



Exploring Rural and Urban Mortality Differences

Technical Notes

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*The North Dakota and NORC Rural Health Reform Policy Research Center (RHRPRC)
is a consortium that combines the resources of the University of North Dakota
Center for Rural Health and NORC Walsh Center for Rural Health Analysis.*

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The Rural Health Reform Policy Research Center

The Rural Health Reform Policy Research Center (RHRPRC), established in 2012 through a partnership between the University of North Dakota Center for Rural Health and the NORC Walsh Center for Rural Health Analysis, measures and projects the impact of health reform policies on rural and frontier communities and develops recommendations and strategies for policy makers and rural stakeholders to leverage opportunities to improve access to health care services and the health status of rural residents.

Research conducted by the RHRPRC informs policy makers and rural stakeholders to:

- Increase access to health care services
- Improve overall health status of rural residents
- Assist rural communities in securing adequate, affordable, high-quality health services

The goal of the RHRPRC is to produce high-quality, actionable rural health research and analysis to guide Federal, state, and local decision-makers through the implementation of health reform policies and provisions.

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Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

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We would like to thank our partners at the University of North Dakota Center for Rural Health, including Marilyn G. Klug, PhD, and Shawnda Schroeder, PhD.

Purpose of the Study

Exploring Rural and Urban Mortality Differences examines the impact of rurality on mortality and explores regional differences in primary and underlying causes of death. This study used a quantitative analysis approach drawing upon the data available from the National Vital Statistics System (NVSS) at CDC WONDER.

This project builds off of the recently developed *2014 Update of the Rural-Urban Chartbook* (Rural Health Reform Policy Research Center, *The Rural-Urban Chartbook*, October, 2014) which examined health status by level of rurality (five rural-urban statuses), sex, and region (four regions). Findings from the Chartbook indicate that all-cause mortality is higher in rural areas than urban areas for all age groups in most regions. Cause-specific mortality is often higher in rural counties than urban counties, with notable differences in certain regions. The *Exploring Rural and Urban Mortality Differences* study builds upon those findings and other recent publications that indicate there are persistent differences in mortality between rural and urban residents. For example, over the last decade some mortality rates, such as COPD mortality rates, have increased only for rural residents despite numerous public policy efforts to increase access to health care services in rural communities. This study explores the geographic variations of mortality.

Differences in rural-urban mortality rates have been described as a “nonmetropolitan mortality penalty.” Since the mid-1980s, when mortality rates were at par, death rates in nonmetropolitan counties have exceeded those of metropolitan counties. For example, stroke mortality rates have been higher in nonmetropolitan counties for the past 30 years. In 2013, there were 56,986 excess deaths in nonmetropolitan counties, that is, deaths that would have been avoided if the death rates for metropolitan and nonmetropolitan counties were the same. In 2005, a similar gap existed and the excess deaths were primarily attributed to deaths from heart disease, cancer, and stroke. Additionally, the proportion of those at greatest need of health care services, the elderly, is increasing in rural populations. For example, between 1998 and 2011 the percent of non-core rural elderly increased 14.4 percent (from 15.3 percent to 17.5 percent respectively) while the percent of large central urban elderly decreased 1.7 percent (from 11.6 percent to 11.8 percent respectively).

A number of risk factors contribute to high mortality rates in rural communities. Smoking rates, obesity, and physical inactivity rates are higher in nonmetropolitan counties than in metropolitan counties in most regions. High mortality rates and risk factors are a reflection of the physical and social environment in which people live and work. Some of these socio-economic determinants of health include poverty, education, rural attitudes and culture, psychosocial risk factors, and access to healthcare and public health services. Our goal is to help inform policy makers regarding the health status of rural Americans and to establish a baseline to assess the effect of the Patient Protection and Affordable Care Act on health status.

The mortality estimates generally have relatively small sampling errors, but estimates for certain population subgroups may be based on a small sample size and have relatively large sampling errors. Numbers of births and deaths from the National Vital Statistics System represent complete counts (except for births in those states where data are based on a 50 percent sample for certain years). Therefore, these data are not subject to sampling error. However, when the figures are used for analytical purposes, such as the comparison of rates over a period of time, the number of events that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances. When the number of events is small and the probability of such an event is rare, estimates may be unstable, and considerable caution must be used in interpreting the statistics.

The 2015 Edition

Exploring Rural and Urban Mortality Differences contains visual aids which displays indicators of mortality rates by age group, rural-urban status, region, and sex for populations 15 years of age and older cross-referenced to tables and statistical results. The major pieces of the 2015 effort are described below.

Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013

The 2015 Excel Workbook contains 5 tables that describe mortality rates for five different age groups: Infants (under 1 year of age), children (1-14 years of age), adolescents and young adults (15-24 years of age), working-age adults (25-64 years of age), and seniors (65 years of age or older). Data are presented on 10 leading causes of death for each age group as reported by the Centers of Disease Control and Prevention.

Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013

The Online Tool: Index for Mortality Rates is an interactive data visualization Tableau workbook that displays the mortality rate index by age group, rural-urban status, sex (only for populations 15 years of age and older), and region (Health and Human Services Regions (HHS), Appalachia, Delta). These charts compare mortality rates in subgroups to the national average. Data are presented for the top 10 leading causes of death and figures display standardized differences between urban, rural, and national death rates. Users can select filters to review specific areas of interest.

Online Tool: Mortality Rates among Persons by Cause of Death, Age, and Rural-Urban Status: United States, 2011-2013

The Online Tool: Mortality Rates among Persons is an interactive data visualization Tableau workbook that maps mortality rates by age group, rural-urban status, HHS region, and sex (only for populations 15 years of age and older). These charts compare mortality rates in the 10 HHS regions to one another based on rural-urban status. Data are presented for the top 10 leading causes of death. Users can select filters to review specific areas of interest.

Exploring Rural and Urban Mortality Differences by HHS Region

Exploring Rural and Urban Mortality Differences by HHS Region is a PowerPoint slide deck that serves as an offline and printable version of the Online Tool: Index for Mortality Rates. It contains 80 figures from the Online Tool displaying mortality rate indices by age group, rural-urban status, HHS region, and sex (only for populations 15 years of age and older). Data are presented for the top 10 leading causes of death and figures display standardized differences between urban, rural, and national death rates.

Mapping Rural and Urban Mortality Differences by HHS Region

Mapping Rural and Urban Mortality Differences by HHS Region is a PowerPoint slide deck that serves as an offline and printable version of the Online Tool: Mortality Rates among Persons. It contains 80 figures from the Online Tool mapping mortality rates by age group, rural-urban status, HHS region, and sex (only for populations 15 years of age and older). Data are presented for the top 10 leading causes of death.

Exploring Rural and Urban Mortality Differences in the Appalachian Region

Exploring Rural and Urban Mortality Differences in the Appalachian Region is a PowerPoint slide deck that serves as an offline and printable version of the Online Tool: Index for Mortality Rates in the Appalachian Region. It contains 9 figures from the Online Tool displaying mortality rate indices by age group, rural-urban status, and sex (only for populations 15 years of age and older) within the Appalachian Region. Data are presented for the top 10 leading causes of death and figures display standardized differences between urban, rural, and national death rates.

Exploring Rural and Urban Mortality Differences in the Delta Region

Exploring Rural and Urban Mortality Differences in the Delta Region is a PowerPoint slide deck that serves as an offline and printable version of the Online Tool: Index for Mortality Rates in the Delta Region. It contains 9 figures from the Online Tool displaying mortality rate indices by age group, rural-urban status, and sex (only for populations 15 years of age and older) within the Delta Region. Data are presented for the top 10 leading causes of death and figures display standardized differences between urban, rural, and national death rates.

Appendixes

Appendix I. Data Sources describes the data sources used in Exploring Rural and Urban Mortality Differences and provides references for further information about the source(s). Appendix II. Definitions and Methods is an alphabetical listing of selected terms used in Exploring Rural and Urban Mortality Differences. It also contains information on the statistical methodologies used in the report.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Technical Documentation

Data Sources

Data for the Exploring Rural and Urban Mortality Differences presentations, data tables, and web-based tools come from several data systems and cover three years of data. Detailed descriptions of the data sources included are provided in Appendix I. Additional information clarifying and qualifying the data are included in the table notes and in Appendix II Definitions and Methods.

Data Presentation

Many measures in the presentations, Excel spreadsheet tables, and online tools are shown for people in specific age groups and by sex because of the strong effect of age and sex on most health outcomes. Some estimates are age-adjusted using the age distribution of the 2000 standard population. Where this has been done, it is noted in the data tables that accompany the charts. Age-adjusted rates are computed to eliminate differences in observed rates that result from age differences in population composition (see definition for Age Adjustment in Appendix II). Data years are combined to increase sample size and the reliability of the estimates. Some charts present region-specific mortality rates while others focus on the mortality rate compared to national rates among population subgroups for the same time point. Point estimates and standard errors are available in the Excel spreadsheet tables. Estimates for up to 10 causes of death are shown. Missing rural-urban status or fewer than 10 causes of death indicate suppressed or unreliable estimates.

Statistical Testing

Data comparisons can be described in many ways. Within the Excel Workbook Tables age 15 years and older comparisons to national rates present statistically significant changes between the regional, sex, and rural-urban status and the national sex are assessed at the 0.05 level using two-sided significance tests (z-tests). Terms such as “similar” or “no difference” used in the text indicate that the statistics being compared were not significantly different. Lack of comment regarding the difference between statistics does not necessarily suggest that the difference was tested and found to be not significant. Because statistically significant differences are partly a function of sample size (the larger the sample, the smaller the change that can be detected), they do not necessarily have public health significance. Testing and comparisons use the estimates and standard errors in the trend and data tables, not the rounded estimates shown in the maps or charts.

Numbers of deaths obtained from the National Vital Statistics System represent complete counts and therefore are not subject to sampling error. They are, however, subject to random variation, which means that the number of events that actually occur in a given year may be considered as one of a large series of possible results that could have arisen under the same circumstances. When the number of events is small and the probability of such an event is small, considerable caution must be observed in interpreting the conditions described by the charts. Estimates that are unreliable or suppressed because of small numbers of events have been excluded from maps and charts and have been noted with an asterisk in the data tables. The criteria used to designate or suppress unreliable estimates are indicated in the notes to the applicable tables or charts.

Standard errors for all data sets were provided directly by those programs.

Limitations and Considerations

Although mortality rates are based on a census of all death certificates, certain limitations must be kept in mind.

Suppressed and Unreliable Rates. First, sub-national (e.g. rural-urban level) data representing fewer than 10 deaths are suppressed (See Assurance of Confidentiality in the Appendix for more information) and unreliable rates have been omitted for continuity so as to not mislead the reader (death count less than 20). Note that use of the data implies consent or agreement to abide by the policies. Suppressed and unreliable rates are not shown on visuals and graphs for confidentiality and reliability reasons. By using this data you agree to not present or publish

death or birth counts of 9 or fewer or rates based on counts of nine or fewer (in figures, graphs, maps, table, etc.). Since there are fewer deaths for individuals under the age of 25, more suppressed and unreliable rates exist thus limiting the findings for all but the top causes of death.

Regional Mortality Rates. States are combined into regions to increase sample size and the reliability of the estimates and thus do not represent a single state's estimate of mortality rates. See Appendix I. Data Sources for information on the data source and links to data tools if state rates are of interest.

Combined Three-Year Estimates. Data years are combined to increase sample size and the reliability of the estimates and thus do not represent a single year estimate of mortality rates.

Consistency. The process for filling out death certificates are state-specific, allowing for a degree of variability between states. Additionally, although a standard process exists to determine an individual's causes of death, interpretation of the standards may differ by physician, points in time, between states, and/or within the same state. In addition, identification of multiple cause-of-death has select limitations. For more information see the Multiple Cause-of-Death File in Appendix I.

Comparisons to the National Rate. An index comparing a subpopulation to the national mortality rate is provided in both the 1) Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013, and 2) all presentations except Mapping Rural and Urban Mortality Differences by HHS Region. Although large differences may be present between the national mortality rate (index = 100) and the subpopulation mortality rate, presentation of the index does not imply that the rates are statistically significant. Please see Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete details on statistical comparisons provided through data tables.

