**Southwest Rural**
**HEALTH RESEARCH CENTER**

# Healthy People 2020 Progress for Leading Causes of Death in Rural and Urban America: A Chartbook

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## Purpose

### Objectives/Purpose

This chartbook was constructed with the following objectives in mind, as they relate to the seven leading causes of death between 2007 and 2017:

- Provide an overall depiction of progress toward Healthy People 2020 benchmarks along the urban-rural continuum

- Provide a depiction of progress toward Healthy People 2020 benchmarks among various racial and ethnic groups along the urban-rural continuum

- Provide a depiction of progress toward Healthy People 2020 benchmarks among men and women along the urban-rural continuum

- Provide a depiction of progress toward Healthy People 2020 benchmarks among residents of the four U.S. census regions along the urban-rural continuum

## Background

Over the last forty years, Healthy People has articulated a vision for the United States that entails goals and objectives centered on disease prevention and health promotion.[1,2] The U.S. Department of Health and Human Services (HHS) articulates these goals in ten-year increments so improvements in the health of Americans can be assessed, collaborations across various sectors and communities can be implemented, individuals can be empowered to make informed decisions about their health, and the impact of various prevention activities can be measured.[1] With the nation's significant improvements in averting mortality from infectious diseases,[3] it now faces mortality driven by chronic non-infectious diseases.[4] Over the last decade, the leading causes of death, for which targets were established by Healthy People 2020 (HP 2020) have been heart disease, cancer, unintentional injuries, chronic obstructive pulmonary disease (COPD), stroke, diabetes, and suicide. While the U.S. has made significant progress toward its goal for a healthier

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[1] We would like to thank the National Center for Health Statistics and Johanna Alfier in particular for their guidance in developing this chartbook.

## Key Findings

- Rural America is lagging behind urban America in achieving Healthy People 2020 mortality objectives for leading causes of death.

- Men have been less likely than women to achieve Healthy People 2020 mortality goals in rural and urban America.

- The rural South has seen less progress than other regions towards Healthy People 2020 targets for diabetes, cancer, stroke, chronic obstructive pulmonary disease, and heart disease, while the rural West has made less progress for suicide mortality.

- Age-adjusted suicide mortality increased across all levels of rurality during the study period, and by 2017, all levels of rurality were above the Healthy People 2020 target, with the highest mortality rates in rural America.

- Interventions aimed at reducing deaths from leading causes of death in rural America are needed to help rural America achieve Healthy People 2020 mortality goals.

population, several disparities among subpopulations continue to prevail.[5]

Researchers have noted that, nationally, the incidence, prevalence, and mortality burden of certain chronic diseases have been on the rise among rural sub-populations.[6,7] Several reasons for these increases among rural residents have been posited, including limited access to health insurance, limited access to healthcare services, limited access to nutritious foods, and limited opportunities for physical activity.[8-13] Several interventions have been envisioned and implemented to address some of these issues. However, results of a national survey conducted in 2011 and 2012 indicated health priorities and challenges for rural America had not changed substantially from the previous decade.[8] Moreover, little is known about recent mortality trends for specific diseases along the urban-rural continuum in the U.S., particularly those considered to be the leading causes of death. Furthermore, little is known about how overall trends in the leading causes of death along the urban-rural continuum align with HP 2020 targets.[61-62]

In addition to the overall disparities noted above, researchers have also found significant differences in chronic disease outcomes persist among racial and ethnic minorities, between men and women, and among residents of various census regions.[14-20] However, like overall trends in disease-specific mortality for the leading causes of death along the urban-rural continuum, very little is known about the progress made toward HP 2020 targets at the intersection of urban/rural residence and gender, race/ethnicity, and residence in various U.S. census regions. It is helpful to policy makers, healthcare practitioners, and advocates alike to be aware of overall disparities in mortality outcomes for leading chronic conditions in the U.S. Nevertheless, additional context and specificity concerning progress toward national goals among various subpopulations found across the urban-rural continuum, i.e. specific racial and ethnic minorities, men and women, and residents of various census regions, would be instructive for determining distinctive places and groups of people for which heightened attention is needed if the nation is to reach Healthy People targets.

Therefore, the purpose of this chartbook is to provide readers with a contemporary understanding of the extent to which HP 2020 targets have been reached for seven leading causes of death. Progress toward these targets will be assessed across six levels of rurality as outlined by the National Center for Health Statistics (NCHS)[21], as well as by race/ethnicity, gender and U.S. census region. The widespread availability of this chartbook will assist local, state, and federal entities with the ability to make informed allocative, procedural, and practice-based decisions that will move subpopulations toward Healthy People targets in an equitable and collaborative manner.

## Methods

To study national progress in achieving HP 2020 goals across levels of rurality, this research relied on mortality data from the National Center for Health Statistics (NCHS). Specifically, we analyzed mortality data for heart disease, cancer, unintentional injury, COPD, stroke, diabetes, and suicide. Data for heart disease, cancer, unintentional injury, stroke, diabetes, and suicide were obtained using the CDC Wonder platform. Data for COPD were obtained through direct communication with NCHS. Cause of death was determined using the International Classification of Diseases, 10th Revision (ICD-10). Mortality rates were determined based on the underlying cause of death for each cause of death except diabetes, which reflects all deaths attributed to diabetes as a multiple cause of death – in line with HP 2020 guidelines. Rates for each cause of death reflect the entire population except for COPD, which accounts for deaths in adults 45 and older, in line with HP 2020 standards.

Our analysis relied on age-adjusted estimates for mortality from each of our leading causes of death per 100,000 people who live in the area being analyzed in a given year. Rurality in our data was determined using the 2013 NCHS Urban-Rural classification for counties, which includes six levels of rurality: Large Central Metropolitan (most urban), Large Fringe Metropolitan, Medium Metropolitan, Small Metropolitan, Micropolitan, and Non-Core (most rural). For each figure in this

chartbook, Micropolitan and Non-Core are considered rural and the other four classifications are considered urban. Each analysis goes from 2007 – the baseline year for all HP 2020 goals – to 2017 – the most recent year of data available. Finally, region was determined using U.S. census regions. For each leading cause of death explored, the HP 2020 target is indicated by a black dashed line. Each objective is measured relative to this target line, with a goal of being below the target line by 2020.
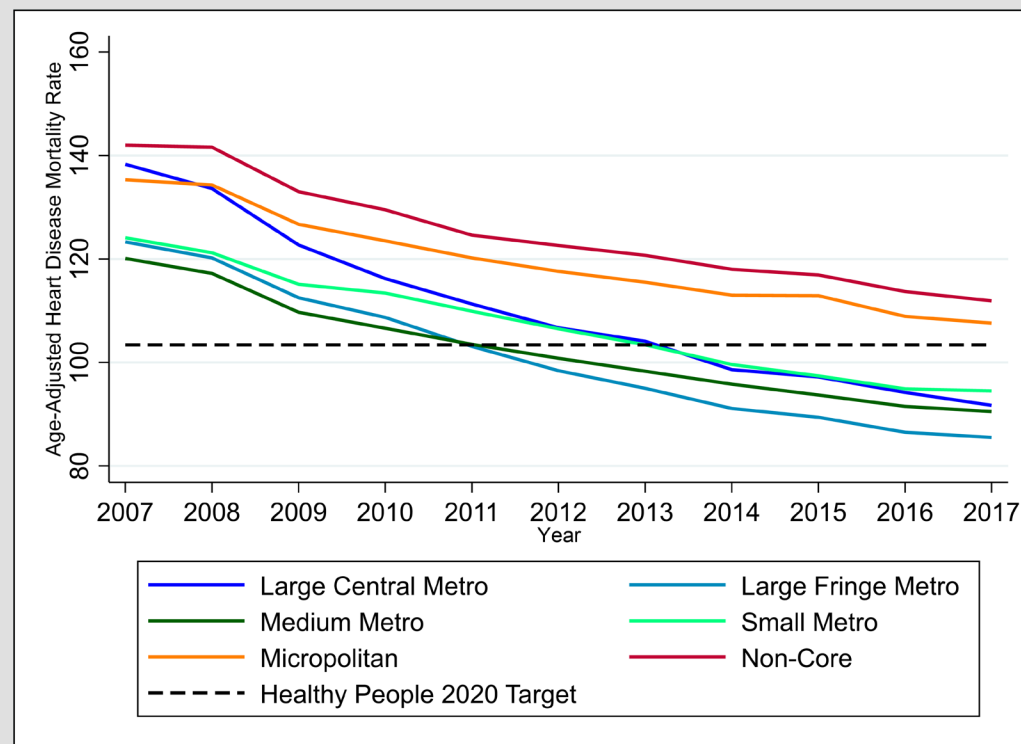
## Results

### *Heart Disease*

Background

Heart disease is the number one leading cause of death in the United States for both men and women, killing more than 600,000 people each year.[22,23] While heart disease is a leading cause of death across all racial groups, heart disease mortality is substantially higher among non-Hispanic Blacks compared with any other racial group, and heart disease readmission rates are higher among Hispanics compared with Whites.[24,25] It is estimated that heart disease costs the U.S. over 200 billion each year due to healthcare service, medications, and lost productivity.[23] In 2007, there were 129.2 coronary heart disease deaths per 100,000 population. The HP 2020 goal was to reduce heart disease mortality by 20 percent from rates in 2007, resulting in a target rate of 103.4 heart disease deaths per 100,000 population.[26]
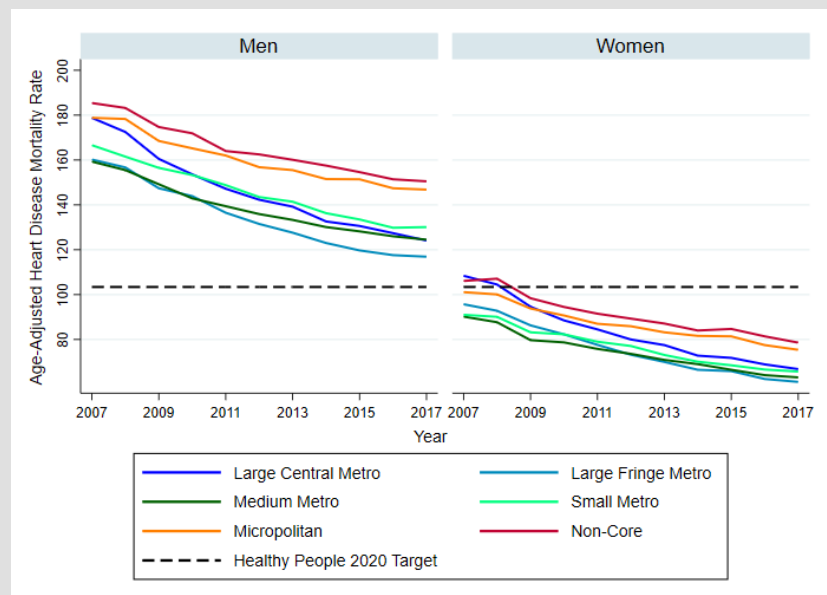
**Figure 1. Overall Age-Adjusted Heart Disease Deaths by Year**



