH, KS
584	6	GRAND FORKS (GRAND FORKS), ND - POLK, MN
585	3	WEBSTER, IA - HUMBOLDT, IA
586	3	LAWRENCE, SD - CAMPBELL, WY
587	4	SEWARD, KS - TEXAS, OK
588	5	STEARNS (ST. CLOUD), MN - MORRISON, MN
589	6	WAPELLO, IA - MAHASKA, IA
590	3	BIG STONE, MN - ROBERTS, SD
591	8	BUCHANAN (ST. JOSEPH), MO - NODAWAY, MO
592	5	KANDIYOHI, MN - YELLOW MEDICINE, MN
593	6	LINCOLN, NE - PERKINS, NE
594	8	CUSTER, NE - VALLEY, NE
595	5	GREGORY, SD - TRIPP, SD
596	6	POTTAWATTAMIE (COUNCIL BLUFFS), IA - SHELBY, IA
597	2	BELTRAMI, MN - CLEARWATER, MN
598	3	RENO, KS - STAFFORD, KS
599	3	ST. CHARLES (ST. CHARLES), MO - LINCOLN, MO
600	4	BEADLE, SD - HAND, SD
601	4	LABETTE, KS - ALLEN, KS
602	3	BROWN, MN - REDWOOD, MN
603	3	MILLE LACS, MN - ISANTI (CAMBRIDGE), MN
604	4	PENNINGTON, MN - KITTSON, MN
605	4	STARK, ND - GOLDEN VALLEY, ND
606	5	STORY, IA - HAMILTON, IA
607	3	HENRY, MO - ST. CLAIR, MO
608	3	DOUGLAS, MN - STEVENS, MN
609	2	LYON, MN - LINCOLN, MN
610	2	BROOKINGS, SD - KINGSBURY, SD
611	2	YORK, NE - POLK, NE
612	5	CROW WING, MN - WADENA, MN
613	4	RED WILLOW, NE - DECATUR, KS
614	2	MISSISSIPPI, AR - PEMISCOT, MO
615	9	DAVISON, SD - CHARLES MIX, SD

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
616	3	PHELPS, NE - FURNAS, NE
617	2	GREENE, IA - GUTHRIE, IA
618	3	PRATT, KS - KIOWA, KS
619	4	NOBLES, MN - JACKSON, MN
621	2	WYANDOTTE (KANSAS CITY), KS - LEAVENWORTH, KS
622	3	MITCHELL, KS - OSBORNE, KS
623	5	DAWES, NE - SHERIDAN, NE
624	5	JOHNSON (OVERLAND PARK), KS - DOUGLAS, KS
625	3	CLAY, IA - DICKINSON, IA
626	2	MARTIN, MN - EMMET, IA
627	4	PHELPS, MO - DENT, MO
628	2	RICHARDSON, NE - PAWNEE, NE
629	6	HUGHES, SD - HAAKON, SD
630	3	CRAWFORD, KS - BOURBON, KS
631	2	ROSEAU, MN - LAKE OF THE WOODS, MN
632	3	STUTSMAN, ND - FOSTER, ND
633	3	CARROLL, IA - CALHOUN, IA
634	2	FLOYD, IA - CHICKASAW, IA
635	2	MARSHALL, KS - WASHINGTON, KS
636	2	RAWLINS, KS - CHEYENNE, KS
637	3	PHILLIPS, KS - SMITH, KS
638	3	PIERCE, ND - ROLETTE, ND
639	2	VERNON, MO - CEDAR, MO
640	6	ADAMS, ND - BOWMAN, ND
641	2	SCOTT (DAVENPORT), IA - MUSCATINE, IA
642	2	CLOUD, KS - REPUBLIC, KS
643	2	GREELEY, KS - WICHITA, KS
644	3	PAGE, IA - FREMONT, IA
645	2	LUCAS, IA - WAYNE, IA
646	2	FREEBORN, MN - FARIBAULT, MN
647	2	MONTGOMERY, IA - ADAMS, IA
648	5	WALWORTH, SD - POTTER, SD
649	2	APPANOOSE, IA - DAVIS, IA
650	3	DICKINSON, KS - GEARY, KS
651	3	PLATTE, NE - NANCE, NE
652	2	OBRIEN, IA - OSCEOLA, IA
654	3	CHASE, NE - DUNDY, NE
655	3	RAMSEY, ND - EDDY, ND
656	4	PETTIS, MO - SALINE, MO
657	2	LIVINGSTON, MO - CARROLL, MO
658	2	FILLMORE, NE - THAYER, NE
659	3	THOMAS, KS - SHERMAN, KS
660	2	OTOE, NE - JOHNSON, NE
661	2	HARPER, KS - KINGMAN, KS
662	1	CLAY, KS
663	1	MADISON, MO
664	1	STEVENS, KS
665	1	MITCHELL, IA
666	3	AUDRAIN, MO - MONROE, MO
667	1	RUSSELL, KS
668	1	CHERRY, NE
669	1	BARBER, KS
670	1	GRANT, ND
671	1	ATCHISON, KS
672	1	SIOUX, IA
673	1	LINN, MO
674	1	MCPHERSON, KS
675	1	WILSON, KS
676	1	TANEY, MO
678	2	ATCHISON, MO - HOLT, MO
679	2	MARSHALL, IA - TAMA, IA
680	2	DICKEY, ND - LA MOURE, ND
681	1	CRAWFORD, IA
682	1	NESS, KS
683	2	GRUNDY, MO - MERCER, MO
684	2	MCINTOSH, ND - LOGAN, ND
685	1	CAMDEN, MO
686	1	POWESHIEK, IA
687	1	NEMAHA, NE
688	11	DENVER (DENVER), CO - JEFFERSON, CO
689	8	MULTNOMAH (PORTLAND), OR - CLACKAMAS, OR
690	3	YUBA, CA - SUTTER (YUBA CITY), CA
691	8	YELLOWSTONE (BILLINGS), MT - CARBON, MT
692	7	CASCADE (GREAT FALLS), MT - GLACIER, MT
693	5	BERNALILLO (ALBUQUERQUE), NM - VALENCIA, NM
694	6	NEZ PERCE, ID - ASOTIN, WA