Graphical Displays. In addition to suppressed and unreliable rates being excluded, some available data points may also appear missing. Within the index graphs, if two or more data points are equal for a select cause-of-death, region, age group, and sex then only the most urban data point will display.

Rural-Urban Status. Although rural-urban status classification is county specific, lower levels of geography may provide a more accurate reflection of the level of rurality. It has long been recognized that, because of its geographic size, a metropolitan county often includes territory not functionally integrated with a specific urban core. This is especially true for large counties, which often contain many small cities and sparsely-populated territories located at a considerable distance from the primary urban core. Second, classifying territory in the United States by county unit is complicated by the fact that counties differ by region and state. In general, the more western the state, the more territory its counties encompass. The need for a classification system that uses subcounty building blocks has become increasingly important as U.S. settlement patterns have become more complex: large urban cores dominate increasingly large areas that surround them; employment and residential nodes have grown in suburban areas; and, commuting between more rural territories, suburban nodes, and urban cores has increased. While subcounty units, such as Rural-Urban Commuting Area (RUCA) codes based on census tracts, would provide greater precision when classifying areas, few health data systems report subcounty-level data at the time of publication.

Details by Product

Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013

Data includes ten causes of death. The causes of death represent the top 10 causes of death for that particular age group. See definition for Cause-of-Death Rankings in Appendix II.

Table 1. Quick Reference of Reported Data

Age Group	Sex	Rural-Urban Status
Under 1 Year	Grouped	2 categories: Urban, Rural

1 to 14 Years	Grouped	2 categories: Urban, Rural
15 to 24 Years	Separated: Male, Female	2 categories: Urban, Rural
25 to 64 Years	Separated: Male, Female	5 categories: Large Central, Large Fringe, Medium/Small Metro, Micropolitan, Non-core
65+ Years	Separated: Male, Female	5 categories: Large Central, Large Fringe, Medium/Small Metro, Micropolitan, Non-core

Table 2. Rural-Urban Status Definitions

2013 NCHS Urban-Rural Classification	Definition
Large Central	Counties in MSA of 1 million or more population that contain the entire population of the largest principal city of the MSA; are completely contained in the largest principal city of the MSA; or contain at least 250,000 residents of any principal city of the MSA
Large Fringe	Counties in MSAs with a population of at least 1 million residents
Medium/Small Metro	Counties in MSAs with a population of less than 1 million residents
Micropolitan	Counties with populations of 10,000 to 49,999 residents
Non-core	Remaining nonmetropolitan counties that are not in a micropolitan statistical area

Under 1 Year

SOURCE: CDC/NCHS, National Vital Statistics System, public-use Multiple Linked Birth/Infant Death File. Available from: <http://wonder.cdc.gov/>. See National Vital Statistics System (NVSS) in Appendix I.

Years included: 2011, 2012, 2013. See Technical Notes for more information.

Grouped by: UCD - ICD-10 113 Cause List, 2013 Urbanization (Urban and Rural). See definitions for Cause-of-Death, Cause-of-Death Ranking, and Rural-Urban Status in Appendix II for more information.

Show zero values: True.

Show suppressed: True. See Suppression in Appendix II for more information.

Standard population: 2000 U.S. Std. Population.

Calculate rates per: 100,000 population. See Rate in Appendix II for more information.

Age adjusted: True. See Age Adjustment in Appendix II for more information.

Show unreliable rate: False. See Unreliable Rate in Appendix II for more information.

See Rate in Appendix II for more information on calculations.

1 to 14 Years

SOURCE: CDC/NCHS, National Vital Statistics System, public-use Multiple Cause-of-Death Files. Available from: <http://wonder.cdc.gov/>. See National Vital Statistics System (NVSS) in Appendix I.

Years included: 2011, 2012, 2013. See Technical Notes for more information.

Grouped by: UCD - ICD-10 113 Cause List, 2013 Urbanization (Urban and Rural). See Cause-of-Death, Cause-of-Death Ranking, and Rural-Urban Status in Appendix II for more information.

Show zero values: True.

Show suppressed: True. See Suppression in Appendix II for more information.

Standard population: 2000 U.S. Std. Population

Calculate rates per: 100,000 population. See Rate in Appendix II for more information.

Age adjusted: True. See Age Adjustment in Appendix II for more information.

Show unreliable rate: False. See Unreliable Rate in Appendix II for more information.

15 to 24 Years

SOURCE: CDC/NCHS, National Vital Statistics System, public-use Multiple Cause-of-Death Files. Available from: <http://wonder.cdc.gov/>. See National Vital Statistics System (NVSS) in Appendix I.

Years included: 2011, 2012, 2013. See Technical Notes for more information.

Grouped by: UCD - ICD-10 113 Cause List, Gender, 2013 Urbanization (Urban and Rural). See Cause-of-Death, Cause-of-Death Ranking, and Rural-Urban Status in Appendix II for more information.

Show zero values: True.

Show suppressed: True. See Suppression in Appendix II for more information.

Standard population: 2000 U.S. Std. Population

Calculate rates per: 100,000 population. See Rate in Appendix II for more information.

Age adjusted: True. See Age Adjustment in Appendix II for more information.

Show unreliable rate: False. See Unreliable Rate in Appendix II for more information.

25 to 64 Years and 65 Years and Older

SOURCE: CDC/NCHS, National Vital Statistics System, public-use Multiple Cause-of-Death Files. Available from: <http://wonder.cdc.gov/>. See National Vital Statistics System (NVSS) in Appendix I.

Years included: 2011, 2012, 2013. See Technical Notes for more information.

Grouped by: UCD - ICD-10 113 Cause List, Gender, 2013 Urbanization (Large Central, Large Fringe, Medium/Small Metro, Micropolitan, and Non-core). See Cause-of-Death, Cause-of-Death Ranking, and Rural-Urban Status in Appendix II for more information.

Show zero values: True

Show suppressed: True. See Suppression in Appendix II for more information.

Standard population: 2000 U.S. Std. Population.

Calculate rates per: 100,000 population. See Rate in Appendix II for more information.

Age adjusted: True. See Age Adjustment in Appendix II for more information.

Show unreliable rate: False. See Unreliable Rate in Appendix II for more information.

Shading: Rows corresponding to Males are green and rows corresponding to females are orange. National rows are the darkest shade. The lightest shades correspond to urban counties while a darker hue corresponds to rural counties.

Statistical tests were performed by region, rural-urban status, and compared against the national rate for that age group and sex. See Technical Notes for more information.

Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013

All graphs were created using Tableau Software Version 9.0. For more information see: <http://www.tableau.com/>.

Top 10 Causes of Death

See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for information on the underlying mortality rates.

See Mortality Index in Appendix II for more information on index calculations.

Up to 10 causes of death are presented for each age, sex, and region grouping. See Cause-of-Death and Cause-of-Death Ranking in Appendix II for more information.

Graphs analyzed by sex are only available for age groups 15-24 years, 25-64 years, and 65 years and older. If an unavailable sex is selected then the graph will not display. For more information see Quick Reference to Reported Data for a complete list of available groupings.

Graphs are available by region including 10 HHS regions as well as the Appalachian region and Delta region. Please see Geographic Region, Appalachian Region, and/or Delta Region in Appendix II for more information.

Suppressed and unreliable rates are not shown within each graph. Suppressed data points occur when there are fewer than 10 deaths within that population sub-group (age, sex, rural-urban status, region). Since the mortality rate for individuals under the age of 25 years is lower than for those over the age of 25 years, more suppressed and unreliable rates exist thus limiting the visuals for almost all but the top causes of death for a specific region. A graph with fewer than 10 causes of death indicates that all points are suppressed for the missing cause(s).

Some available data points may not be visible on the graphs. If two or more data points are equal for a select cause-of-death, region, age group, and sex then only the most urban data point will display. For the hierarchy of urban to rural classifications see Rural-Urban Status in Appendix II. See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete mortality rates.

Although large differences may be present between the national mortality rate (index = 100) and the subpopulation mortality rate (if index is not equal to 100), presentation of the index does not imply that the rates are statistically significant. Please see Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete details on statistical comparisons provided through data tables.

Single Cause of Death

See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for more information on mortality rates.

See Mortality Index in Appendix II for more information on index calculations.

Up to 10 causes of death are presented for each age, sex, and region grouping. See Cause-of-Death and Cause-of-Death Ranking in Appendix II for more information.

Graphs analyzed by sex are only available for age groups 15-24 years, 25-64 years, and 65 years and older. If an unavailable sex is selected then the graph will not display. For more information see Quick Reference to Reported Data for a complete list of available groupings.

Graphs are available by region including 10 HHS regions as well as the Appalachian region and Delta region. Please see Geographic Region, Appalachian Region, and/or Delta Region in Appendix II for more information.

Suppressed and unreliable rates are not shown within each graph. Suppressed data points occur when there are fewer than 10 deaths within that population sub-group (age, sex, rural-urban status, region). When data is suppressed for a given age, sex, rural-urban status, and region combination, a message will appear in the key to indicate that the data is suppressed. Since the mortality rate for individuals under the age of 25 is lower than for

those over the age of 25, more suppressed and unreliable rates exist thus limiting the visuals for almost all but the top causes of death for a specific region.

Some available data points may not be visible. If two or more data points are equal for a select cause-of-death, region, age group, and sex then only the most urban data point will display. For the hierarchy of urban to rural classifications see Rural-Urban Status in Appendix II. See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete mortality rates.

Although large differences may be present between the national mortality rate (index = 100) and the subpopulation mortality rate (if index is not equal to 100), presentation of the index does not imply that the rates are statistically significant. Please see Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete details on statistical comparisons provided through data tables.

Online Tool: Mortality Rates among Persons by Cause of Death, Age, and Rural-Urban Status: United States, 2011-2013

All maps were created using Tableau Software Version 9.0. For more information see: <http://www.tableau.com/>.

0-24 Years

See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for information on the underlying mortality rates.

Shading and color variations are defined for each age, sex, and cause-of-death (e.g. one legend for one screenshot). Thus a similar shade or color across age groups, sex, or causes-of-death does not imply a similar mortality rate. Light to dark colors represent lower to higher mortality rates respectively within each grouping. The color groups were created using Tableau's Stepped Color option. "The stepped color option groups the values into uniform bins each given a unique color. Use the text box to specify how many bins you want to use. For example, if you had a range of values from 0 to 100 and you select 5 steps, the color range would be broken up every 20 units. That means that all points between 0 and 20 would be colored the same, all points between 21 and 40 would be colored the same and so on. The dialog box below shows the color range broken up into five steps... When the number of steps is odd, the center mark is placed in the middle of the center step. When the number of steps is even, the center mark is placed at the boundary of the center-most two steps." (Source: http://onlinehelp.tableau.com/current/pro/online/mac/en-us/viewparts_marks_markproperties_color.html, accessed on 7/10/2015).

Maps are available for up to 10 causes of death for each age, sex, and region grouping. See Cause-of-Death and Cause-of-Death Ranking in Appendix II for more information.

Maps are available for two rural-urban classifications. See Rural-Urban Status in Appendix II for more information.

Maps are only available for sex groupings available. If an unavailable sex is selected then the map will not display. For more information see Quick Reference to Reported Data for a complete list of available groupings.

Mortality rates are calculated by 10 HHS regions. HHS regions are noted by a number on each state. Please see Geographic Region in Appendix II for more information.

Suppressed and unreliable rates are not shown within each map and display as a grey area. Since the mortality rate for individuals under the age of 25 is lower than for those over the age of 25, more suppressed and unreliable rates exist thus limiting the visuals for all but the top causes of death.

Although large differences may be present between one HHS region's mortality rate and another region's mortality rate, presentation of shade or color variations does not imply that the differences in rates are statistically significant. Comparisons across regions were not performed for this project.

≥ 25 years

See Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for information on the underlying mortality rates.