**Rural areas fail to meet HP 2020 objective for heart disease**
When examining changes in heart disease mortality from 2007 to 2017, it is apparent that deaths from heart disease have declined over the past decade. Over the course of the study period, heart disease mortality rates were generally highest in Non-Core areas, and lowest in Medium Metropolitan and Large Fringe Metropolitan areas. While heart disease mortality remained well above the HP 2020 target for all rurality levels in 2007, by 2017 only four areas along the urban-rural continuum – Large Central Metropolitan, Large Fringe Metropolitan, Medium Metropolitan, Small Metropolitan – achieved the HP 2020 goal.
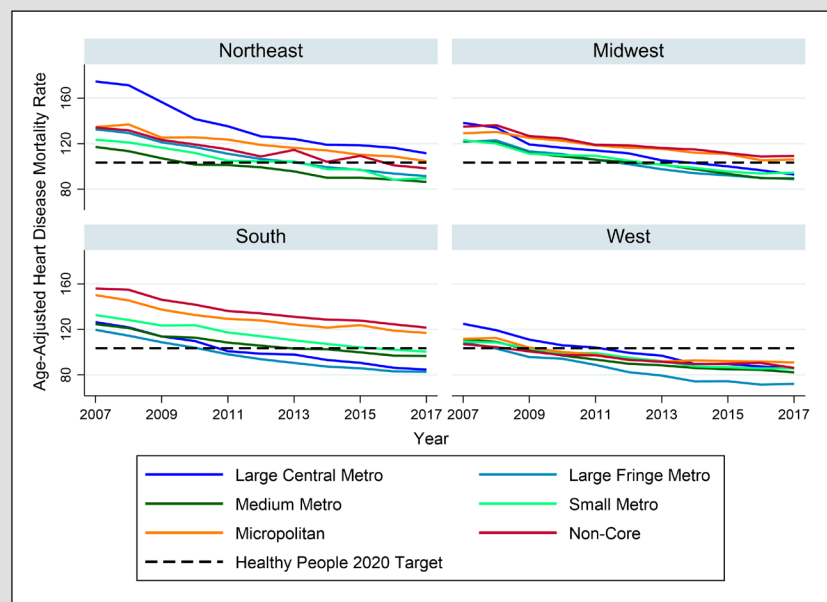
**Figure 2. Age-Adjusted Heart Disease Deaths by Gender and Year**



**Despite significant declines, male mortality remains above HP 2020 target**

Overall, heart disease mortality rates were higher among males relative to females. From 2007-2017, both sexes achieved significant declines in heart disease mortality across all urban-rural levels, with Large Central Metropolitan areas experiencing the greatest rate of decline. For both males and females, heart disease mortality rates were consistently highest in Non-Core areas, and lowest in Medium Metropolitan and Large Fringe Metropolitan areas. By 2017, females across all areas successfully achieved the HP 2020 goal for heart disease mortality, while male heart disease mortality rates remained well above the HP 2020 target rate across all areas along the urban-rural continuum.
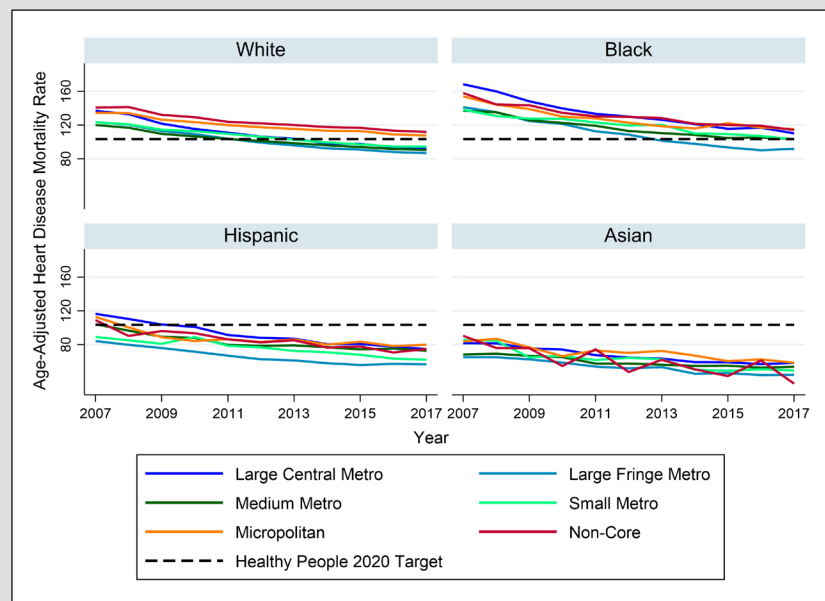
**Figure 3. Age-Adjusted Heart Disease Deaths by Census Region and Year**



**Challenges remain for rural South and Midwest**

Overall, all census regions experienced declines in heart disease mortality from 2007 to 2017. In the West, the greatest decline in mortality occurred in Large Fringe Metropolitan areas, while Large Central Metropolitan areas had the greatest rate of decline in the Northeast, Midwest, and South. Furthermore, the highest rates of heart disease mortality occurred in Large Central Metropolitan areas of the Northeast and West, while Non-Core areas had the highest mortality rates in the South and Midwest. In the South and Midwest, the HP 2020 goal was met in Metropolitan areas, while mortality rates in rural (Non-Core and Micropolitan) areas continued to fall above the HP 2020 target rate by 2017. In the Northeast, all areas along the urban-rural continuum except Large Central Metropolitan and Micropolitan areas achieved HP 2020 goals by 2017. Therefore, the West was the only census region where all NCHS levels met HP 2020 objectives for heart disease.

**Figure 4. Age-Adjusted Heart Failure Deaths by Race and Year**



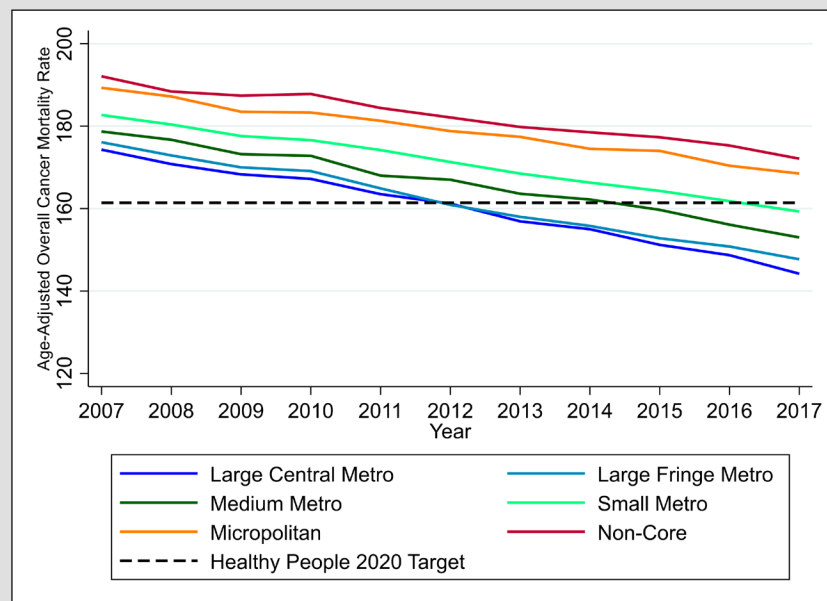**Mortality higher among rural Blacks and Whites compared to other racial groups**

All racial groups experienced declines in heart disease mortality over the past decade. Within NCHS categories, Large Central Metropolitan areas experienced the greatest declines in heart disease mortality among Whites, Blacks and Hispanics, while the greatest mortality decline among Asians occurred in Non-Core areas. By 2017, both Asian and Hispanics achieved HP 2020 goals for heart disease across all six urban-rural levels. For Whites, the HP 2020 goal was achieved in Metropolitan areas, while mortality rates in rural (Noncore and Micropolitan) did not meet the HP 2020 objective by 2017. Of all racial groups, Blacks appear to be faring the worst in heart disease mortality, with five of the six areas along the urban-rural continuum failing to meet the HP 2020 target by 2017.

## *Cancer*

Background

Cancer is the second leading cause of death in the U.S. According to the American Cancer Society, there were 1,735,350 new cases of cancer diagnosed in 2018 and about 609,640 deaths. The most common cancers among men are lung cancer, prostate cancer, and colorectal cancer, while breast cancer, colorectal cancer, and lung cancer are most common among women.[27] Between 2006 and 2015, the cancer incidence rate was stable among women, but dropped by about 2 percent per year among men. However, the mortality rate during the same period declined by about 1.4 percent and 1.8 percent among men and women, respectively.[28] The HP 2020 goal was to reduce the mortality rate of cancer by 10 percent from 179.3 cancer deaths per 100,000 population in 2007 to 161.4 deaths per 100,000 population in 2020.[29]
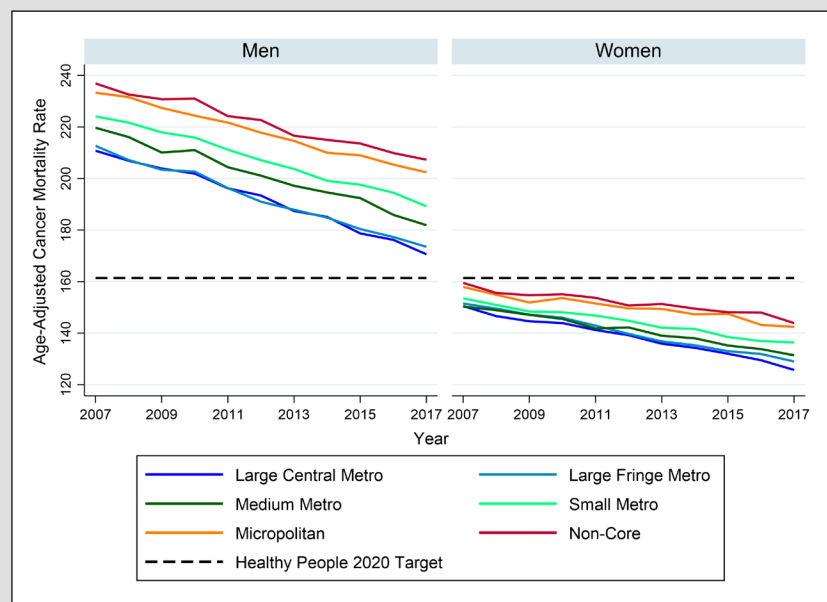
**Figure 5. Overall Age-Adjusted Cancer Deaths by Year**