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
695	4	TWIN FALLS, ID - JEROME, ID
696	5	BANNOCK, ID - BINGHAM, ID
697	3	BUTTE (CHICO), CA - TEHAMA, CA
698	6	SPOKANE (SPOKANE), WA - STEVENS, WA
699	5	MARICOPA (PHOENIX), AZ - YAVAPAI, AZ
700	5	PIMA (TUCSON), AZ - COCHISE, AZ
701	10	WASHOE (RENO), NV - ORMSBY, NV
702	2	BENTON (KENNEWICK), WA - FRANKLIN, WA
703	6	UTAH (PROVO), UT - SEVIER, UT
704	4	PUEBLO (PUEBLO), CO - COLFAX, NM
705	3	MARION (SALEM), OR - YAMHILL, OR
707	8	CLARK (LAS VEGAS), NV - WASHINGTON, UT
708	6	SALT LAKE (SALT LAKE CITY), UT - UINTAH, UT
709	4	SACRAMENTO (SACRAMENTO), CA - PLACER, CA
710	3	SHASTA (REDDING), CA - MODOC, CA
711	6	MESA, CO - GARFIELD, CO
712	4	HILL, MT - PHILLIPS, MT
713	6	MISSOULA, MT - RAVALLI, MT
714	6	CUSTER, MT - FALLON, MT
715	3	CACHE, UT - FRANKLIN, ID
716	7	ADA (BOISE CITY), ID - CANYON, ID
717	4	WALLA WALLA, WA - UMATILLA, OR
718	3	FRESNO (FRESNO), CA - KINGS, CA
719	5	DESCHUTES, OR - CROOK, OR
720	3	ELKO, NV - LANDER, NV
721	3	LEWIS AND CLARK, MT - BROADWATER, MT
722	8	BONNEVILLE, ID - MADISON, ID
723	2	LOS ANGELES (LOS ANGELES), CA - ORANGE, CA
724	4	SANTA FE (SANTA FE), NM - RIO ARRIBA, NM
725	4	CURRY, NM - QUAY, NM
726	2	NATRONA (CASPER), WY - CONVERSE, WY
727	2	LINN, OR - BENTON, OR
728	2	FLATHEAD, MT - LINCOLN, MT
729	4	MALHEUR, OR - WASHINGTON, ID
730	2	CASSIA, ID - MINIDOKA, ID
731	6	ALAMOSA, CO - RIO GRANDE, CO
732	3	DONA ANA (LAS CRUCES), NM - LUNA, NM
733	2	SHERIDAN, MT - DANIELS, MT
734	5	KOOTENAI, ID - BONNER, ID
735	2	MOFFAT, CO - ROUTT, CO
736	6	KING (SEATTLE), WA - SNOHOMISH, WA
737	4	STANISLAUS (MODESTO), CA - MERCED, CA
738	3	COOS, OR - DEL NORTE, CA
739	2	YAKIMA (YAKIMA), WA - KITTITAS, WA
740	8	SAN JUAN, NM - LA PLATA, CO
741	4	LARAMIE (CHEYENNE), WY - CHEYENNE, NE
742	3	SILVER BOW, MT - DEER LODGE, MT
743	2	KLAMATH, OR - LAKE, OR
744	5	WEBER (OGDEN), UT - DAVIS, UT
745	5	OTERO, CO - PROWERS, CO
746	3	SOLANO (VALLEJO), CA - NAPA, CA
747	4	CHELAN, WA - OKANOGAN, WA
748	6	WASCO, OR - HOOD RIVER, OR
749	2	PARK, WY - BIG HORN, WY
750	3	SAN JOAQUIN (STOCKTON), CA - AMADOR, CA
751	3	SANTA CLARA (SAN JOSE), CA - MONTEREY, CA
752	3	JACKSON (MEDFORD), OR - JOSEPHINE, OR
753	2	NEVADA, CA - SIERRA, CA
754	5	EL PASO (COLORADO SPRINGS), CO - KIT CARSON, CO
755	2	IRON, UT - BEAVER, UT
756	2	PARK, MT - SWEET GRASS, MT
757	2	SAN FRANCISCO (SAN FRANCISCO), CA - SAN MATEO, CA
758	5	THURSTON (OLYMPIA), WA - LEWIS, WA
759	3	UNION, OR - BAKER, OR
760	4	WELD (GREELEY), CO - MORGAN, CO
761	6	DELTA, CO - MONTROSE, CO
763	3	LOGAN, CO - PHILLIPS, CO
764	2	SONOMA (SANTA ROSA), CA - MARIN, CA
765	2	MCKINLEY, NM - APACHE, AZ
766	2	ALAMEDA (OAKLAND), CA - CONTRA COSTA, CA
767	4	RICHLAND, MT - DAWSON, MT
768	2	SAN BERNARDINO, CA - RIVERSIDE (RIVERSIDE), CA
769	2	OTERO, NM - LINCOLN, NM
770	2	SHERIDAN, WY - JOHNSON, WY
771	3	ALBANY, WY - CARBON, WY