Shading and color variations are defined for each age, sex, and cause-of-death (e.g. one legend for one screenshot). Thus a similar shade or color across age groups, sex, or causes-of-death does not imply a similar mortality rate. Light to dark colors represent lower to higher mortality rates respectively within each grouping. The color groups were created using Tableau's Stepped Color option. "The stepped color option groups the values into uniform bins each given a unique color. Use the text box to specify how many bins you want to use. For example, if you had a range of values from 0 to 100 and you select 5 steps, the color range would be broken up every 20 units. That means that all points between 0 and 20 would be colored the same, all points between 21 and 40 would be colored the same and so on. The dialog box below shows the color range broken up into five steps... When the number of steps is odd, the center mark is placed in the middle of the center step. When the number of steps is even, the center mark is placed at the boundary of the center-most two steps." (Source: http://onlinehelp.tableau.com/current/pro/online/mac/en-us/viewparts_marks_markproperties_color.html, accessed on 7/10/2015).

Maps are available for up to 10 causes of death for each age, sex, and region grouping. See Cause-of-Death and Cause-of-Death Ranking in Appendix II for more information.

Maps are available for five rural-urban classifications. See Rural-Urban Classification in Appendix II for more information.

Maps are only available for sex groupings available. If an unavailable sex is selected then the map will not display. For more information see Quick Reference to Reported Data for a complete list of available groupings.

Mortality rates are calculated by 10 HHS regions. HHS regions are noted by a number on each state. Please see Geographic Region in Appendix II for more information.

Suppressed and unreliable rates are not shown within each map and display as a grey area. Since the mortality rate for individuals under the age of 25 is lower than for those over the age of 25, more suppressed and unreliable rates exist thus limiting the visuals for all but the top causes of death.

Although large differences may be present between one HHS region's mortality rate and another region's mortality rate, presentation of shade or color variations does not imply that the differences in rates are statistically significant. Comparisons across regions were not performed for this project.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Exploring Rural and Urban Mortality Differences by HHS Region

Figure 1

Figure 1 was acquired from the homepage for the HHS Regional Offices website, which can be found at <http://www.hhs.gov/iea/regional/index.html>. The content was created by Intergovernmental/External Affairs. The contents of the webpage were last reviewed on April 15, 2014.

Figures 2 – 81

Figures 2 through 81 were based on screenshots of the Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013.

Screenshots were taken the week of 7/13/2015 – 7/17/2015. For more information see Online Tool: Index for Mortality Rates.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Mapping Rural and Urban Mortality Differences by HHS Region

Figure 1

Figure 1 was acquired from the homepage for the HHS Regional Offices website, which can be found at <http://www.hhs.gov/iea/regional/index.html>. The content was created by Intergovernmental/External Affairs. The contents of the webpage were last reviewed on April 15, 2014.

For more information see Geographic Region in Appendix II.

Figures 2 – 80

Figures 2 through 81 were based on screenshots of the Online Tool: Mortality Rates among Persons by Cause of Death, Age, and Rural-Urban Status: United States, 2011-2013. Screenshots were taken the week of 8/17/2015 – 8/21/2015. For more information see Online Tool: Mortality Rates.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Exploring Rural and Urban Mortality Differences in the Appalachian Region

Figure 1

Figure one was created with Tableau Software Version 9.0 (<http://www.tableau.com/>) using Appalachian Region's counties acquired from the Appalachian Regional Commission (<http://www.arc.gov/>) and the 2013 Rural-Urban Classification acquired from the National Center for Health Statistics (NCHS) (http://www.cdc.gov/nchs/data_access/urban_rural.htm).

For more information see Appalachian Region and Rural-Urban Status in Appendix II.

Figures 2 – 9

Figures 2 through 9 were based on screenshots of the Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013. Screenshots were taken the week of 7/13/2015 – 7/17/2015. For more information see Online Tool: Index for Mortality Rates.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Exploring Rural and Urban Mortality Differences in the Delta Region

Figure 1

Figure one was created with Tableau Software Version 9.0 (<http://www.tableau.com/>) using Delta Region's counties acquired from the Delta Regional Authority (<http://dra.gov/>) and the 2013 Rural-Urban Classification acquired from the National Center for Health Statistics (NCHS) (http://www.cdc.gov/nchs/data_access/urban_rural.htm).

For more information see Delta Region and Rural-Urban Status in Appendix II.

Figures 2 – 9

Figures 2 through 9 were based on screenshots of the Online Tool: Index for Mortality Rates by Cause Related to the National Rate among Persons by Age, Region, and Rural-Urban Status: United States, 2011-2013. Screenshots were taken the week of 7/13/2015 – 7/17/2015. For more information see Online Tool: Index for Mortality Rates.

Electronic Access

The *Exploring Rural and Urban Mortality Differences* may be accessed from the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org/>.

Each of the individual data tables are available in an Excel file that can be accessed through the Rural Health Research Gateway website at <http://www.ruralhealthresearch.org> and the Rural Health Reform Policy Research Center website at <http://ruralhealth.und.edu/projects/health-reform-policy-research-center>.

Appendix

Appendix I: Data Sources

National Vital Statistics System (NVSS)

CDC/NCHS

Overview. NVSS collects and publishes official national statistics on births, deaths, fetal deaths, and (prior to 1996) marriages and divorces occurring in the United States, based on U.S. Standard Certificates. Fetal deaths are classified and tabulated separately from other deaths. The vital statistics files—Birth, Mortality, Multiple Cause-of-Death, and Linked Birth/Infant Death—are described in detail below.

Data Years. The death registration area for 1900 consisted of 10 states, D.C., and a number of cities located in nonregistration states. It covered 40 percent of the continental U.S. population. The birth registration area was established in 1915 with 10 states and D.C. The birth and death registration areas continued to expand until 1933, when they included all 48 states. D.C., Alaska, and Hawaii were added to both registration areas in 1959 and 1960, respectively—the years in which they gained statehood.

Coverage. NVSS collects and presents U.S. resident data for the aggregate of 50 states, New York City, and D.C., as well as for each individual state and D.C. and the U.S. dependent areas of Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas. Vital events occurring in the United States to non-U.S. residents, and vital events occurring abroad to U.S. residents, are excluded. Starting with Health, United States, 2013, information on vital events for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas is shown in selected tables that show data by state, but are not included in HHS or U.S. totals.

Methodology. NCHS' Division of Vital Statistics obtains information on births and deaths from the registration offices of each of the 50 states, New York City, D.C., Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas. Until 1972, microfilm copies of all death certificates and a 50 percent sample of birth certificates were received from all registration areas and processed by NCHS. In 1972, some states began sending their data to NCHS through the Cooperative Health Statistics System (CHSS). States that participated in the CHSS program processed 100 percent of their death and birth records and sent the entire data file to NCHS on computer tapes. Currently, data are sent to NCHS through the Vital Statistics Cooperative Program (VSCP), following the same procedures as with CHSS. The number of participating states grew from 6 in 1972 to 46 in 1984. Starting in 1985, all 50 states and D.C. participated in VSCP.

U.S. Standard Certificates. U.S. Standard Certificates of Live Birth and Death and Fetal Death Reports are revised periodically, allowing evaluation and addition, modification, and deletion of items. Beginning with 1989, revised Standard Certificates replaced the 1978 versions. The 1989 revision of the birth certificate included items to identify the Hispanic parentage of newborns and to expand information about maternal and infant health characteristics. The 1989 revision of the death certificate included items on educational attainment and Hispanic origin of decedents, as well as changes to improve the medical certification of cause of death. Standard Certificates recommended by NCHS are modified in each registration area to serve the area's needs. However, most certificates conform closely in content and arrangement to the Standard Certificate, and all certificates contain a minimum data set specified by NCHS. The 2003 revision of vital records went into effect in some states and territories beginning in 2003, but full implementation in all states and territories will be phased in over several years.

Birth File

Overview. Vital statistics natality data are a fundamental source of information on all births occurring in the United States. This is one of the few sources of comparable health-related data for small geographic areas.

Selected Content. The Birth file is used to calculate infant mortality rates. The file includes characteristics of the baby, such as sex, birthweight, and weeks of gestation; demographic information about the parents, such as age, race, Hispanic origin, parity, educational attainment, marital status, and state of residence; medical and health information, such as prenatal care, based on hospital records; and behavioral risk factors for the birth, such as mother's tobacco use during pregnancy.

Data Years. The birth registration area began in 1915 with 10 states and D.C.

Coverage. Birth data presented in Health, United States are based on reporting from all 50 states and D.C. Data for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas are not included in HHS regions and U.S. totals. Beginning with 1970, the data excludes births to nonresidents of the United States.

Methodology. In the United States, state laws require birth certificates to be completed for all births. The registration of births is the responsibility of the professional attendant at birth, generally a physician or midwife. The birth certificate must be filed with the local registrar of the district in which the birth occurs. Each birth must be reported promptly; the reporting requirements vary from state to state, ranging from 24 hours to as much as 10 days after the birth.

Federal law mandates national collection and publication of birth and other vital statistics data. NVSS is the result of cooperation between NCHS and the states to provide access to statistical information from birth certificates. Standard forms for the collection of the data, and model procedures for the uniform registration of the events, are developed and recommended for state use through cooperative activities of the states and NCHS. NCHS shares the costs incurred by the states in providing vital statistics data for national use.

Issues Affecting Interpretation. Data on mother's educational attainment, tobacco use during pregnancy, and prenatal care based on the 2003 revision of the U.S. Standard Certificate of Live Birth are not comparable with data based on the 1989 revision of the U.S. Standard Certificate of Live Birth. Two-thirds (66 percent) of all births in 2009, 76 percent in 2010, 83 percent in 2011, and 86 percent in 2012 were reported using the 2003 revision. Interpretation of trend data should take into consideration changes to reporting areas. For methodological and reporting area changes for the following birth certificate items, see Age, Cigarette Smoking, Education, Hispanic Origin, Marital Status, Prenatal Care, and Race in Appendix II.

For More Information. See the Birth Data website at: <http://www.cdc.gov/nchs/births.htm>.

Mortality File

Overview. Vital statistics mortality data are a fundamental source of demographic, geographic, and cause-of-death information. This data set is one of the few sources of comparable health-related data for small geographic areas over an extended time period. The data are used to present the characteristics of those dying in the United States, to determine life expectancy, and to compare mortality trends with those in other countries.

Selected Content. The Mortality file includes demographic information on age, sex, race, Hispanic origin, state of residence, and educational attainment, as well as medical information on cause of death.

Data Years. The death registration began in 1900 with 10 states and D.C.

Coverage. Mortality data presented in Health, United States are based on reporting from all 50 states and D.C. Data for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas are shown in selected state tables, but are not included in U.S. totals. Beginning with 1970, mortality statistics for the U.S. exclude deaths of nonresidents of the U.S. Mortality statistics for Puerto Rico, Virgin Islands, American Samoa, and Northern Marianas excluded deaths of nonresidents for each area. For Guam, mortality statistics exclude deaths that occurred to a resident of any place other than Guam or the U.S. (50 states and D.C.).

Methodology. By law, the registration of deaths is the responsibility of the funeral director. The funeral director obtains demographic data for the death certificate from an informant. The physician in attendance at the death is required to certify the cause of death. When the cause of death is not from natural causes, a coroner or medical examiner may be required to examine the body and certify the cause of death. Data for the entire United States refer to events occurring within the United States; data for geographic areas are by place of residence. For methodological and reporting area changes for the following death certificate items, see Hispanic Origin, and Race in Appendix II.

Issues Affecting Interpretation. The International Classification of Diseases (ICD), by which cause of death is coded and classified, is revised approximately every 10–20 years. Because revisions of the ICD may cause discontinuities in trend data by cause of death, comparison of death rates by cause of death across ICD revisions should be done with caution and with reference to the comparability ratio. (See Comparability Ratio in Appendix

II). Prior to 1999, modifications to the ICD were made only when a new revision of the ICD was implemented. A process for updating the ICD was introduced with the 10th revision (ICD–10) that allows for mid-revision changes. These changes, however, may affect comparability of data between years for select causes of death. Minor changes may be implemented every year, whereas major changes may be implemented every 3 years (e.g., 2003 data year). In data year 2006, major changes were implemented, including the addition and deletion of several ICD codes. For more information, see Heron et al. (2009).