**Cancer mortality rates decline, but HP 2020 target unmet in rural areas**

Overall, cancer mortality rates have declined steadily, but remain above the HP 2020 target in rural areas. Between 2012 and 2017, cancer death rates in all metropolitan areas – Large Central Metropolitan, Large Fringe Metropolitan, Medium Metropolitan, and Small Metropolitan areas – met the desired HP 2020 target of 161.4 deaths per 100,000 population. However, even though the death rates also fell in Micropolitan and Non-Core areas, the HP 2020 target has not been met. As of 2017, the cancer death rate was 168.5 and 172.1 deaths per 100,000 population in Micropolitan and Noncore areas respectively, which were 7.1, and 10.7 points above the HP 2020 target.
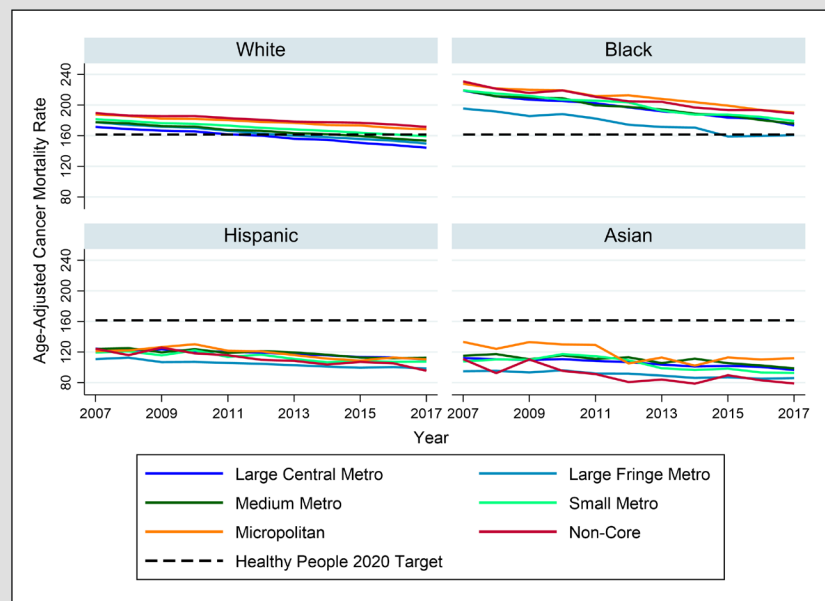
**Figure 6. Age-Adjusted Cancer Deaths by Gender and Year**



**Cancer mortality rates decline among males, but HP 2020 target not met**

Cancer mortality rates have declined sharply among males, particularly in Large Central and Large Fringe Metropolitan areas. However, regardless of the residence category, the HP 2020 target of 161.4 deaths per 100,000 population has not been achieved among males. In 2017, the age-adjusted cancer death rates among male residents of Micropolitan and Non-Core areas were 41 and 45.9 points above the HP 2020 target, respectively. The cancer death rates among women declined steadily in all rural-urban categories and remained below the HP 2020 target.
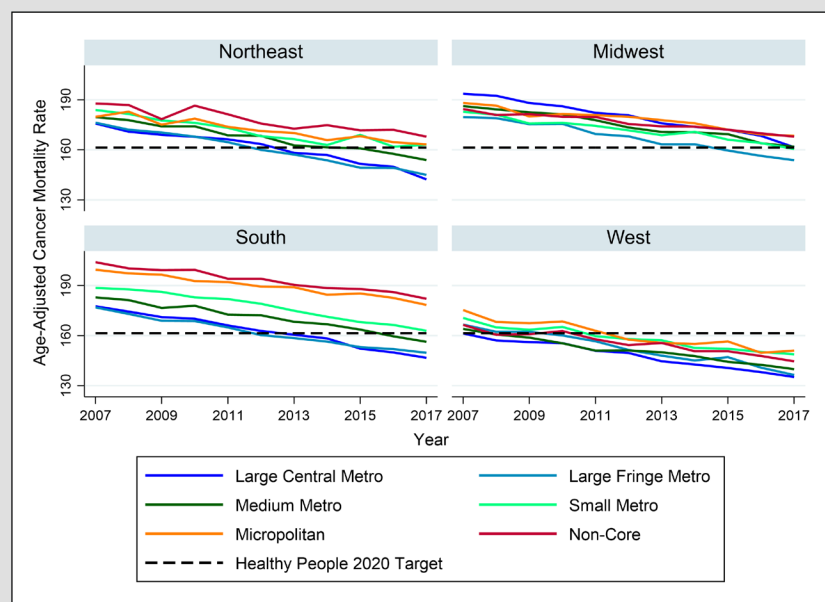
**Figure 7. Age-Adjusted Cancer Deaths by Race and Year**



**Cancer mortality rates still above HP 2020 target among Blacks and rural Whites**

Between 2007 and 2017, cancer mortality declined across all racial/ethnic groups and levels of rurality. However, as of 2017, the HP 2020 target had not been achieved among Whites in rural areas. Among Blacks, the HP 2020 target was not met at all, except for Blacks in Large Fringe Metropolitan Areas. Cancer mortality for Hispanics and Asians remained below the desired target between 2007 and 2017.

**Figure 8. Age-Adjusted Cancer Deaths by Census Region and Year**



**Cancer mortality declines across all census regions, but HP 2020 target not met in rural Northeast, Midwest and South**

There has been progress towards the HP 2020 target across all census regions. However, cancer mortality rates have remained above the target of 161.4 deaths per 100,000 population in the rural areas of the Northeast, Midwest and South. Even though mortality rates declined over the ten-year period in the South, there remained marked disparities between Metropolitan and Non-Metropolitan areas. As of 2017, the age-adjusted cancer mortality rate in Non-Core areas in the South was 35.4 points higher than that of Large Central Metropolitan areas. Moreover, the mortality rate in the rural South, i.e. in Non-Core and Micropolitan areas, was still 17.0 to 20.7 points above the HP 2020 target.
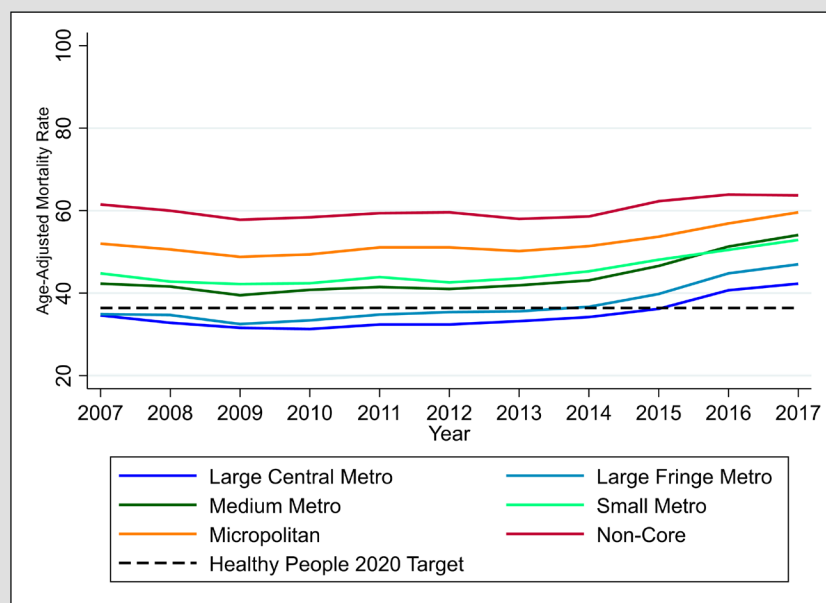
*Unintentional Injuries*

Background

In studying progress towards HP 2020 mortality goals, it is critical to understand changes in deaths caused by unintentional injury or accidents. Improvements in public health and public safety have resulted in important declines in unintentional injury mortality in the U.S. over the past century.[30] Nevertheless, unintentional injury led to 161,374 deaths in just 2016, making it one of the leading causes of death in the U.S. in the most recently available data.[31] The role of unintentional injury in mortality is even more pronounced among adolescents, where it is the leading cause of death.[32] While a wide variety of accidents that can result in death exist, the majority of these deaths are caused by motor vehicle crashes, poisoning, and falls.[32]

Healthy People 2020 targeted unintentional injury as an important mortality goal – setting a target of 36.4 age-adjusted deaths per year from an initial rate of 40.4 age-adjusted deaths per year in 2007.
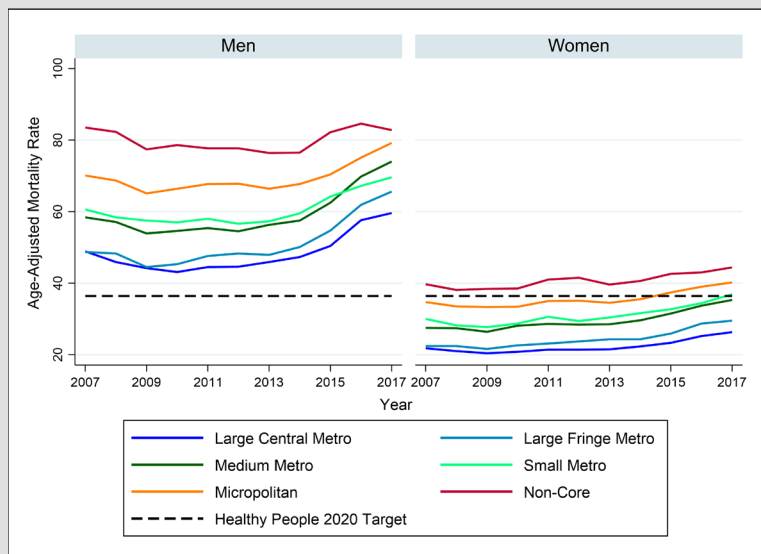
**Figure 9. Overall Age-Adjusted Unintentional Injury Deaths by Year**