Health Service Areas

HSA Number	Number of counties in HSA	HSA Name
772	2	CHAVES, NM - EDDY, NM
773	2	GALLATIN, MT - MADISON, MT
774	2	SAN DIEGO (SAN DIEGO), CA - IMPERIAL, CA
775	3	TETON, WY - LINCOLN, WY
777	3	FREMONT, WY - HOT SPRINGS, WY
778	2	MEAGHER, MT - WHEATLAND, MT
779	2	ROOSEVELT, MT - VALLEY, MT
780	2	PLUMAS, CA - LASSEN, CA
781	2	SANTA BARBARA (SANTA BARBARA), CA - SAN LUIS OBISPO, CA
782	2	LANE (EUGENE), OR - DOUGLAS, OR
783	2	LINCOLN, OR - TILLAMOOK, OR
784	2	LATAH, ID - WHITMAN, WA
785	2	CLALLAM, WA - JEFFERSON, WA
786	2	CHAFFEE, CO - LAKE, CO
787	1	YUMA (YUMA), AZ
788	1	POWELL, MT
789	1	TULARE (VISALIA), CA
790	1	VENTURA (OXNARD), CA
792	1	UINTA, WY
793	3	GRANT, NM - CATRON, NM
794	1	PIERCE (TACOMA), WA
795	1	BOULDER (BOULDER), CO
796	1	LARIMER (FORT COLLINS), CO
797	1	PLATTE, WY
799	2	SWEETWATER, WY - DAGGETT, UT
800	1	HUMBOLDT, CA
801	4	SAN MIGUEL, NM - GUADALUPE, NM
802	1	SANTA CRUZ (SANTA CRUZ), CA
803	1	MOHAVE, AZ
804	1	WESTON, WY
805	1	WHITE PINE, NV
806	1	GRANT, OR
807	1	KERN (BAKERSFIELD), CA
808	2	BLAINE, ID - CAMAS, ID
809	2	CARBON, UT - EMERY, UT
810	2	FERGUS, MT - PETROLEUM, MT
811	1	MENDOCINO, CA
812	2	FREMONT, CO - CUSTER, CO
813	1	LEMHI, ID
814	1	UNION, NM
815	1	WHATCOM (BELLINGHAM), WA
816	2	INYO, CA - MONO, CA
817	3	KETCHIKAN GATEWAY, AK - WRANGELL - PETERSBURG, AK
818	4	JUNEAU, AK - SITKA, AK
819	3	FAIRBANKS NORTH STAR, AK - SOUTHEAST FAIRBANKS, AK
820	15	ANCHORAGE (ANCHORAGE), AK - KENAI PENINSULA, AK
821	3	HONOLULU (HONOLULU), HI - MAUI, HI
822	1	KAUAI, HI
823	1	HAWAII, HI
824	5	NEW YORK, NY - KINGS (NEW YORK), NY (repeat of HSA 94)

Courtesy of NCHS