The death certificate has been revised periodically. A revised U.S. Standard Certificate of Death was recommended for state use beginning January 1, 1989. Among the changes were the addition of a new item on educational attainment and Hispanic origin of the decedent, and changes to improve the medical certification of cause of death. The U.S. Standard Certificate of Death was revised again in 2003; states are adopting this new certificate on a rolling basis.

The 2003 revision included significant changes in the way information on educational attainment and race is collected and coded. The educational attainment item was changed to be consistent with U.S. Census Bureau data and to improve the ability to identify specific types of educational degrees. Educational attainment data collected using the 2003 revision are not comparable with data collected using the 1989 revision. The 2003 revision also permits reporting of more than one race (multiple races). This change was implemented to reflect the increasing diversity of the U.S. population and to be consistent with the decennial census. Some states, however, are still using the 1989 revision of the U.S. Standard Certificate of Death, which allows only a single race to be reported. Until all states adopt the new death certificate, the race data reported using the 2003 revision are “bridged” for those for whom more than one race was reported (multiple race) to one single race, to provide comparability with race data reported on the 1989 revision. For more information on the impact of the 2003 certificate revisions on mortality data presented in Health, United States, see Race in Appendix II.

For More Information. See the Mortality Data website at: <http://www.cdc.gov/nchs/deaths.htm>.

Multiple Cause-of-Death File

Overview. Multiple cause-of-death data reflect all medical information reported on death certificates and complement traditional underlying cause-of-death data. Multiple-cause data give information on diseases that are a factor in death, whether or not they are the underlying cause of death, on associations among diseases, and on injuries leading to death.

Selected Content. In addition to the same demographic variables listed for the Mortality file, the Multiple Cause-of-Death file includes record axis and entity axis cause-of-death data (see Methodology, below).

Data Years. Multiple cause-of-death data files are available for every data year since 1968.

Methodology. NCHS is responsible for compiling and publishing annual national statistics on causes of death. In carrying out this responsibility, NCHS adheres to the World Health Organization (WHO) Nomenclature Regulations. These regulations require that: (a) cause of death be coded in accordance with the applicable revision of the International Classification of Diseases (ICD) [see International Classification of Diseases (ICD) in Appendix II]; and (b) that underlying cause of death be selected in accordance with international rules. Traditionally, national mortality statistics have been based on a count of deaths, with one underlying cause assigned for each death.

Prior to 1968, mortality medical data were based on manual coding of an underlying cause of death for each certificate, in accordance with WHO rules. Starting with 1968, NCHS converted to computerized coding of the underlying cause and manual coding of all causes (multiple causes) on the death certificate. In this system, called Automated Classification of Medical Entities (ACME), multiple cause codes serve as inputs to the computer software, which employs WHO rules to select the underlying cause. ACME is used to select the underlying cause of death for all death certificates in the United States, and cause-of-death data in Health, United States are coded using ACME. In addition, NCHS has developed two computer systems as inputs to ACME. Beginning with 1990 data, the Mortality Medical Indexing, Classification, and Retrieval system (MICAR) was introduced to automate coding multiple causes of death. MICAR provides more detailed information on the conditions reported on death certificates than is available through the ICD code structure. Then, beginning with data year 1993, Super MICAR, an enhancement of MICAR, was introduced. Super MICAR allows for literal entry of the multiple cause-of-death text as reported by the certifier. This information is then processed automatically by the MICAR and ACME computer systems. Records that cannot be processed automatically by MICAR or Super MICAR are multiple-

cause-coded manually and then further processed through ACME. Starting in 2003, Super MICAR was used to process all of the Nation's death records.

Issues Affecting Interpretation. The ICD, by which cause of death is coded and classified, is revised approximately every 10 to 15 years. Revisions of the ICD may cause discontinuities in trend data by cause of death; therefore, comparison of death rates by cause of death across ICD revisions should be done with caution and with reference to the comparability ratio. (See Comparability Ratio in Appendix II). Multiple-cause data were obtained from all certificates for 2011–2013.

Accessed: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2013 on CDC WONDER Online Database, released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at <http://wonder.cdc.gov/mcd-icd10.html> from February 2015 to July 2015.

For More Information. See the Mortality Multiple Cause data file website at: http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm and the CDC WONDER website at: <http://wonder.cdc.gov/>.

Linked Birth/Infant Death File

Overview. National linked files of live births and infant deaths are used for research on infant mortality.

Selected Content. The Linked Birth/Infant Death data set links information from the birth certificate to information from the death certificate for each infant death in the United States. The purpose of the linkage is to use the many additional variables from the birth certificate, including the more accurate race and ethnicity data, for more detailed analyses of infant mortality patterns. The Linked Birth/Infant Death data set includes all variables on the natality (Birth) file, including racial and ethnic information, birthweight, and maternal smoking, as well as variables in the Mortality file, including cause of death and age at death.

Data Years. National linked files of live births and infant deaths were first produced for the 1983 birth cohort. Birth cohort linked file data are available for 1983–1991, and both period linked files and birth cohort linked files are available starting with 1995. National linked files do not exist for 1992–1994.

Coverage. To be included in the U.S. linked file, both the birth and death must have occurred in the 50 states, D.C., Puerto Rico, Virgin Islands, and Guam. Data for Puerto Rico, Virgin Islands, and Guam are not included in HHS or U.S. totals. Linked birth/infant death data are not available for American Samoa and Northern Marianas.

Methodology. Infant mortality rates are based on infant deaths per 100,000 live births. Infant deaths are defined as a death before the infant's first birthday. About 98 percent to 99 percent of infant death records can be linked to their corresponding birth certificates. The linkage makes available extensive information from the birth certificate about the pregnancy, maternal risk factors, infant characteristics, and health items at birth that can be used for more detailed analyses of infant mortality. The linked file is used for calculating infant mortality rates by race and ethnicity, which are more accurately measured from the birth certificate.

Starting with 1995 data, linked birth/infant death data files are available in two different formats: period data and birth cohort data. The numerator for the period linked file consists of all infant deaths occurring in a given data year linked to their corresponding birth certificates, whether the birth occurred in that year or the previous year. The numerator for the birth cohort linked file consists of deaths to infants born in a given year. In both cases, the denominator is all births occurring in the year. For example, the 2010 period linked file contains a numerator file that consists of all infant deaths occurring in 2010 that have been linked to their corresponding birth certificates, whether the birth occurred in 2009 or 2010. In contrast, the 2010 birth cohort linked file will contain a numerator file that consists of all infant deaths to babies born in 2010, whether the death occurred in 2010 or 2011. Although the birth cohort format has methodological advantages, it creates substantial delays in data availability because it is necessary to wait until the close of the following data year to include all infant deaths in the birth cohort. Starting with 1995 data, period linked files are used for infant mortality rate tables in Health, United States.

Other changes to the data set starting with 1995 include the addition of record weights to compensate for the one percent to two percent of infant death records that could not be linked to their corresponding birth records. In addition, not-stated birthweight was imputed if the period of gestation was known. This imputation was done to

improve the accuracy of birthweight-specific infant mortality rates because the percentage of records with not-stated birthweight is generally higher for infant deaths (3.2 percent in 2010) than for live births (0.1 percent in 2010). In 2009, not-stated birthweight was imputed for 0.07 percent of births. In 2010, not-stated birthweight was imputed for 0.08 percent of births.

Issues Affecting Interpretation. A new revision of the birth certificate was introduced in 2003 and is being adopted by states on a voluntary, rolling basis. Changes include new standards for geographic and race/ethnicity coding.

Accessed: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2013 on CDC WONDER Online Database, released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at <http://wonder.cdc.gov/mcd-icd10.html> from February 2015 to July 2015.

For More Information. See the NCHS Linked Birth and Infant Death Data website at: <http://www.cdc.gov/nchs/linked.htm>.

Appendix II. Definitions and Method

Age

Reported as age at last birthday, that is, age in completed years.

Age Adjustment

Mortality data for age groups 1-14, 25-64 and 65 and over are age-adjusted in order to eliminate differences in observed estimates that result from differences in the age distribution of the population among urbanization levels and regions. The projected 2000 U.S. population was used as the standard population (see Definitions, Age adjustment). The specific age groups used for age adjustment are as follows:

Age Group in the Report	Age Groups Used for Age Adjustment
1-14	1-4; 5-14
25-64	25-34; 35-44; 45-54; 55-64
65 and over	65-74; 75-84; 85+

Age adjustment, using the direct method, is the application of age-specific rates in a population of interest to a standardized age distribution in order to eliminate differences in observed rates that result from age differences in population composition (see Table 3). This adjustment is usually done when comparing two or more populations at one point in time or one population at two or more points in time.

Age-adjusted rates are calculated by the direct method as follows:

$$\sum_{i=1}^n r_i \times (p_i/P)$$

Where r_i = rate in age group i in the population of interest

p_i = standard population in age group i

$$P = \sum_{i=1}^n p_i$$

n = total number of age groups over the age range of the age-adjusted rate

Age adjustment by the direct method requires use of a standard age distribution. The standard for age adjusting death rates for data occurring after year 2000 is the year 2000 projected U.S. resident population.

The populations used to calculate standard age-adjusted rates are documented here: More information: [http://wonder.cdc.gov/wonder/help/mcd.html#2000 Standard Population](http://wonder.cdc.gov/wonder/help/mcd.html#2000%20Standard%20Population).

The method used to calculate age-adjusted rates is documented here: More information: [http://wonder.cdc.gov/wonder/help/mcd.html#Age-Adjusted Rates](http://wonder.cdc.gov/wonder/help/mcd.html#Age-Adjusted%20Rates).

Table 3. Projected Year 2000 U.S. Population and Proportion Distribution by Age for Age Adjusting Death Rates

Age	Population	Proportion Distribution (weights)	Standard million
Total	274,634,000	1.000000	1,000,000
Under 1 year	3,795,000	0.013818	13,818
1–4 years	15,192,000	0.055317	55,317
5–14 years	39,977,000	0.145565	145,565
15–24 years	38,077,000	0.138646	138,646
25–34 years	37,233,000	0.135573	135,573
35–44 years	44,659,000	0.162613	162,613
45–54 years	37,030,000	0.134834	134,834
55–64 years	23,961,000	0.087247	87,247
65–74 years	18,136,000	0.066037	66,037
75–84 years	12,315,000	*0.044842	44,842
85 years and older	4,259,000	0.015508	15,508

*Figure is rounded up instead of down to force total to 1.0.

SOURCE: Anderson RN, Rosenberg HM. Age Standardization of Death Rates: Implementation of the Year 2000 Standard. National vital statistics reports; vol 47 no 3. Hyattsville, Maryland: National Center for Health Statistics. 1998.

For more information on implementation of the new population standard for age adjustment of death rates, see:

Centers for Disease Control and Prevention. National Center for Health Statistics. *Age Standardization of Death Rates: Implementation of the Year 2000 Standard*. By Robert N. Anderson and Harry M. Rosenberg. National Vital Statistics Reports: Vol. 47 No. 3. DHHS Publication No. (PHS) 99–1120. Hyattsville, MD: National Center for Health Statistics, 1998. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr47/nvs47_03.pdf.

Alzheimer’s Disease

See Appendix II Cause-of-Death.

Appalachian Region

The Appalachian Region, as defined in Application Regional Commission’s (ARC) authorizing legislation, is a 205,000-square-mile region that spans the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. The Region includes 420 counties in 13 states and has a population of 25 million people. Forty-two percent of the Region’s population is rural, compared with 20 percent of the national population. The Appalachian Region’s economy, once highly dependent on mining, forestry, agriculture, chemical industries, and heavy industry, has become more diversified in recent times, and now includes manufacturing and professional service industries.