**Unintentional injury mortality is on the rise and highest in rural America**

In analyzing changes in overall age-adjusted unintentional injury mortality across years, it is clear that the U.S. is moving away from the HP 2020 target. While Large Central Metropolitan and Large Fringe Metropolitan areas started the HP 2020 period below the target line, mortality increases in the past five years have moved their mortality rates above the 2020 goal. Mortality rates for unintentional injury in rural areas have remained largely unchanged since 2007. Non-Core and Micropolitan areas started the Healthy People period far above the target mortality and remain there today. Perhaps most notably, it appears that since 2015, mortality from unintentional injury is on the rise across all levels of rurality. As unintentional injury is often the ICD code used for drug overdoses, the growing mortality rates since 2015 could reflect increasing mortality caused by the opioid epidemic.[63]
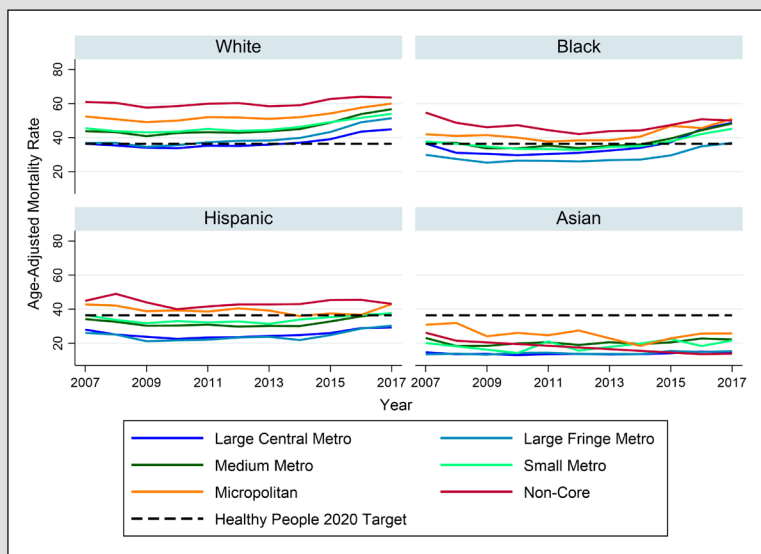
**Figure 10. Age-Adjusted Unintentional Injury Deaths by Gender and Year**



**Unintentional injury mortality is getting worse faster for men, especially in rural areas**

When analyzing HP 2020 progress for unintentional injury by gender, it is clear that mortality from unintentional injury is more common among men than women. Importantly, HP 2020 progress differences across genders do vary by rural status. For men, unintentional injury mortality started above the HP 2020 target for all levels of rurality and has remained well above the 2020 target. For women, urban areas started in 2007 having already achieved the 2020 target and remain below the target. Women in Non-Core areas have not achieved the HP 2020 goal, while women in Micropolitan areas have seen increasing mortality, pushing them away from achieving the unintentional injury mortality goal. Interestingly, while the trend of rising mortality rates is seen for both men and women, rates appear to be increasing faster for men, particularly in urban areas.
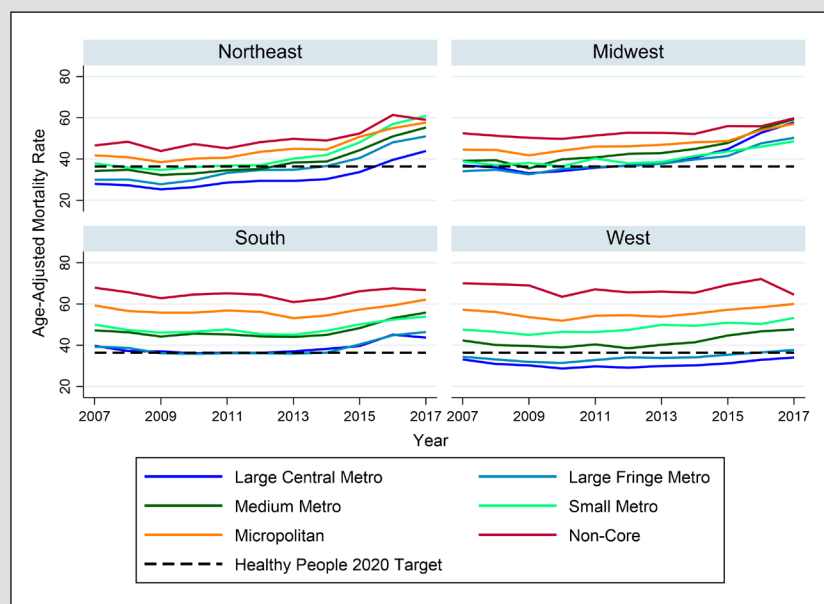
**Figure 11. Age-Adjusted Unintentional Injury Deaths by Race and Year**



**Mortality high for whites and blacks, better for Asians and urban Hispanics**

Progress toward the HP 2020 mortality objective for unintentional injury also varies considerably by race and ethnicity across levels of rurality. Results from 2007-2017 indicate that Asians across all levels of rurality and Hispanics in urban areas have achieved the HP 2020 goal, while all other groups have not. Unintentional injury mortality is highest among Whites, particularly in rural America where there has been no progress towards reducing White unintentional injury mortality in the past decade. Among Whites and Blacks there is also clear evidence of the growing unintentional injury mortality in recent years, as was seen in Figures 9 and 10. While Blacks in rural areas remained above the Healthy People target during the entire period of analysis, Small and Medium Metropolitan areas made some progress in the early years of analysis before seeing increasing mortality push them above the Healthy People target. Finally, Hispanics in rural areas have seen little movement overall towards the Healthy People target, but as they started the period of analysis close to the 2020 goal, their mortality rates are still lower than rural Whites or Blacks.

**Figure 12. Age-Adjusted Unintentional Injury Deaths by Census Region and Year**



**Mortality is on the rise across census regions but highest in rural South and West**

Unintentional injury mortality also varies considerably by census region. As of 2017, only Large Central Metropolitan areas in the West had achieved the HP 2020 mortality goal. The second highest mortality rates were seen in the Non-Core West, behind only the Non-Core South. The fact that the West has the second-highest and lowest mortality rates demonstrates the significant variation in mortality for the West across levels of rurality. This variation across levels of rurality is also pronounced in the South, which mirrors the West with high mortality in rural America. Mortality patterns also mirror each other in the Northeast and Midwest. In both census regions, mortality rates have risen steeply in the past few years, although 2017 mortality rates were higher in Large Central Metropolitan areas of the Midwest than the Northeast. Similarly, urban parts of both regions started the period of analysis having already achieved the HP 2020 goal but have since moved above the 2020 target.

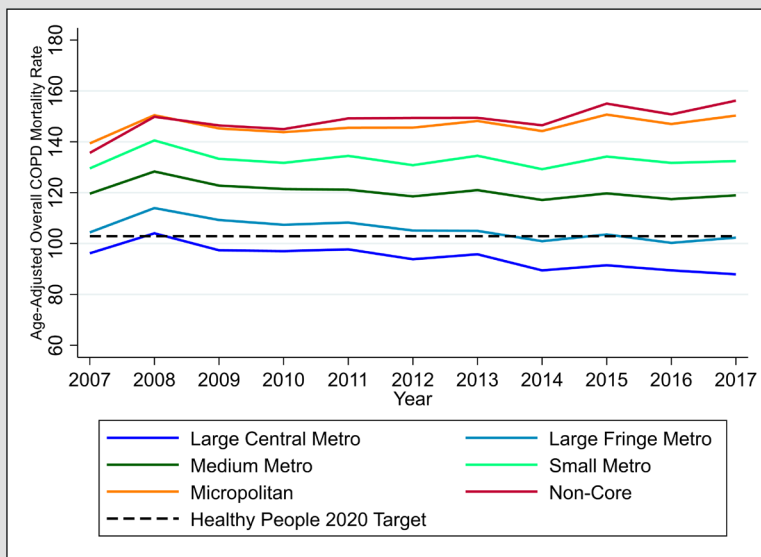*Chronic Obstructive Pulmonary Disease (COPD)*

Background

Chronic obstructive pulmonary disease is one of the leading causes of death in the U.S., with roughly 120,000 Americans dying from the disease each year.[34,35] Chronic obstructive pulmonary disease includes a group of diseases like emphysema and bronchitis, which result in breathing problems for the roughly 16 million Americans with the disease.[36] Importantly, prior research suggests more than half of adults with pulmonary issues do not know they have COPD, so the actual number of Americans with the disease could be higher.[37,38] While smoking tobacco has been found to be key to the development of

COPD, not all individuals with COPD are smokers and not all smokers develop COPD.[35] Additional risk factors include occupation, air pollutants, certain respiratory infections, and genetics.[37]

Given its prominence as a leading cause of death, HP 2020 targeted reducing COPD deaths as an important mortality goal – hoping to decrease the mortality rate from 113.9 in 2007 to 102.6. Unlike other HP 2020 mortality objectives in this chartbook, COPD mortality estimates only reflect the 45 year and older population, because COPD is rarely diagnosed in young individuals. This is in line with the Healthy People objective for this cause of death.
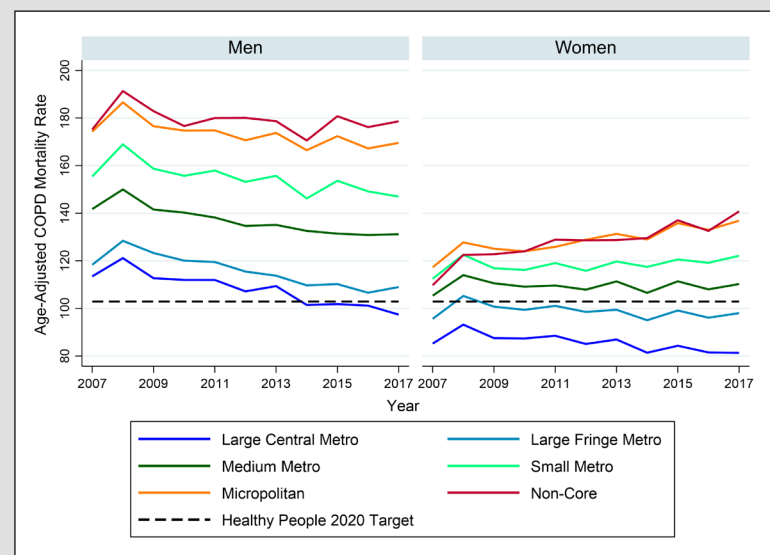
**Figure 13. Overall COPD Deaths by Year**



**COPD mortality is higher in rural areas and stable over time**

When examining COPD mortality over time and across levels of rurality, it is clear that COPD mortality is much higher in rural areas than in urban areas. While Large Central and Fringe Metropolitan areas both achieved the HP2020 goal by 2017, rural areas made little progress towards the objective. Importantly, COPD mortality rates are mostly stable over time at each level of rurality. After an initial increase in mortality between 2007-2008, mortality rates are mostly flat, with little improvement towards the HP 2020 target and even some movement away from the target in Micropolitan and non-core areas.
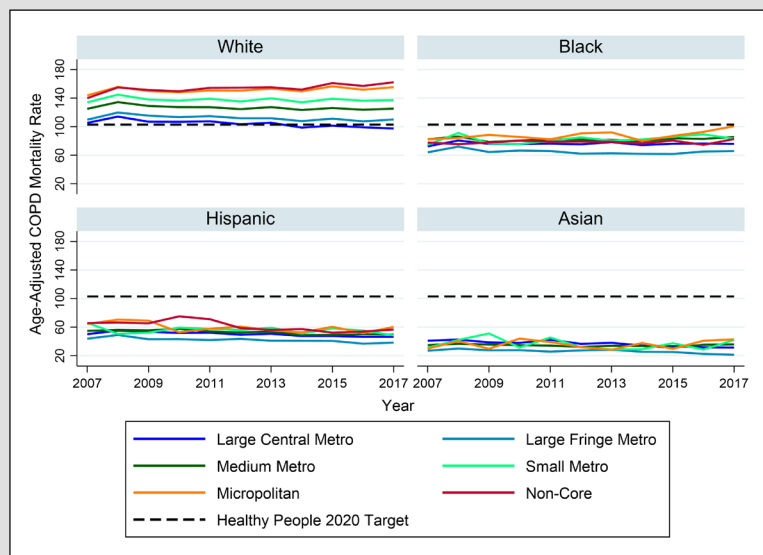
**Figure 14. Age-Adjusted COPD Deaths by Gender and Year**



**COPD shows minor improvement among men, increased death in women**

Analyzing trends in COPD mortality from 2007-2017 across men and women reveals the importance of looking at differences in COPD mortality across gender and rurality. Overall, COPD mortality rates are consistently higher for men than for women. The differences are particularly striking in rural America where male mortality rates are consistently between 170-190 and female mortality rates barely exceed 140. Interestingly, differences across levels of rurality are also more striking for men. In other words, the gap between mortality rates in rural and urban areas is much larger for men than for women. Importantly, however, looking at trends over time does suggest potential improvements for men and worsening rates for rural women. While only men in Large Central Metropolitan areas have achieved the HP 2020 goal, trend lines at most levels of rurality show minor improvements over time. For women, however, COPD mortality appears to be on the rise, particularly in the Non-Core and in Micropolitan areas. Critically, COPD is the only cause of death examined where trends are getting worse for women, but improving for men.

**Figure 15. Age-Adjusted COPD Deaths by Race and Year**



**COPD mortality highest for Whites across levels of rurality**

Comparing U.S. progress in meeting HP 2020 mortality goals for COPD across race and levels of rurality reveals that COPD mortality is much higher among Whites than any other racial group. Whites at all levels of rurality except Large Central Metropolitan areas have failed to achieve the HP 2020 COPD mortality target, and trends over time suggest that little progress has been made at other levels of rurality. Hispanics and Asians, by comparison are doing quite well when studying COPD. Hispanics and Asians at all levels of rurality started the period of analysis having already achieved the Healthy People mortality objective for COPD, and those mortality rates have stayed largely consistent from 2007-2017. Rates for Blacks are slightly higher than rates for Asians or Hispanics, but show similar patterns, with most levels of rurality starting below the HP 2020 target line and staying there throughout the past decade. Notably, our findings do detect an uptick in Black mortality in Micropolitan areas to near the HP 2020 objective. Close monitoring of this population and the development of public health interventions are warranted to prevent continued increases.

**Figure 16. COPD Deaths by Census Region and Year**



**COPD mortality highest in rural South, lowest in urban West**

In looking at COPD mortality across census regions and levels of rurality, it is noted that important geographic differences exist in COPD mortality in the U.S. Urban areas of the West consistently have the lowest COPD mortality rates in the country, while the rural South has the highest rates. By 2017, Large Central Metropolitan areas had achieved the HP 2020 COPD mortality goal in all four census regions, but Large Fringe Metropolitan areas had only reached the target in the West. When analyzing just the most rural area, Non-Core, it appears COPD mortality is lowest in the West, highest in the South, with the Non-Core in the Northeast and Midwest regions performing better than Micropolitan or Small Metropolitan areas.
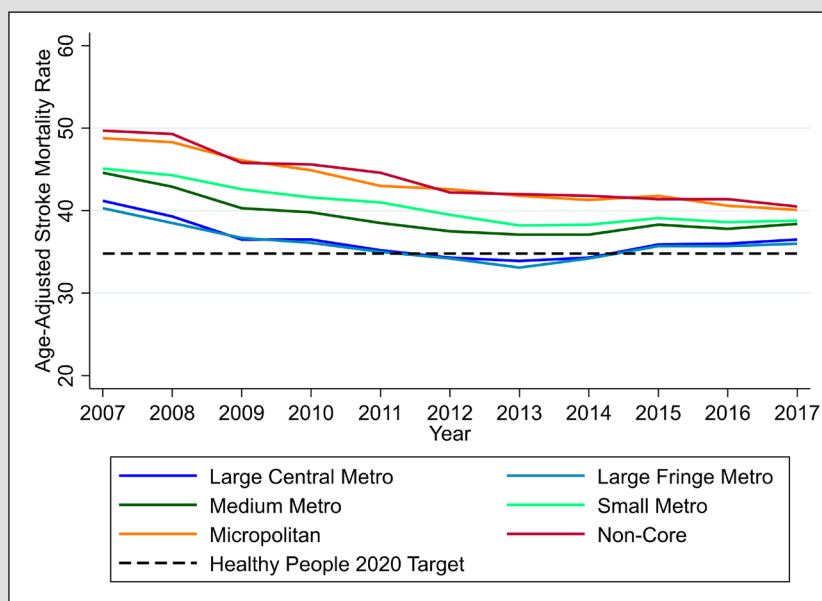
*Stroke*

Background

Stroke is a major cause of serious disability and is the fifth leading cause of death among American adults, following heart disease, cancer, accidents, and chronic lower respiratory diseases.[39,40] Each year, about 795,000 Americans experience a stroke and one out of every 20 deaths is attributable to a stroke.[40] The estimated economic impact of stroke involves $34 billion dollars annually. These costs include healthcare-related costs and costs associated with loss of productivity, the inability to work, and disability.[41] Also, there has been growing concern about disparities across gender, racial/ethnic groups, and rural-urban residence. It was documented that age-adjusted stroke mortality was higher in men than women.[42] Non-Hispanic Blacks had two-fold higher risks of a first stroke compared to non-Hispanic Whites,[40] and higher death rates than other racial/ethnic groups.[43] In comparison to urban areas, rural areas showed significantly higher rates of stroke deaths.[44] In 2007, age-adjusted stroke mortality reached 43.5 per 100,000 population.[45]

With growing recognition of the importance of stroke, the HP 2020 goal was to reduce stroke death rates by 20 percent in order to achieve a target of less than 34.8 deaths per 100,000.[46] Rural Healthy People 2020 national survey respondents identified cardiovascular disease and stroke as the overall 6th highest priority for rural populations.[47]
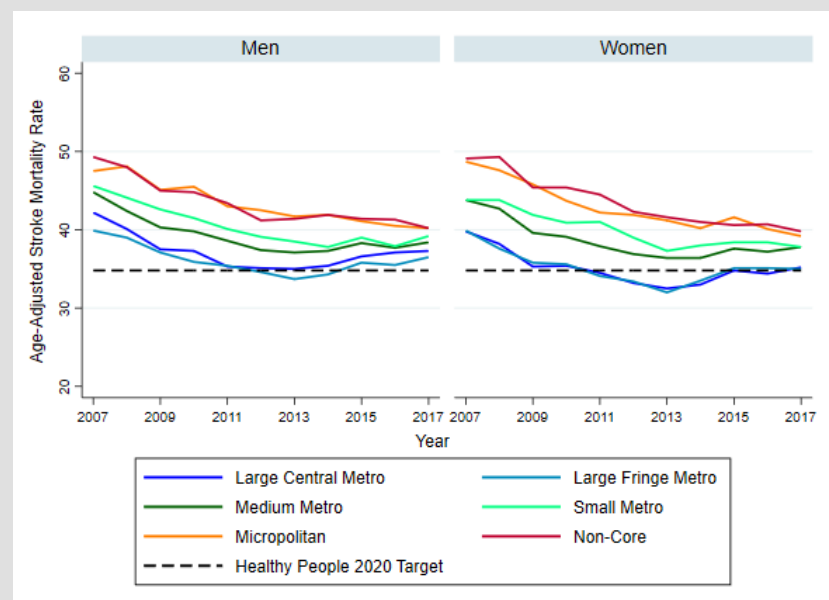
**Figure 17. Overall Age-Adjusted Stroke Deaths by Year**



**Stroke death rates have declined over time, but failed to meet the HP 2020 target in all levels of rurality**

Despite the steady decline in stroke mortality between 2007 and 2017, none of the levels of rurality met the HP 2020 target for stroke death rates of 34.8 per 100,000 population. Over the study period, rural areas experienced a greater reduction of stroke mortality than urban areas. Stroke mortality in Micropolitan and Non-Core areas was 40.1 and 40.5 in 2017, as compared to 48.8 and 49.7 in 2007, respectively. The stroke mortality in Large Central Metropolitan and Large Fringe Metropolitan areas was 36.5 and 36 in 2017 as compared to 41.2 and 40.3 in 2007, respectively. However, as with the previous decade, rural areas remain the highest in stroke mortality and far above the HP 2020 target. In contrast, Large Central Metropolitan and Large Fringe Metropolitan areas are slightly above the HP 2020 target mortality.
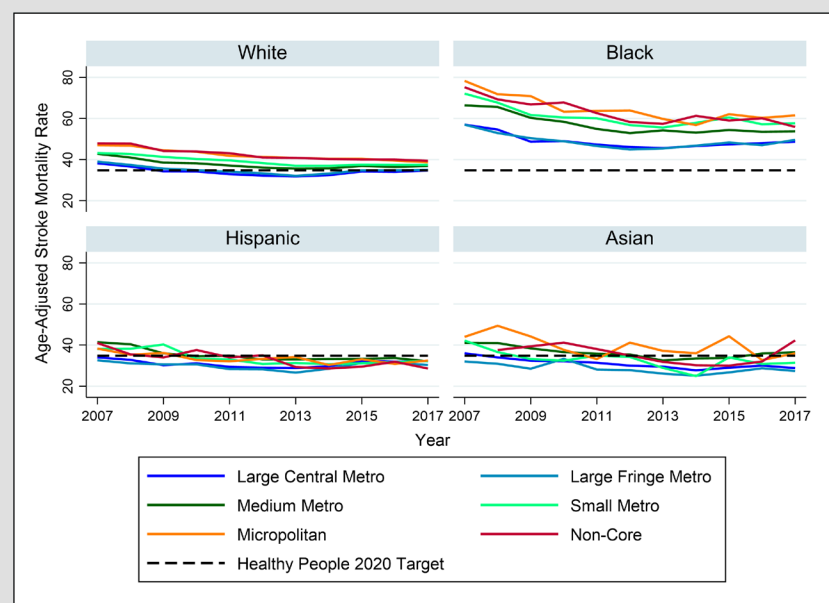
**Figure 18. Age-Adjusted Stroke Deaths by Gender and Year**