Figure 1. Appalachian Region by County and Rural-Urban Status

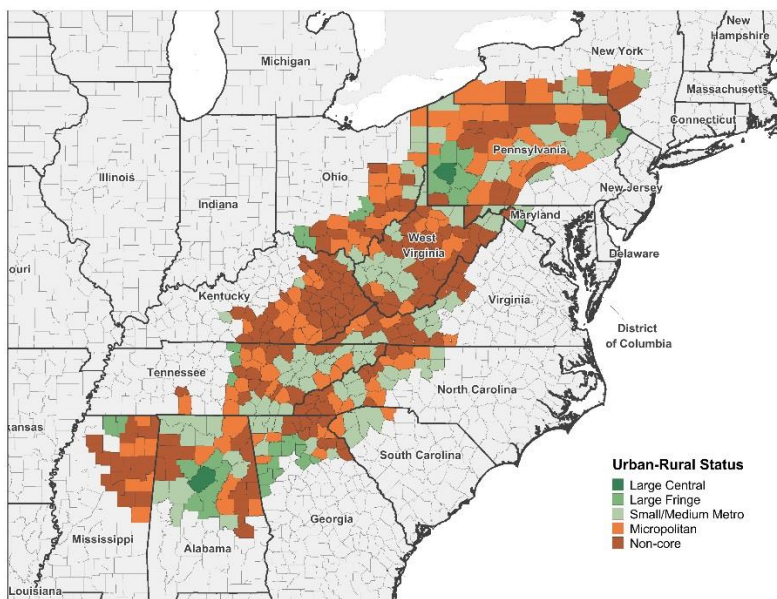


Table 4. Appalachian Region by FIPS Code

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
01007	Bibb County	AL	28087	Lowndes County	MS	42129	Westmoreland County	PA
01009	Blount County	AL	28093	Marshall County	MS	42131	Wyoming County	PA
01015	Calhoun County	AL	28095	Monroe County	MS	45007	Anderson County	SC
01017	Chambers County	AL	28097	Montgomery County	MS	45021	Cherokee County	SC
01019	Cherokee County	AL	28103	Noxubee County	MS	45045	Greenville County	SC
01021	Chilton County	AL	28105	Oktibbeha County	MS	45073	Oconee County	SC
01027	Clay County	AL	28107	Panola County	MS	45077	Pickens County	SC
01029	Cleburne County	AL	28115	Pontotoc County	MS	45083	Spartanburg County	SC
01033	Colbert County	AL	28117	Prentiss County	MS	47001	Anderson County	TN
01037	Coosa County	AL	28139	Tippah County	MS	47007	Bledsoe County	TN
01043	Cullman County	AL	28141	Tishomingo County	MS	47009	Blount County	TN
01049	DeKalb County	AL	28145	Union County	MS	47011	Bradley County	TN
01051	Elmore County	AL	28155	Webster County	MS	47013	Campbell County	TN
01055	Etowah County	AL	28159	Winston County	MS	47015	Cannon County	TN
01057	Fayette County	AL	28161	Yalobusha County	MS	47019	Carter County	TN
01059	Franklin County	AL	37003	Alexander County	NC	47025	Claiborne County	TN
01065	Hale County	AL	37005	Alleghany County	NC	47027	Clay County	TN
01071	Jackson County	AL	37009	Ashe County	NC	47029	Cocke County	TN
01073	Jefferson County	AL	37011	Avery County	NC	47031	Coffee County	TN
01075	Lamar County	AL	37021	Buncombe County	NC	47035	Cumberland County	TN

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
01077	Lauderdale County	AL	37023	Burke County	NC	47041	DeKalb County	TN
01079	Lawrence County	AL	37027	Caldwell County	NC	47049	Fentress County	TN
01083	Limestone County	AL	37039	Cherokee County	NC	47051	Franklin County	TN
01087	Macon County	AL	37043	Clay County	NC	47057	Grainger County	TN
01089	Madison County	AL	37059	Davie County	NC	47059	Greene County	TN
01093	Marion County	AL	37067	Forsyth County	NC	47061	Grundy County	TN
01095	Marshall County	AL	37075	Graham County	NC	47063	Hamblen County	TN
01103	Morgan County	AL	37087	Haywood County	NC	47065	Hamilton County	TN
01107	Pickens County	AL	37089	Henderson County	NC	47067	Hancock County	TN
01111	Randolph County	AL	37099	Jackson County	NC	47073	Hawkins County	TN
01115	St. Clair County	AL	37111	McDowell County	NC	47087	Jackson County	TN
01117	Shelby County	AL	37113	Macon County	NC	47089	Jefferson County	TN
01121	Talladega County	AL	37115	Madison County	NC	47091	Johnson County	TN
01123	Tallapoosa County	AL	37121	Mitchell County	NC	47093	Knox County	TN
01125	Tuscaloosa County	AL	37149	Polk County	NC	47099	Lawrence County	TN
01127	Walker County	AL	37161	Rutherford County	NC	47101	Lewis County	TN
01133	Winston County	AL	37169	Stokes County	NC	47105	Loudon County	TN
13011	Banks County	GA	37171	Surry County	NC	47107	McMinn County	TN
13013	Barrow County	GA	37173	Swain County	NC	47111	Macon County	TN
13015	Bartow County	GA	37175	Transylvania County	NC	47115	Marion County	TN
13045	Carroll County	GA	37189	Watauga County	NC	47121	Meigs County	TN
13047	Catoosa County	GA	37193	Wilkes County	NC	47123	Monroe County	TN
13055	Chattooga County	GA	37197	Yadkin County	NC	47129	Morgan County	TN
13057	Cherokee County	GA	37199	Yancey County	NC	47133	Overton County	TN
13083	Dade County	GA	36003	Allegany County	NY	47137	Pickett County	TN
13085	Dawson County	GA	36007	Broome County	NY	47139	Polk County	TN
13097	Douglas County	GA	36009	Cattaraugus County	NY	47141	Putnam County	TN
13105	Elbert County	GA	36013	Chautauqua County	NY	47143	Rhea County	TN
13111	Fannin County	GA	36015	Chemung County	NY	47145	Roane County	TN
13115	Floyd County	GA	36017	Chenango County	NY	47151	Scott County	TN
13117	Forsyth County	GA	36023	Cortland County	NY	47153	Sequatchie County	TN
13119	Franklin County	GA	36025	Delaware County	NY	47155	Sevier County	TN
13123	Gilmer County	GA	36077	Otsego County	NY	47159	Smith County	TN
13129	Gordon County	GA	36095	Schoharie County	NY	47163	Sullivan County	TN
13135	Gwinnett County	GA	36097	Schuyler County	NY	47171	Unicoi County	TN
13137	Habersham County	GA	36101	Steuben County	NY	47173	Union County	TN
13139	Hall County	GA	36107	Tioga County	NY	47175	Van Buren County	TN
13143	Haralson County	GA	36109	Tompkins County	NY	47177	Warren County	TN
13147	Hart County	GA	39001	Adams County	OH	47179	Washington County	TN

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
13149	Heard County	GA	39007	Ashtabula County	OH	47185	White County	TN
13157	Jackson County	GA	39009	Athens County	OH	51005	Alleghany County	VA
13187	Lumpkin County	GA	39013	Belmont County	OH	51017	Bath County	VA
13195	Madison County	GA	39015	Brown County	OH	51021	Bland County	VA
13213	Murray County	GA	39019	Carroll County	OH	51023	Botetourt County	VA
13223	Paulding County	GA	39025	Clermont County	OH	51027	Buchanan County	VA
13227	Pickens County	GA	39029	Columbiana County	OH	51035	Carroll County	VA
13233	Polk County	GA	39031	Coshocton County	OH	51045	Craig County	VA
13241	Rabun County	GA	39053	Gallia County	OH	51051	Dickenson County	VA
13257	Stephens County	GA	39059	Guernsey County	OH	51063	Floyd County	VA
13281	Towns County	GA	39067	Harrison County	OH	51071	Giles County	VA
13291	Union County	GA	39071	Highland County	OH	51077	Grayson County	VA
13295	Walker County	GA	39073	Hocking County	OH	51089	Henry County	VA
13311	White County	GA	39075	Holmes County	OH	51091	Highland County	VA
13313	Whitfield County	GA	39079	Jackson County	OH	51105	Lee County	VA
21001	Adair County	KY	39081	Jefferson County	OH	51121	Montgomery County	VA
21011	Bath County	KY	39087	Lawrence County	OH	51141	Patrick County	VA
21013	Bell County	KY	39099	Mahoning County	OH	51155	Pulaski County	VA
21019	Boyd County	KY	39105	Meigs County	OH	51163	Rockbridge County	VA
21025	Breathitt County	KY	39111	Monroe County	OH	51167	Russell County	VA
21043	Carter County	KY	39115	Morgan County	OH	51169	Scott County	VA
21045	Casey County	KY	39119	Muskingum County	OH	51173	Smyth County	VA
21049	Clark County	KY	39121	Noble County	OH	51185	Tazewell County	VA
21051	Clay County	KY	39127	Perry County	OH	51191	Washington County	VA
21053	Clinton County	KY	39131	Pike County	OH	51195	Wise County	VA
21057	Cumberland County	KY	39141	Ross County	OH	51197	Wythe County	VA
21061	Edmonson County	KY	39145	Scioto County	OH	54001	Barbour County	WV
21063	Elliott County	KY	39155	Trumbull County	OH	54003	Berkeley County	WV
21065	Estill County	KY	39157	Tuscarawas County	OH	54005	Boone County	WV
21069	Fleming County	KY	39163	Vinton County	OH	54007	Braxton County	WV
21071	Floyd County	KY	39167	Washington County	OH	54009	Brooke County	WV
21079	Garrard County	KY	42003	Allegheny County	PA	54011	Cabell County	WV
21087	Green County	KY	42005	Armstrong County	PA	54013	Calhoun County	WV
21089	Greenup County	KY	42007	Beaver County	PA	54015	Clay County	WV
21095	Harlan County	KY	42009	Bedford County	PA	54017	Doddridge County	WV
21099	Hart County	KY	42013	Blair County	PA	54019	Fayette County	WV
21109	Jackson County	KY	42015	Bradford County	PA	54021	Gilmer County	WV
21115	Johnson County	KY	42019	Butler County	PA	54023	Grant County	WV

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
21119	Knott County	KY	42021	Cambria County	PA	54025	Greenbrier County	WV
21121	Knox County	KY	42023	Cameron County	PA	54027	Hampshire County	WV
21125	Laurel County	KY	42025	Carbon County	PA	54029	Hancock County	WV
21127	Lawrence County	KY	42027	Centre County	PA	54031	Hardy County	WV
21129	Lee County	KY	42031	Clarion County	PA	54033	Harrison County	WV
21131	Leslie County	KY	42033	Clearfield County	PA	54035	Jackson County	WV
21133	Letcher County	KY	42035	Clinton County	PA	54037	Jefferson County	WV
21135	Lewis County	KY	42037	Columbia County	PA	54039	Kanawha County	WV
21137	Lincoln County	KY	42039	Crawford County	PA	54041	Lewis County	WV
21147	McCreary County	KY	42047	Elk County	PA	54043	Lincoln County	WV
21151	Madison County	KY	42049	Erie County	PA	54045	Logan County	WV
21153	Magoffin County	KY	42051	Fayette County	PA	54047	McDowell County	WV
21159	Martin County	KY	42053	Forest County	PA	54049	Marion County	WV
21165	Menifee County	KY	42057	Fulton County	PA	54051	Marshall County	WV
21169	Metcalfe County	KY	42059	Greene County	PA	54053	Mason County	WV
21171	Monroe County	KY	42061	Huntingdon County	PA	54055	Mercer County	WV
21173	Montgomery County	KY	42063	Indiana County	PA	54057	Mineral County	WV
21175	Morgan County	KY	42065	Jefferson County	PA	54059	Mingo County	WV
21181	Nicholas County	KY	42067	Juniata County	PA	54061	Monongalia County	WV
21189	Owsley County	KY	42069	Lackawanna County	PA	54063	Monroe County	WV
21193	Perry County	KY	42073	Lawrence County	PA	54065	Morgan County	WV
21195	Pike County	KY	42079	Luzerne County	PA	54067	Nicholas County	WV
21197	Powell County	KY	42081	Lycoming County	PA	54069	Ohio County	WV
21199	Pulaski County	KY	42083	McKean County	PA	54071	Pendleton County	WV
21201	Robertson County	KY	42085	Mercer County	PA	54073	Pleasants County	WV
21203	Rockcastle County	KY	42087	Mifflin County	PA	54075	Pocahontas County	WV
21205	Rowan County	KY	42089	Monroe County	PA	54077	Preston County	WV
21207	Russell County	KY	42093	Montour County	PA	54079	Putnam County	WV
21231	Wayne County	KY	42097	Northumberland County	PA	54081	Raleigh County	WV
21235	Whitley County	KY	42099	Perry County	PA	54083	Randolph County	WV
21237	Wolfe County	KY	42103	Pike County	PA	54085	Ritchie County	WV
24001	Allegany County	MD	42105	Potter County	PA	54087	Roane County	WV
24023	Garrett County	MD	42107	Schuylkill County	PA	54089	Summers County	WV
24043	Washington County	MD	42109	Snyder County	PA	54091	Taylor County	WV
28003	Alcorn County	MS	42111	Somerset County	PA	54093	Tucker County	WV
28009	Benton County	MS	42113	Sullivan County	PA	54095	Tyler County	WV
28013	Calhoun County	MS	42115	Susquehanna County	PA	54097	Upshur County	WV
28017	Chickasaw County	MS	42117	Tioga County	PA	54099	Wayne County	WV
28019	Choctaw County	MS	42119	Union County	PA	54101	Webster County	WV

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
28025	Clay County	MS	42121	Venango County	PA	54103	Wetzel County	WV
28057	Itawamba County	MS	42123	Warren County	PA	54105	Wirt County	WV
28069	Kemper County	MS	42125	Washington County	PA	54107	Wood County	WV
28081	Lee County	MS	42127	Wayne County	PA	54109	Wyoming County	WV

For More Information. See the Application Regional Commission's website at:

http://www.arc.gov/appalachian_region/TheAppalachianRegion.asp.

Assurance of Confidentiality Constraints

What are the Assurance of Confidentiality constraints for the data?

All mortality rates reported must meet the NCHS data use restrictions. Vital statistics data are suppressed due to confidentiality constraints, in order to protect personal privacy. The term "Suppressed" replaces sub-national death counts, births counts, death rates and associated confidence intervals and standard errors, as well as corresponding population figures, when the figure represents zero to nine (0-9) persons.

As of December 12, 2011, additional privacy constraints apply to infant mortality statistics representing infant age groups and live births as the denominator population. When an infant mortality measure represents fewer than ten (0-9) infant deaths, all corresponding live birth population denominator figures are suppressed. When the infant mortality measure represents ten to nineteen (10-19) infant deaths, the number of deaths and live births are shown, but rates and associated measures are not shown.

Prior to May 23, 2011, data cells in tables for year 1989 and later years were suppressed only for single county-level data, when the data represented five or fewer (1-5) deaths for a time period less than three years, and the county's total population in the April 1st, 2000 Census was fewer than one hundred thousand (100,000) persons. Prior to December 12, 2011, the same constraints applied to infant mortality statistics and all-ages mortality statistics.

Totals and sub-totals are suppressed when the value falls within scope of the suppression criteria, or when the summary value includes a single suppressed figure, in order to prevent the inadvertent disclosure of suppressed values.

The confidentiality constraints and use of the "unreliable" flag are established by the original data providers. For more information, please contact the [data providers](#).

What are my responsibilities in accessing this data?

See CDC Wonder's [Data Use Restrictions](#) to review the policies affecting access to the data. Note that use of the data implies consent or agreement to abide by the policies. The data use restrictions include agreeing to not present or publish death or birth counts of 9 or fewer or rates based on counts of nine or fewer (in figures, graphs, maps, table, etc.).

Bacterial Sepsis

See Cause-of-Death in Appendix II.

Benign Neoplasms

See Cause-of-Death in Appendix II.

Cause-of-Death

For the purpose of this project, the cause-of-death is attributed to one or more condition, also known as multiple cause of death, based on information reported on the death certificate and using the international rules for selecting the underlying and non-underlying causes of death from the conditions stated on the certificate.

Cause of death is coded according to the appropriate revision of the International Classification of Diseases (ICD-20) (see Table 5). Effective with deaths occurring in 1999, the United States began using the 10th revision of the ICD (ICD-10).

Each ICD revision has produced discontinuities in cause-of-death trends. These discontinuities are measured by using comparability ratios that are essential to the interpretation of mortality trends. For further discussion, see:

http://www.cdc.gov/nchs/nvss/mortality/comparability_icd.htm.

Table 5. ICD-10 codes and descriptions by cause-of-death

Cause	ICD-10 Codes	Description
Alzheimer's Disease	G30	Type of dementia that causes problems with memory, thinking, and behavior.
Bacterial Sepsis	P36	Extreme immune response to infection that redirects blood flow to the infected area, so other vital organs do not receive necessary blood and nutrients.
Benign Neoplasms	D00-D48	A localized tumor that does not invade surrounding tissue, but can be serious if they press on vital structures such as blood vessels or nerves.
Cerebrovascular	I60-I69	A group of brain dysfunctions related to blood supply to the brain, such as stroke. Hypertension is most prevalent cause.
Chronic Low. Respiratory Disease	J40-J47	A series of diseases that affect the lungs, making it difficult to breath. The most common is chronic obstructive pulmonary disease (COPD).
Circulatory System Disease	I00-I99	Any problem with the circulatory system, which often are related to too much fat, cholesterol, and calcium built up on artery walls restricting blood flow.
Complicated Pregnancy	O00-O07	A problem with the mother's health during pregnancy or complications during childbirth which causes the mother to die.
Congenital Anomalies	Q00-Q99	Birth defects which may be caused by genes, infections, nutrition, or environment. The most common severe congenital anomalies are heart defects, neural tube defects and Down syndrome.
Diabetes Mellitus	E10-E14	A chronic, lifelong condition that affects a person's body's ability to use the energy and sugar found in food.
Heart Disease	I00-I09, I11, I113, I20-I151	A range of conditions that affect a person's heart, including coronary artery disease and heart attacks. Also called "cardiovascular disease."
Homicide	U01-U02, X85-Y09, Y87.1	Intentionally, unlawfully killed by another person.
Influenza & Pneumonia	J09-J18	The infection and inflammation of the nose, airways, and lungs, which make it difficult to breathe.
Liver Disease	K70, K73-K74	A range of problems can cause the liver to fail because of tissue scarring.
Malignant Neoplasms	C00-C97	Cancer, which entails uncontrolled growth of abnormal cells.
Maternal Pregnancy Comp.	P01	A problem with the mother's health during pregnancy or complications during childbirth which causes the infant to die.
Neonatal Hemorrhage	P50-P52, P54	Severe blood loss in newborn infants caused by a deficiency of vitamin K.
Nephritis	N00-N07, N17-N19, N25-N27	An inflammation of the kidney, which is commonly caused by infection or autoimmune disorders.
Placenta, Cord, Membranes	P02	Abnormalities in the placenta, umbilical cord, or membrane that result in death from strangulation, severe bleeding, or disconnecting from the infant, among other things.
Respiratory Distress of Newborn	P22	A condition among infants that causes fast breathing, fast heart rate, and blue discoloration of the skin because the infant's lungs are not fully developed.
Septicemia	A41-A41	A severe blood infection that can lead to organ failure and blood clotting.
Short Gestation	P07	A preterm infant who has not have developed necessary organs and circulation to survive outside of the mother's womb.

SIDS	R95	The sudden unexplained death of a child less than one year of age.
Suicide	U03, X60-X84, Y87.0	The act of intentionally causing one's own death.
Unintentional Injury	V01-X59, Y85-Y86	Any death caused by an accident, including vehicle accidents, drug overdoses, and poisoning.

Cause-of-Death Ranking

All data tables, graphs, and maps include up to 10 causes of death. The causes of death represent the top 10 causes of death for that particular age group. Rankings were determined by the CDC Web-based Injury Statistics Query and Reporting System (WISQARS) based on the 2011 - 2013 National Center for Health Statistics (NCHS), National Vital Statistics System. Causes of death are ranked by the number of deaths from each cause-specific mortality. For more information on a specific cause-of-death see Cause-of-death in Appendix II.

Causes of death of public health and medical importance are compiled into tabulation lists and are ranked according to the number of deaths assigned to these causes. The tabulation lists used for ranking in the 10th revision of the International Classification of Diseases (ICD) include the List of 113 Selected Causes of Death, and the ICD-10 List of 130 Selected Causes of Infant Death. For more information about the cause-of-death ranking please see:

http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf.

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Table 6. Top 10 Causes of Death by Age Range

Rank	Age				
	<1 Year	1 to 14 Years	15 to 24 Years	25 to 64 Years	65+ Years
1	Congenital Anomalies	Unintentional Injury	Unintentional Injury	Malignant Neoplasms	Heart Disease
2	Short Gestation	Malignant Neoplasms	Suicide	Heart Disease	Malignant Neoplasms
3	SIDS	Congenital Anomalies	Homicide	Unintentional Injury	Chronic Low. Respiratory Disease
4	Maternal Pregnancy Complications	Homicide	Malignant Neoplasms	Suicide	Cerebrovascular
5	Unintentional Injury	Heart Disease	Heart Disease	Liver Disease	Alzheimer's Disease
6	Placenta, Cord, Membranes	Suicide	Congenital Anomalies	Diabetes Mellitus	Diabetes Mellitus
7	Bacterial Sepsis	Influenza & Pneumonia	Diabetes Mellitus	Chronic Low. Respiratory Disease	Unintentional Injury
8	Respiratory Distress	Chronic Low. Respiratory Disease	Cerebrovascular	Cerebrovascular	Influenza & Pneumonia
9	Circulatory System Disease	Benign Neoplasms	Complicated Pregnancy	Homicide	Nephritis
10	Neonatal Hemorrhage	Cerebrovascular	Influenza & Pneumonia	Septicemia	Septicemia

For More Information. See the Leading Causes of Death Reports, National and Regional, 2011 – 2013 available from the Web-based Injury Statistics Query and Reporting System website: http://webappa.cdc.gov/sasweb/ncipc/leadcaus10_us.html.

Cerebrovascular

See Cause-of-Death in Appendix II.

Chronic Lower Respiratory Disease

See Cause-of-Death in Appendix II.

Circulatory System Disease

See Cause-of-Death in Appendix II.

Complicated Pregnancy

See Cause-of-Death in Appendix II.

Congenital Anomalies

See Cause-of-Death in Appendix II.

Delta Region

The Delta region is comprised of 10 million people who reside in the 252 counties and parishes within eight different states: Alabama, Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee. The Delta Region population has been shrinking as residents leave the area. Twenty percent of the Region's population live in poverty, compared with 14 percent of the national population. Poverty rates are also much more persistent in the Delta Region than in the national population. It makes up one of the most distressed areas of the country.

Established in 2000 by Congress, the Delta Regional Authority makes strategic investments of federal appropriations into the physical and human infrastructure of Delta communities. The 252 counties and parishes served by the Delta Regional Authority make up the most distressed area of the country.