**Male mortality remains above the HP 2020 target, but female mortality in large urban areas met the target**

Over the past decade, stroke mortality showed significant declines in both males and females, regardless of NCHS categories. In both sexes, the greatest decline in stroke mortality took place in rural areas. However, stroke mortality was consistently highest in Micropolitan and Non-Core areas, and lowest in Large Central Metropolitan and Large Fringe Metropolitan areas. While female stroke mortality in Large Central Metropolitan and Large Fringe Metropolitan areas met the HP 2020 target by 2017, male stroke mortality remains above the Healthy 2020 target across all levels of rurality.
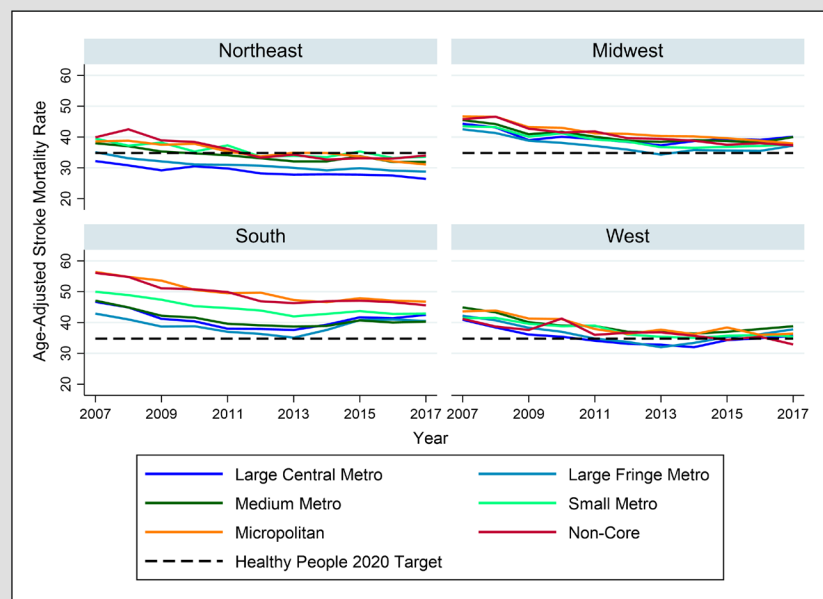
**Figure 19. Age-Adjusted Stroke Deaths by Race and Gender**



**Stroke-related mortality significantly higher among Blacks across all levels of rurality**

Overall, all racial groups across all NCHS categories showed declines in stroke mortality between 2007 and 2017, except for Asians in Non-Core areas. By 2017, Hispanics met the HP 2020 target mortality across all levels of rurality, while Asians met the goal in three NCHS levels – Large Central Metropolitan, Large Fringe Metropolitan, and Small Metropolitan areas. For Whites, the HP 2020 target was met only in Large Central Metropolitan areas. Blacks did not meet the HP 2020 target, in all rurality levels, and remain disproportionately high in stroke mortality compared to other racial/ethnic groups.

**Figure 20. Age-Adjusted Stroke Deaths by Census Region and Year**



**Despite decline over years, stroke mortality continues to be a significant challenge for all regions but the Northeast**

From 2007 to 2017, there have been marked improvements in stroke mortality across all census regions. During this period, the South consistently showed the highest stroke mortality, while the Northeast showed the lowest mortality in all rural-urban categories. By 2017, the HP 2020 goal was met in the Northeast across all levels of rurality. On the contrary, except for the West in Non-Core areas, stroke mortality continued to remain above the HP 2020 target rates in the Midwest, South, and West. Furthermore, disparities in stroke mortality were pronounced in rural areas compared to urban areas in the South. Although the Midwest, South, and West census regions experienced the greatest declines in stroke mortality in Non-Core areas, persistent challenges in reducing stroke mortality continue to be observed in these regions.
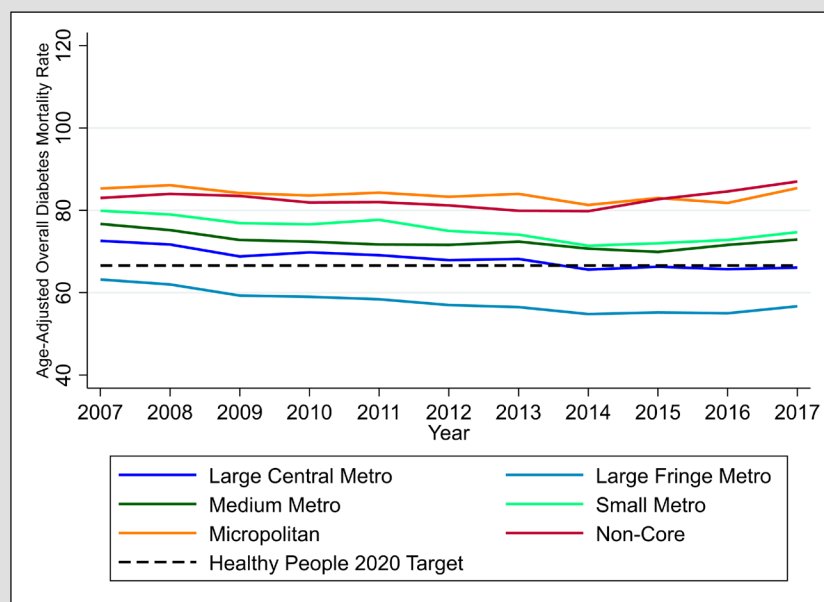
*Diabetes*

Background

Diabetes mellitus (DM) is the seventh leading cause of death in the U.S.[48] Diabetes mellitus can appear in many forms, but the three most common ones are (1) Type 2, which occurs when there is insufficient production of and resistance to insulin in the body; (2) Type 1, which occurs when the body is unable to produce insulin; and (3) Gestational diabetes, which occurs during pregnancy.[49] This disease is associated with substantial human and financial costs. Persons living with diabetes ar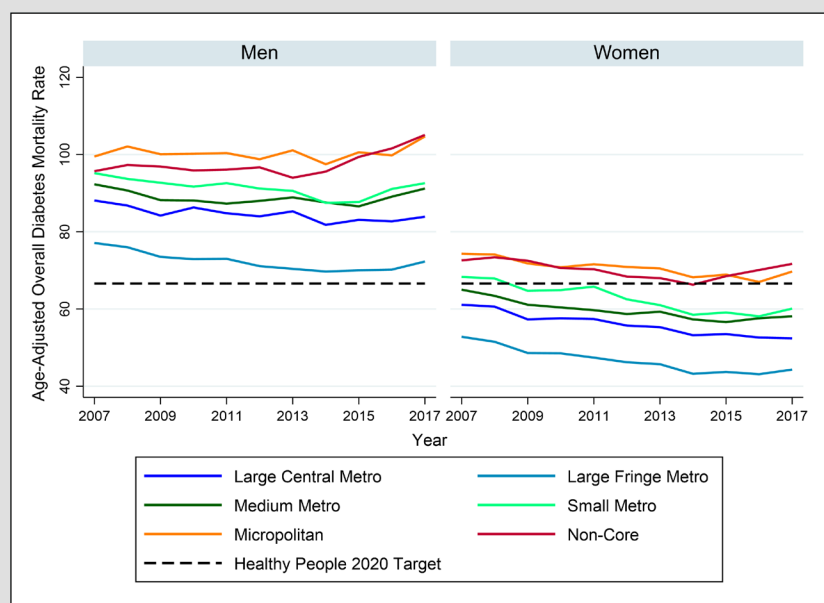e often at risk of experiencing a myriad of other health challenges including kidney failure,[50] cardiovascular disease,[51] blindness,[52] depression,[53] and lower-limb amputation,[54] among others. Moreover, the American Diabetes Association (ADA) has estimated that diabetes is associated with a $90 billion loss in productivity, and $237 billion for direct medical costs.[55] Previous research has noted that between 1988 and 2015, the total number of adults diagnosed with diabetes went from 6.2 million to 21.1 million in the U.S.[55] However, among persons diagnosed with diabetes, on average, mortality rates declined by 20% every decade.[55] The articulated HP 2020 goal for DM was to reduce the mortality rate by 10 percent from 74.0 deaths per 100,000 population in 2007 to 66.6 deaths per 100,000 population.[49]

**Figure 21. Overall Age-Adjusted Diabetes Deaths by Year**



**Residents of rural and Small-Medium Metropolitan areas continue to lag in reaching the Healthy People 2020 diabetes mortality target**
Overall, diabetes mortality rates declined through 2014, but afterward began increasing for most residential areas. Large Central Metropolitan areas were the only exception to this trend. Large Central Metropolitan areas and Large Fringe Metropolitan areas have met the HP 2020 diabetes mortality target, but all other areas have not. Non-Core and Micropolitan residents are furthest away from the target, and like their counterparts in Small Metropolitan, and Medium Metropolitan areas, are moving away from the target.

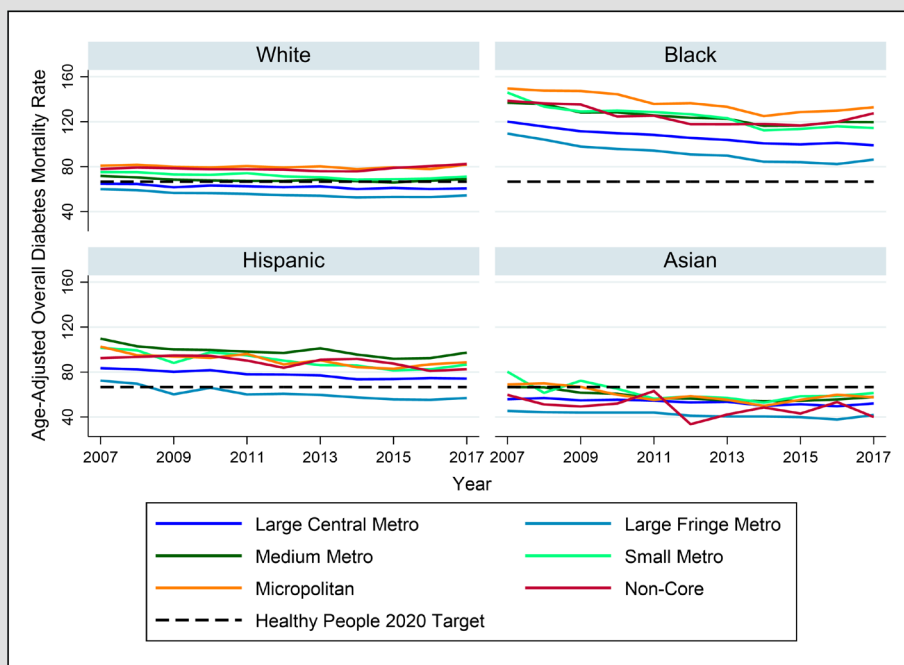**Figure 22. Age-Adjusted Diabetes Deaths by Gender and Year**



**Progress toward the Healthy People 2020 diabetes mortality target has been limited for most men in the U.S.**
Generally, men in the U.S. have not met the HP 2020 diabetes mortality target. Men in Large Fringe Metropolitan areas are closest to meeting the target, while men in Non-Core and Micropolitan areas are furthest away from meeting the target, and are in fact notably moving away from the target. Men in Non-Core and Micropolitan areas are approximately 40 points above the HP 2020 target.