Figure 2. Delta Region by County and Rural-Urban Status

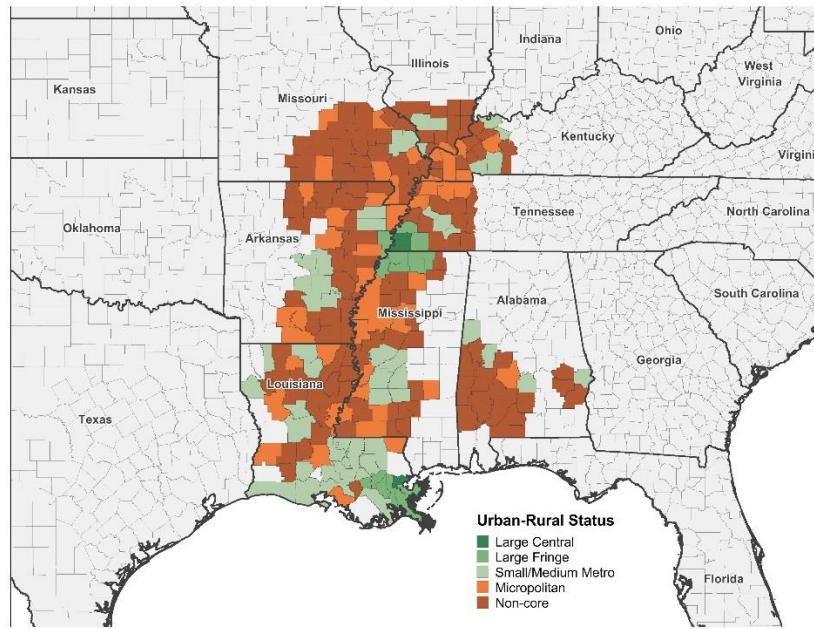


Table 7. Delta Region by FIPS Code

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
01005	Barbour County	AL	21075	Fulton County	KY	29149	Oregon County	MO
01011	Bullock County	AL	21083	Graves County	KY	29153	Ozark County	MO
01013	Butler County	AL	21101	Henderson County	KY	29155	Pemiscot County	MO
01023	Choctaw County	AL	21105	Hickman County	KY	29157	Perry County	MO
01025	Clarke County	AL	21107	Hopkins County	KY	29161	Phelps County	MO
01035	Conecuh County	AL	21139	Livingston County	KY	29179	Reynolds County	MO
01047	Dallas County	AL	21143	Lyon County	KY	29181	Ripley County	MO
01053	Escambia County	AL	21145	McCracken County	KY	29186	Ste. Genevieve County	MO
01063	Greene County	AL	21149	McLean County	KY	29187	St. Francois County	MO
01065	Hale County	AL	21157	Marshall County	KY	29201	Scott County	MO
01085	Lowndes County	AL	21177	Muhlenberg County	KY	29203	Shannon County	MO
01087	Macon County	AL	21219	Todd County	KY	29207	Stoddard County	MO
01091	Marengo County	AL	21221	Trigg County	KY	29215	Texas County	MO
01099	Monroe County	AL	21225	Union County	KY	29221	Washington County	MO
01105	Perry County	AL	21233	Webster County	KY	29223	Wayne County	MO
01107	Pickens County	AL	22001	Acadia Parish	LA	29229	Wright County	MO
01113	Russell County	AL	22003	Allen Parish	LA	28001	Adams County	MS
01119	Sumter County	AL	22005	Ascension Parish	LA	28005	Amite County	MS
01129	Washington County	AL	22007	Assumption Parish	LA	28007	Attala County	MS

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
01131	Wilcox County	AL	22009	Avoyelles Parish	LA	28009	Benton County	MS
05001	Arkansas County	AR	22011	Beauregard Parish	LA	28011	Bolivar County	MS
05003	Ashley County	AR	22013	Bienville Parish	LA	28015	Carroll County	MS
05005	Baxter County	AR	22021	Caldwell Parish	LA	28021	Claiborne County	MS
05011	Bradley County	AR	22023	Cameron Parish	LA	28027	Coahoma County	MS
05013	Calhoun County	AR	22025	Catahoula Parish	LA	28029	Copiah County	MS
05017	Chicot County	AR	22027	Claiborne Parish	LA	28031	Covington County	MS
05021	Clay County	AR	22029	Concordia Parish	LA	28033	DeSoto County	MS
05025	Cleveland County	AR	22031	De Soto Parish	LA	28037	Franklin County	MS
05031	Craighead County	AR	22033	East Baton Rouge Parish	LA	28043	Grenada County	MS
05035	Crittenden County	AR	22035	East Carroll Parish	LA	28049	Hinds County	MS
05037	Cross County	AR	22037	East Feliciana Parish	LA	28051	Holmes County	MS
05039	Dallas County	AR	22039	Evangeline Parish	LA	28053	Humphreys County	MS
05041	Desha County	AR	22041	Franklin Parish	LA	28055	Issaquena County	MS
05043	Drew County	AR	22043	Grant Parish	LA	28061	Jasper County	MS
05049	Fulton County	AR	22045	Iberia Parish	LA	28063	Jefferson County	MS
05053	Grant County	AR	22047	Iberville Parish	LA	28065	Jefferson Davis County	MS
05055	Greene County	AR	22049	Jackson Parish	LA	28071	Lafayette County	MS
05063	Independence County	AR	22051	Jefferson Parish	LA	28077	Lawrence County	MS
05065	Izard County	AR	22053	Jefferson Davis Parish	LA	28083	Leflore County	MS
05067	Jackson County	AR	22057	Lafourche Parish	LA	28085	Lincoln County	MS
05069	Jefferson County	AR	22059	La Salle Parish	LA	28089	Madison County	MS
05075	Lawrence County	AR	22061	Lincoln Parish	LA	28091	Marion County	MS
05077	Lee County	AR	22063	Livingston Parish	LA	28093	Marshall County	MS
05079	Lincoln County	AR	22065	Madison Parish	LA	28097	Montgomery County	MS
05085	Lonoke County	AR	22067	Morehouse Parish	LA	28107	Panola County	MS
05089	Marion County	AR	22069	Natchitoches Parish	LA	28113	Pike County	MS
05093	Mississippi County	AR	22071	Orleans Parish	LA	28119	Quitman County	MS
05095	Monroe County	AR	22073	Ouachita Parish	LA	28121	Rankin County	MS
05103	Ouachita County	AR	22075	Plaquemines Parish	LA	28125	Sharkey County	MS
05107	Phillips County	AR	22077	Pointe Coupee Parish	LA	28127	Simpson County	MS
05111	Poinsett County	AR	22079	Rapides Parish	LA	28129	Smith County	MS
05117	Prairie County	AR	22081	Red River Parish	LA	28133	Sunflower County	MS
05119	Pulaski County	AR	22083	Richland Parish	LA	28135	Tallahatchie County	MS
05121	Randolph County	AR	22087	St. Bernard Parish	LA	28137	Tate County	MS

FIPS Code	County	State	FIPS Code	County	State	FIPS Code	County	State
05123	St. Francis County	AR	22089	St. Charles Parish	LA	28139	Tippah County	MS
05129	Searcy County	AR	22091	St. Helena Parish	LA	28143	Tunica County	MS
05135	Sharp County	AR	22093	St. James Parish	LA	28145	Union County	MS
05137	Stone County	AR	22095	St. John the Baptist Parish	LA	28147	Walthall County	MS
05139	Union County	AR	22097	St. Landry Parish	LA	28149	Warren County	MS
05141	Van Buren County	AR	22099	St. Martin Parish	LA	28151	Washington County	MS
05145	White County	AR	22101	St. Mary Parish	LA	28157	Wilkinson County	MS
05147	Woodruff County	AR	22105	Tangipahoa Parish	LA	28161	Yalobusha County	MS
17003	Alexander County	IL	22107	Tensas Parish	LA	28163	Yazoo County	MS
17055	Franklin County	IL	22111	Union Parish	LA	47005	Benton County	TN
17059	Gallatin County	IL	22113	Vermilion Parish	LA	47017	Carroll County	TN
17065	Hamilton County	IL	22117	Washington Parish	LA	47023	Chester County	TN
17069	Hardin County	IL	22119	Webster Parish	LA	47033	Crockett County	TN
17077	Jackson County	IL	22121	West Baton Rouge Parish	LA	47039	Decatur County	TN
17087	Johnson County	IL	22123	West Carroll Parish	LA	47045	Dyer County	TN
17127	Massac County	IL	22125	West Feliciana Parish	LA	47047	Fayette County	TN
17145	Perry County	IL	22127	Winn Parish	LA	47053	Gibson County	TN
17151	Pope County	IL	29017	Bollinger County	MO	47069	Hardeman County	TN
17153	Pulaski County	IL	29023	Butler County	MO	47071	Hardin County	TN
17157	Randolph County	IL	29031	Cape Girardeau County	MO	47075	Haywood County	TN
17165	Saline County	IL	29035	Carter County	MO	47077	Henderson County	TN
17181	Union County	IL	29055	Crawford County	MO	47079	Henry County	TN
17193	White County	IL	29065	Dent County	MO	47095	Lake County	TN
17199	Williamson County	IL	29067	Douglas County	MO	47097	Lauderdale County	TN
21007	Ballard County	KY	29069	Dunklin County	MO	47109	McNairy County	TN
21033	Caldwell County	KY	29091	Howell County	MO	47113	Madison County	TN
21035	Calloway County	KY	29093	Iron County	MO	47131	Obion County	TN
21039	Carlisle County	KY	29123	Madison County	MO	47157	Shelby County	TN
21047	Christian County	KY	29133	Mississippi County	MO	47167	Tipton County	TN
21055	Crittenden County	KY	29143	New Madrid County	MO	47183	Weakley County	TN

For More Information. See the Delta Regional Authority's website at: <http://dra.gov/about-dra/mission-and-vision/>.

Diabetes Mellitus

See Cause-of-Death in Appendix II.

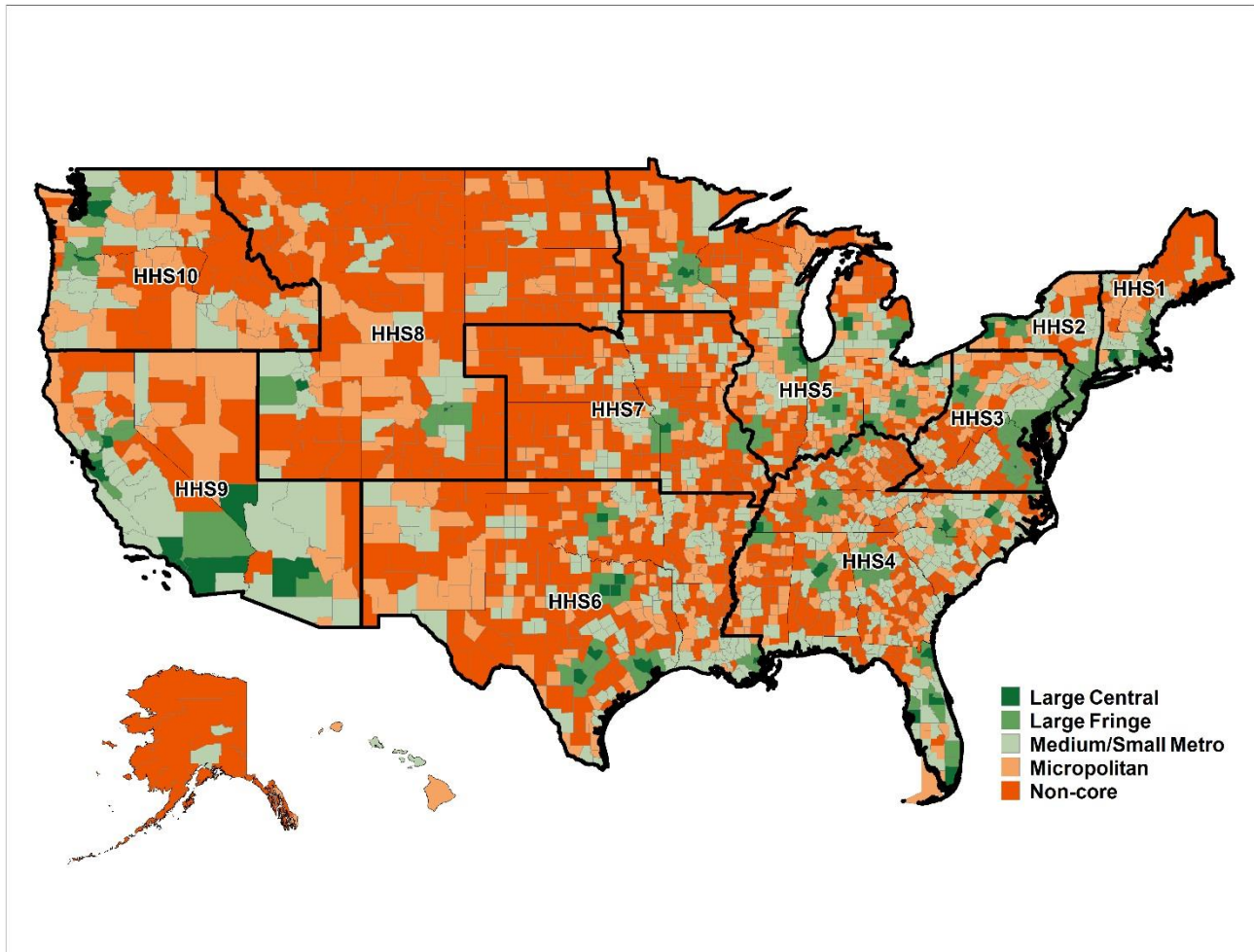
Geographic Region

The Office of Intergovernmental and External Affairs groups the 50 states, D.C., and territories, into 10 geographic regions. Each region has a Regional Office that directly serves state and local organizations. Each HHS department maintains close contact with state, local and tribal partners and addresses the needs of communities and individuals served through HHS programs and policies (See Figure 3). See Appalachian Region and Delta Region in Appendix II for more information.