**Women residing in rural areas of the U.S. met the Healthy People 2020 diabetes mortality target momentarily, but have been moving away from the target since 2016**
Women in the U.S. have made notably better progress toward the HP 2020 target than men have. Women in Large Central, Medium, Large Fringe, and Small Metropolitan areas have met and stayed below the target throughout the past decade. Women in Non-Core and Micropolitan areas met the target briefly in 2013 and 2016, respectively, but were moving away from the target in 2017.

**Figure 23. Age-Adjusted Diabetes Deaths by Race and Year**



**The Healthy People 2020 diabetes mortality target remains elusive among Blacks in the U.S. as well as among rural Whites and Hispanics**
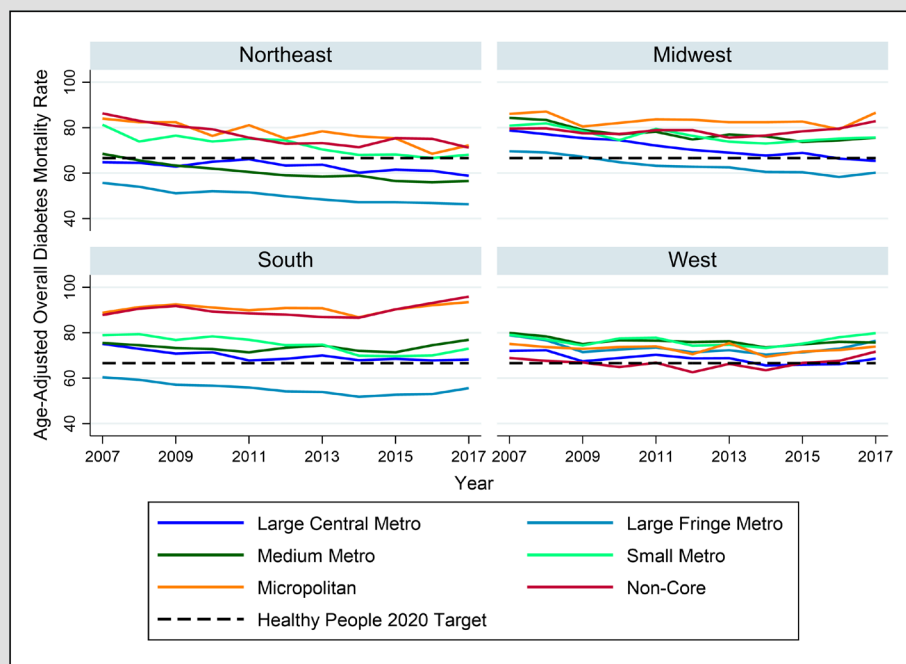
Whites in Large Central Metropolitan and Large Fringe Metropolitan areas were successful in meeting the HP 2020 diabetes mortality target. While Whites residing in Small Metropolitan and Medium Metropolitan areas were close to meeting or met the target, respectively, they were moving away from the target in 2017. Whites residing in Non-Core and Micropolitan areas were furthest away from meeting the target, and were, in fact, moving away from the target in 2017.

Blacks in the U.S. have not met the HP 2020 diabetes mortality target. This is true for Blacks regardless of the type of area in which they live. Despite this, Blacks residing in Large Fringe Metropolitan areas were closest to reaching the target, followed by Blacks in Large Central Metropolitan areas. Overall, declines in diabetes mortality among Blacks have occurred. However, in 2017, residents of Non-Core and Micropolitan areas were furthest away from the target, and also moving away from it.

Between 2007 and 2017, Asians in the U.S. met the HP 2020 diabetes mortality target across the urban-rural continuum. In 2012, Asians living in Non-Core areas were furthest below the target, suggesting that rural residence could have been, in some sense, protective in terms of diabetes mortality. Asians residing in Micropolitan areas met the HP 2020 target in 2009, and continued to be below the target through 2017.

Between 2007 and 2017, Hispanics residing outside of Large Fringe Metropolitan areas did not meet the HP 2020 diabetes mortality target. While notable declines were seen for all Hispanics throughout the decade, Hispanics residing in Large Central Metropolitan, Medium Metropolitan, Small Metropolitan, Micropolitan, and Non-Core areas had not met the HP 2020 diabetes mortality target.

**Figure 24. Age-Adjusted Diabetes Deaths by Census Region and Year**



**The rural South had the highest rates of diabetes mortality and Large Fringe Metros had the lowest mortality rates in the Northeast, South, and Midwest**

In the Northeast, Micropolitan and Non-Core residents saw notable declines in diabetes mortality rates, but had not met the HP 2020 target between 2007 and 2017. Residents of Large Central Metropolitan, Medium Metropolitan and Large Fringe Metropolitan areas have remained well below the HP 2020 diabetes mortality target through 2017.

In the Midwest, the HP 2020 diabetes mortality target has been met among residents of Large Central Metropolitan and Large Fringe Metropolitan areas only. Residents of Medium Metropolitan, Small Metropolitan, Non-Core, and Micropolitan areas remained substantially above the diabetes mortality target, with Non-Core and Micropolitan residents consistently being the furthest away from the target between 2014 and 2017.

In the South between 2007 and 2017, residents of Large Fringe Metropolitan areas consistently remained well below the HP 2020 diabetes mortality target. Residents of Large Central Metropolitan areas in the South were very close to meeting the target. Non-Core and Micropolitan residents of the South were furthest away from the HP 2020 diabetes mortality target. Residents of Medium Metropolitan, Small Metropolitan, Non-Core, and Micropolitan areas were moving away from the target in 2017.

Residents of the West largely did not meet the HP 2020 diabetes mortality target. The exceptions were residents of Non-Core areas between 2011 and 2016, and Large Metropolitan areas between 2013 and 2016. By 2017, residents of all areas along the urban-rural continuum were moving away from the HP 2020 diabetes mortality target.
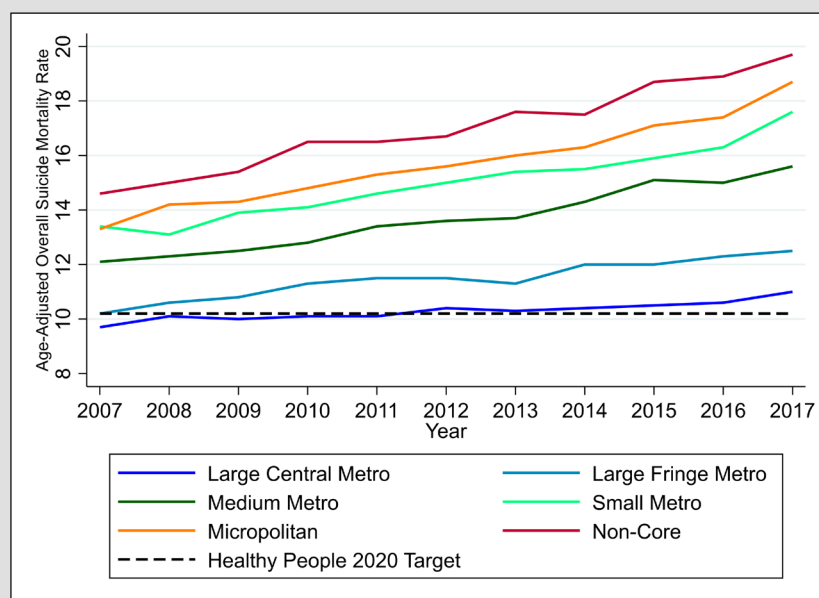
## Suicide

### Background

For over a decade, suicide has been ranked as the 10th leading cause of death for individuals of all ages in the U.S., with higher rates of suicide in men than in women.[56, 57] In 2016, suicide was the second leading cause of death for young people ages 10-24 and the third leading cause of death for those aged 25-44 years.[58] In 2007, there were 11.3 suicide deaths per 100,000 population. The HP 2020 goal for suicide was to reduce suicide mortality by 10 percent from 2007, resulting in a reduced target rate of 10.2 suicides per 100,000 population. While there are a number of methods by which suicide can occur, firearms is the most common means of suicide in the U.S., followed by suffocation and poisoning, respectively.[56] Importantly, prior research suggests that in most countries, including the U.S., suicide rates tend to be higher in men than in women.[59, 60]
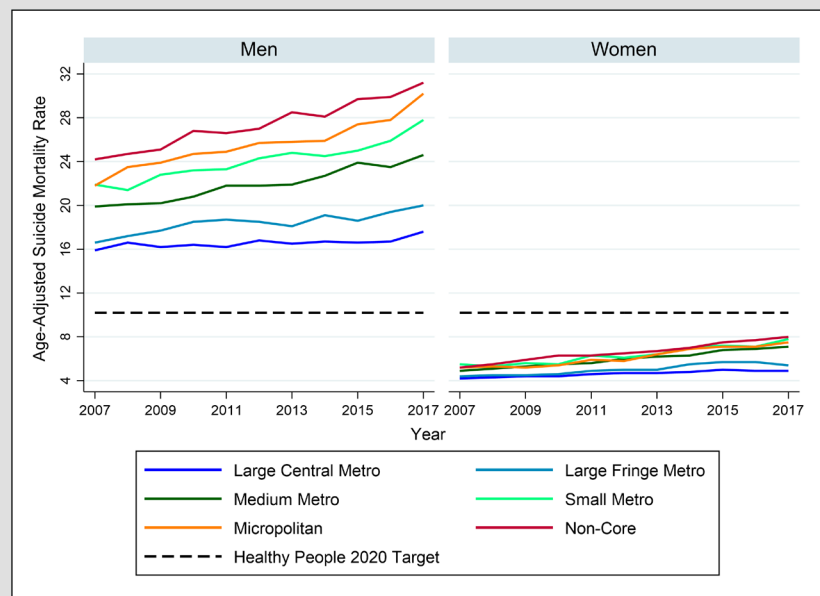
**Figure 25. Overall Age-Adjusted Suicide Deaths by Year**



**Suicide mortality continues to rise, with highest rates occurring in rural areas**

When examining changes in suicide mortality from 2007 to 2017, it is apparent that suicide rates are on the rise in the U.S. While suicide rates in Large Central Metropolitan areas met the HP 2020 target in 2007, steady increases in suicide mortality resulted in rates above the HP 2020 goal by 2017. In fact, age-adjusted suicide mortality increased across all NCHS levels across the study period, and by 2017, all levels remained above the HP 2020 target. In general, suicide mortality increased as locations became more rural and less urban, with Non-Core areas displaying the highest overall age-adjusted suicide mortality rates, ranging from 14.6 per 100,000 in 2007 to 19.7 per 100,000 in 2017. Conversely, the lowest suicide mortality rates from 2007-2017 occurred in Large Central Metropolitan areas.
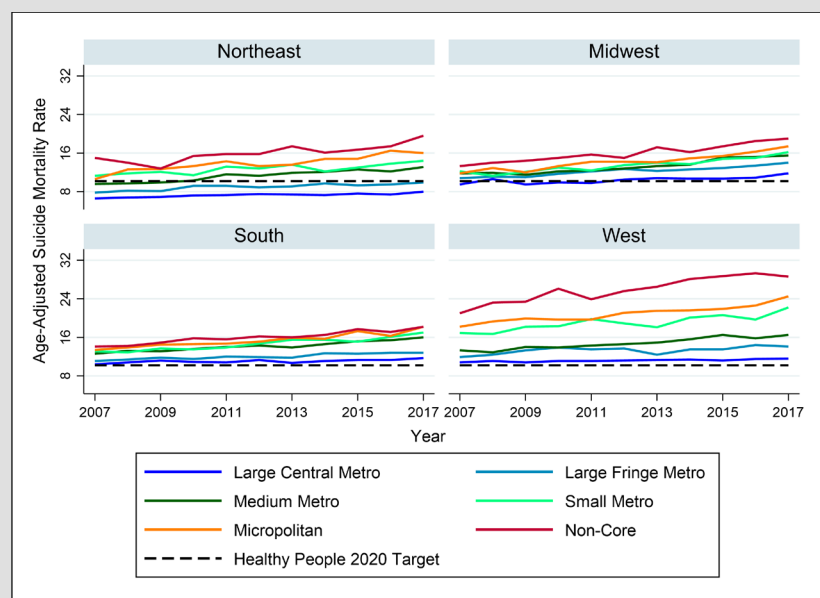
**Figure 26. Age-Adjusted Suicide Deaths by Gender and Year**



**Male suicide rates both higher and increasing faster than female counterparts**

When examining trends in HP 2020 progress for suicide by sex, it is apparent that men face a greater burden of mortality from suicide than women. Male suicide mortality rates across all NCHS levels remained above the 2020 target by 2017, with the highest mortality occurring in rural locations. Female suicide rates across all levels started below the HP 2020 target in 2007, and remained below the HP 2020 goal by 2017, despite increasing trends. Notably, age-adjusted suicide mortality rates for both sexes were consistently highest in Non-Core areas, and lowest in Large Central Metropolitan areas.

**Figure 27. Age-Adjusted Suicide Deaths by Census Region and Year**



**Suicide mortality is increasing across all census regions, but highest in rural West**

Age-adjusted suicide mortality progressively increased from 2007 to 2017 across all census regions. By 2017, age-adjusted suicide mortality remained above the HP 2020 target for the South, West, and Midwest census regions. In the Northeast, age-adjusted suicide mortality rates for Large Central Metropolitan and Large Fringe Metropolitan areas fell below the HP 2020 target, while the remaining NCHS areas remained above the HP 2020 target. From 2007 to 2017, age-adjusted suicide mortality rates were consistently highest in Non-Core areas and consistently lowest in Large Central Metropolitan areas within each census region.
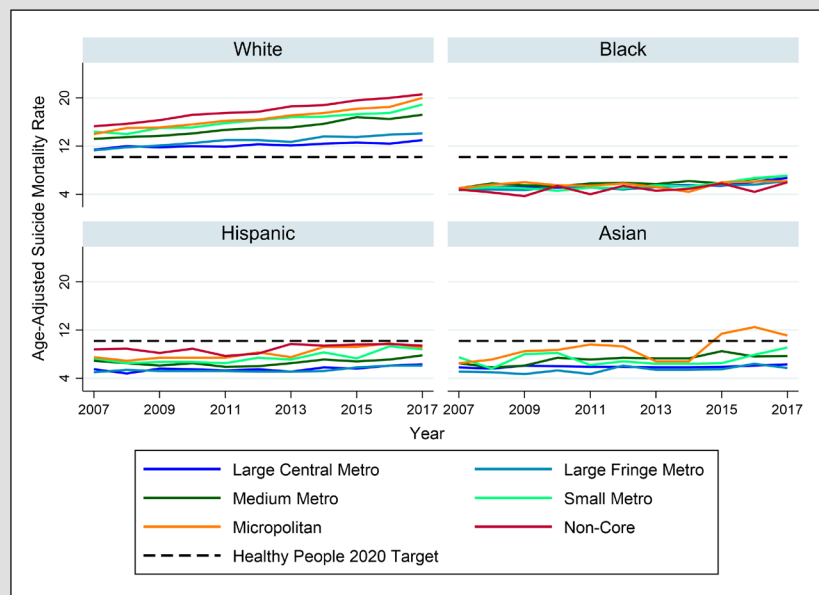
**Figure 28. Age-Adjusted Suicide Deaths by Race and Year**



**Rural Whites experience greatest burden of suicide mortality**

Progress towards the HP 2020 target for suicide mortality differed significantly by race/ethnicity, and levels of rurality. From 2007-2017, suicide mortality for Hispanics and Blacks fell well below the HP 2020 target of 10.2 suicides per 100,000. For Asians, all NCHS levels fell below the HP 2020 target, except for Micropolitan areas – which exceeded the HP 2020 target in 2015-2017. There is no trend line for Asian suicide in Non-Core areas due to data restrictions caused by an insufficient number of cases for the CDC Wonder to produce non-suppressed results. Of all racial groups, Whites appear to be faring the worst in terms of suicide mortality, with rates exceeding the HP 2020 target across all rurality levels. For Whites, Hispanics, and Asians, suicide mortality was generally highest in Micropolitan or Non-Core areas, while the highest suicide mortality rates for Blacks occurred in Large Central and Medium Metropolitan areas.

## Discussion

Our analysis of national progress towards HP 2020 mortality goals for leading causes of death has revealed important discrepancies in progress by rural status. While urban areas of the U.S. have made considerable progress towards HP 2020 goals, rural areas are not keeping pace. Nevertheless, there are notable achievements in meeting the mortality decline targets among certain subpopulations along the urban-rural continuum. For example, with respect to cancer, women, Hispanics, and Asians, as well as residents of the West had reached the mortality benchmark for this disease, even in rural areas. Moreover, in terms of suicide mortality, women, Blacks and Hispanics were well below the HP 2020 targets regardless of residence along the urban-rural continuum. However, despite these achievements, the most rural area, the Non-Core, had the highest mortality rate for every topic examined. Importantly, the Non-Core had not achieved the HP 2020 goal by 2017 for any of the topics analyzed.

Our results also suggest important differences in progress towards HP 2020 goals across leading causes of death. While diabetes, heart disease, and cancer saw considerable progress towards HP 2020 targets, minimal progress had been made for stroke and COPD, and rates for suicide and unintentional injury mortality are actually on the rise – moving away from the 2020 goal.

The analysis of progress across causes of death and levels of rurality were even more revealing when broken down by gender, race, and census region. When analyzing gender, we found that men appear to lag behind women in achieving HP 2020 goals across levels of rurality and causes of death. Our results demonstrate that for every analyzed indicator except stroke, rural men are further away from the HP 2020 goals, and urban women have made the most progress. Particular attention is needed to address sharp increases in suicide and unintentional injury mortality among men. When investigating race, we found that across leading causes of death, Hispanics and Asians

typically had made more progress towards HP 2020 goals than Blacks or Whites. That said, the racial group that had made least progress between Blacks and Whites varied by cause of death. Specifically, Whites had the highest mortality rates for COPD, suicide, and unintentional injury while Blacks had the highest rates for cancer, diabetes, and stroke. Blacks also started our period of analysis with higher rates of heart disease mortality than all other racial groups, but Black mortality was similar to White mortality for heart disease by 2017. Finally, when looking across census regions and levels of rurality, we find that the rural South has made less progress towards HP 2020 goals than other regions for diabetes, cancer, stroke, COPD, and heart disease. Suicide shows a different pattern of results with the highest mortality rates in the rural West.

## Policy Implications

Our study of progress towards HP 2020 goals across levels of rurality leads to several recommendations to reduce mortality rates for leading causes of death and to push us closer to achieving HP 2020 goals. First, given the limited progress of rural America as compared to urban America in achieving HP 2020 goals, more resources are needed to address leading causes of death in rural areas. Simultaneously, resources from existing initiatives may need to better account for structural urbanism, which biases healthcare infrastructure development and spending towards population centers instead of rural areas with higher need.[64] Reducing mortality rates for any of these causes of death requires a multifaceted approach. However, increased resources in rural areas could improve access to care by allowing for more medical providers and transportation to needed preventative health services and would be widely beneficial. Importantly, additional financial resources could also be used in educational efforts aimed at individuals with diabetes, heart disease, and to train rural residents to look for signs of potential suicide.

Second, our chartbook highlights specific areas of concern that should be the focus of future efforts in reducing mortality from these diseases. In particular,

efforts hoping to reduce mortality from the leading causes of death are advised to tailor outreach and resources for men for all leading causes. Furthermore, they should focus outreach efforts and resources for the South for diabetes, cancer, stroke, COPD, and heart disease, as well as the West for suicide. When considering race, efforts should emphasize Whites for COPD, suicide, and unintentional injury, and Blacks for cancer, diabetes, and stroke. Of course, efforts are needed beyond these groups, but by targeting interventions to these groups, the most progress in reducing mortality rates can be made.

Next, our findings suggest the need for more careful consideration of rural America in future iterations of Healthy People. While Healthy People objectives are crafted scientifically, they are based on national rates without careful consideration of the discrepancies that already exist at the start of each new decade of Healthy People. Thus, rural areas must make even more progress than their urban counterparts to achieve these objectives generally. With that in mind, Healthy People 2030 and 2040 should work to address this issue. This could potentially be done by setting goals that are realistic for both urban and rural America to achieve in 10 years, or by setting separate Healthy People goals for rural America. Of course, in setting separate Healthy People goals for rural America, we would need to balance the need for relative and realistic improvement in rural America with ensuring that we don't formalize the impression that rural areas are inherently worse off and that it is acceptable that they have higher mortality rates.

Our chartbook also highlights the need for additional research on Healthy People progress by levels of rurality. Our analysis is limited to just topline statistics and more can be done to move beyond our findings here. Specifically, research that investigates reasons for change in mortality rates over time, particularly for causes of death that have seen spikes in recent years like suicide and unintentional injury is needed. Finally, as federal, state, and local stakeholders continue to assess the health of the nation and set targets to improve population health, more thorough consideration of disparate mortality levels is needed. Further, the unique barriers to achieving optimal

health in rural America should also be contemplated in crafting objectives for Healthy People. By creating objectives that consider current trends in both rural and urban areas, we can work to ensure that rural areas have realistic goals to work towards in the coming decades to improve health access.

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