The HHS regions are as follows:

- Region 1: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
- Region 2: New York, New Jersey
- Region 3: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia
- Region 4: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee
- Region 5: Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin
- Region 6: Arkansas, Louisiana, New Mexico, Oklahoma, Texas
- Region 7: Iowa, Kansas, Missouri, Nebraska
- Region 8: Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming
- Region 9: Arizona, California, Hawaii, Nevada
- Region 10: Alaska, Idaho, Oregon, Washington

Figure 3. United States Counties by Region and Urbanization Level, 2006



For More Information. See the U.S. Department of Health & Human Services Regional Offices website at: <http://www.hhs.gov/iea/regional/>.

Heart Disease

See Cause-of-Death in Appendix II.

Homicide

See Cause-of-Death in Appendix II.

Index

See Mortality Index in Appendix II.

Infant Death

An infant death is the death of a live-born child before his or her first birthday. Age at death may be further classified as neonatal or postneonatal. Neonatal deaths are those that occur before the 28th day of life; postneonatal deaths are those that occur within 28 days to under 1 year of age. (Also see Rate: Death rates in Appendix II).

Influenza & Pneumonia

See Cause-of-Death in Appendix II.

International Classification of Diseases (ICD)

The ICD provides the ground rules for coding and classifying cause-of-death data. The ICD is developed collaboratively between the World Health Organization (WHO) and 10 international centers, one of which is housed at NCHS. The purpose of the ICD is to promote international comparability in the collection, classification, processing, and presentation of health statistics. Since the beginning of the century, the ICD has been modified about once every 10 years, except for the 20-year interval between ICD-9 and ICD-10. The purpose of the revisions is to stay abreast with advances in medical science. New revisions usually introduce major disruptions in time series of mortality statistics. For more information, see <http://www.cdc.gov/nchs/icd.htm>. See related: Cause-of-Death in Appendix II.

HHS Region

See Geographic Region in Appendix II.

Leading Causes-of-Death

See Cause-of-Death Ranking in Appendix II.

Liver Disease

See Cause-of-Death in Appendix II.

Malignant Neoplasms

See Cause-of-Death in Appendix II.

Maternal Pregnancy Complications

See Cause-of-Death in Appendix II.

Mortality

Mortality measures in all presentations, Excel workbook tables, and online tools represent Multiple Cause of Death. See Appendix I, National Center for Health Statistics, National Vital Statistics System for a description of the source for mortality data. Data for the 3 years 2011-2013 were combined to increase reliability of estimates. The top ten causes of death are

represented for each age group (see Cause-of-Death Ranking in Appendix II.) Cause of death coding is for underlying cause of death based on the International Classification of Diseases, Tenth Revision (ICD-10) (see Cause-of-Death in Appendix II).

Mortality Index

The mortality index highlights potential disparities in mortality rates between regional (regional rates were calculated for each cause of death, age group, and rural-urban status) and national rates.

Mortality indices are calculated as follows:

$$\left(\frac{\text{Subpopulation Mortality Rate}}{\text{National Mortality Rate}} \right) * 100$$

Thus, the “Index” is defined as the ratio of the mortality rate for a specific subpopulation compared to the national mortality rate. The base number for comparison is 100 implying that the subpopulation mortality rate is equal to the national mortality rate. Over 100 indicates that the subpopulation mortality rate is higher than the national rate, under 100 indicates that the subpopulation mortality rate is lower than the national rate.

Table 8. Quick Reference of Mortality Index Values

Mortality Index Value	Calculation Implication*
Less than 100	Better: Subpopulation mortality rate is less than the national mortality rate
100	Equal: Subpopulation mortality rate is equal to the national mortality rate
Greater than 100	Worse: Subpopulation mortality rate is greater than the national mortality rate

* Although differences may be present between the national mortality rate (index = 100) and the subpopulation mortality rate, a value greater than or less than 100 does not imply that the comparison is statistically significant. Please see Excel Workbook Tables: Mortality Rates among Persons by Cause of Death, Age, Region, and Rural-Urban Status: United States, 2011-2013 for complete details on statistical comparisons provided through data tables.

Population

Population estimates used to calculate mortality rates in this report are the bridged-race postcensal estimates of the July 1 resident population.

Resident population includes persons whose usual place of residence (that is, the place where one usually lives and sleeps) is in one of the 50 States or the District of Columbia. It includes members of the Armed Forces stationed in the United States and their families. It excludes international military, naval, and diplomatic personnel and their families located in this county and residing in embassies or similar quarters. Also excluded are international workers and international students in this country and Americans living abroad. The resident population is usually the denominator when calculating birth and death rates and incidence of disease.

Neonatal Hemorrhage

See Cause-of-Death in Appendix II.

Nephritis

See Cause-of-Death in Appendix II.

Placenta, Cord, Membranes

See Cause-of-Death in Appendix II.

Rate

A measure of some event, disease, or condition in relation to a unit of population, along with some specification of time. For this report all rates are Mortality Rates. See related: *Age adjustment; Population*.

Mortality rate, in this report, is calculated by dividing the number of deaths in a population in a year by the midyear resident population. For 2010, rates are based on April 1 modified census counts. In this report, age groups 1-14, 25-64, and 65 and over are age-adjusted using the 2000 U.S. standard population. Death rates are expressed as the number of deaths per 100,000 population.

Respiratory Distress of Newborn

See Cause-of-Death in Appendix II.

Rural

See Rural-Urban Status in Appendix II.

Septicemia

See Cause-of-Death in Appendix II.

SIDS – Sudden Infant Death Syndrome

See Cause-of-Death in Appendix II.

Short Gestation

See Cause-of-Death in Appendix II.

Standard Error

The method used to calculate standard errors is documented here: <http://wonder.cdc.gov/wonder/help/mcd.html#Standard-Errors>.

Suicide

See Cause-of-Death in Appendix II.

Suppression

Sub-national (e.g. rural-urban level) data representing fewer than 10 deaths are suppressed. Data are suppressed when the data meet the criteria for confidentiality constraints.

For more information: <http://wonder.cdc.gov/wonder/help/faq.html#Privacy>.

Unintentional Injury

See Cause-of-Death in Appendix II.

Unreliable

If the death count is less than 20 persons, rates are noted as “unreliable” and are not displayed in this report because the information may be misleading.

For more information: <http://wonder.cdc.gov/wonder/help/mcd.html#Unreliable>.

Rural-Urban Status

Counties are classified into five urbanization levels — three for metropolitan (metro) counties and two for nonmetropolitan (nonmetro) counties — using the 2013 National Center for Health Statistics (NCHS) Rural-Urban Classification Scheme for Counties. All 3,143 U.S. counties and county equivalents were assigned to one of the five levels (see Figure 3 for a complete map). From most urban to most rural, the urbanization levels are:

Large central (inner cities) - counties in metropolitan statistical areas (MSA) of 1 million or more population that:

- Contain the entire population of the largest principal city of the MSA;
- Are completely contained in the largest principal city of the MSA; or
- Contain at least 250,000 residents of any principal city of the MSA.

Large fringe (suburban) - remaining counties in MSAs with a population of at least 1 million residents.

Small Metro - counties in MSAs with a population of less than 1 million residents.

Nonmetropolitan (rural) counties:

Micropolitan (large rural) – counties in micropolitan statistical areas (population of 10,000 to 49,999).

Non-core (small rural) – remaining nonmetropolitan counties that are not in a micropolitan statistical area.

Geographic location of death is classified by place of residence unless stated as by place of occurrence. Deaths of nonresidents (e.g. nonresident aliens, nationals living abroad, residents of the U.S. territories) and fetal deaths are not included.

The geographic composition of the five rural-urban statuses by HHS region is described below. Table A describes the composition of the metropolitan counties (large central, large fringe, and small/medium metro) by HHS region. It lists the number of counties included in each HHS region and the population/percent of population of each rural-urban level within HHS regions. Table B describes the composition of the nonmetropolitan counties (micropolitan and non-core) by HHS region. It lists the number of counties included in each HHS region and the population/percent of population of each rural-urban level within HHS regions.

Table 9. Number and Percent of Counties by Rural-Urban Status, United States 2013

Rural-Urban Status	Number of Counties	Percent of Total Counties
Large Central	68	2.2
Large Fringe	368	11.7
Small/Medium	731	23.2
Micropolitan	641	20.4
Non-core	1339	42.5

Table 10. Population by Rural-Urban Status and Region, July 1, 2013

Region	Large Central	Large Fringe	Small/Medium Metro	Micropolitan	Non-core	Total Region's Population	Percent of Population in Region
HHS 1	2,282,375	3,684,152	5,374,190	1,092,606	648,209	13,081,532	5.7%
HHS 2	4,219,526	8,532,649	3,713,321	1,007,589	400,129	17,873,214	7.7%
HHS 3	1,793,942	11,555,827	8,307,162	1,891,854	1,984,981	25,533,766	11.1%
HHS 4	7,830,178	10,985,489	24,249,930	6,528,140	5,028,802	54,622,539	23.7%
HHS 5	3,944,137	12,797,047	13,633,400	6,396,080	3,509,303	40,279,967	17.4%
HHS 6	2,105,409	6,239,045	13,087,686	4,000,527	2,985,606	28,418,273	12.3%
HHS 7	998,412	2,168,057	5,267,895	2,100,114	2,371,152	12,905,630	5.6%
HHS 8	660,292	2,108,743	4,623,539	1,495,436	1,378,398	10,266,408	4.4%
HHS 9	1,043,040	2,238,152	11,643,878	1,302,528	405,051	16,632,649	7.2%
HHS 10	786,579	3,114,075	5,180,411	1,564,936	595,818	11,241,819	4.9%
Appalachian	671,794	4,072,153	10,698,393	5,203,817	3,472,247	24,118,404	10.4%
Delta	1,318,180	1,022,210	3,580,911	1,831,885	2,167,209	9,920,395	4.3%

Table 11. HHS Regions: Percentage of Population by Rural-Urban Status, 2013

HHS Region	Large Central	Large Fringe	Small/ Medium Metro	Micropolitan	Non-core	Total
1	17.5	28.2	41.1	8.4	5.0	100
2	23.6	47.7	20.8	5.6	2.2	100
3	7.0	45.3	32.5	7.4	7.8	100
4	14.3	20.1	44.4	12.0	9.2	100
5	9.8	31.8	33.9	15.9	8.7	100
6	7.4	22.0	46.1	14.1	10.5	100
7	7.7	16.8	40.8	16.3	18.4	100
8	6.4	20.5	45.0	14.6	13.4	100
9	6.3	13.5	70.0	7.8	2.4	100
10	7.0	27.7	46.1	13.9	5.3	100
Appalachian	2.8	16.9	44.4	21.6	14.4	100
Delta	13.3	10.3	36.1	18.5	21.9	100

Table 12. Rural-Urban Status: Percentage of Population Distributed across HHS Regions, 2013

HHS Region	Large Central	Large Fringe	Small/ Medium Metro	Micropolitan	Non-core	Total Region's Population
1	8.9	5.8	5.7	4.0	3.4	5.7
2	16.4	13.5	3.9	3.7	2.1	7.7
3	7.0	18.2	8.7	6.9	10.3	11.1
4	30.5	17.3	25.5	23.8	26.0	23.7
5	15.4	20.2	14.3	23.4	18.2	17.4
6	8.2	9.8	13.8	14.6	15.5	12.3
7	3.9	3.4	5.5	7.7	12.3	5.6
8	2.6	3.3	4.9	5.5	7.1	4.4
9	4.1	3.5	12.2	4.8	2.1	7.2
10	3.1	4.9	5.4	5.7	3.1	4.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Appalachian	2.6	6.4	11.3	19.0	18.0	10.4
Delta	5.1	1.6	3.8	6.7	11.2	4.3

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