

## AHA PRESIDENTIAL ADVISORY

# Call to Action: Rural Health

## A Presidential Advisory From the American Heart Association and American Stroke Association

**ABSTRACT:** Understanding and addressing the unique health needs of people residing in rural America is critical to the American Heart Association's pursuit of a world with longer, healthier lives. Improving the health of rural populations is consistent with the American Heart Association's commitment to health equity and its focus on social determinants of health to reduce and ideally to eliminate health disparities. This presidential advisory serves as a call to action for the American Heart Association and other stakeholders to make rural populations a priority in programming, research, and policy. This advisory first summarizes existing data on rural populations, communities, and health outcomes; explores 3 major groups of factors underlying urban-rural disparities in health outcomes, including individual factors, social determinants of health, and health delivery system factors; and then proposes a set of solutions spanning health system innovation, policy, and research aimed at improving rural health.

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**A**lthough advances in health and health care have spurred improvements in cardiovascular outcomes, cardiovascular disease (CVD) remains the leading cause of death in the United States and around the world. In recent years, declines in cardiovascular mortality have stalled, and some cardiovascular conditions such as stroke and heart failure are showing increasing death rates. These overall trends also mask significant variability; the decrements have been worst for people living in rural counties in the United States, where both overall mortality and cardiovascular mortality are rising.

Rural populations in the United States are heterogeneous and comprise 60 million people or 20% of the US population. Understanding and addressing the unique health needs of people residing in rural America therefore is critical to the American Heart Association's (AHA's) pursuit of a world with longer, healthier lives. In addition, as the healthcare delivery system shifts to organizing and paying for care delivery according to value (best health at best cost) rather than volume of profitable services, it is also imperative that rural populations benefit from innovations in care models and are not left behind in this paradigm shift.

Improving the health of rural populations is consistent with the AHA's commitment to health equity and its focus on social determinants of health (SDOH) to reduce and ideally to eliminate health disparities.<sup>1</sup> The AHA is in a unique position to leverage its many assets in science, education, programs, and advocacy to bring to bear a comprehensive, systematic, and evidence-based approach that will assess the assets and needs of rural populations and use those analyses to reimagine the

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way that health care is delivered to catalyze meaningful improvements in health in rural America.

This presidential advisory serves as a call to action for AHA and other stakeholders to make rural populations a priority in programming, research, and policy. This advisory aims first to summarize existing data on rural populations, communities, and health outcomes; to explore 3 major groups of factors underlying urban-rural disparities in health outcomes, including individual factors, SDOH, and health delivery system factors; and then to propose a set of solutions spanning health system innovation, policy, and research aimed at improving rural health.

## RURAL POPULATIONS AND COMMUNITIES

There is no single definition of rural in the United States. However, the term generally describes areas with low or geographically diffuse populations. The Office of Management and Budget, for example, defines rural counties as those with an urban core of  $\geq 10\,000$  but  $< 50\,000$  population (micropolitan) and those with no urban core. Under this definition, between 15% and 20% of the US population and nearly three-quarters of the land are considered rural. Alternative definitions, including those advocated by the Federal Office of Rural Health Policy, use a more granular definition based on Census Tracts rather than counties. Different definitions have been used for eligibility for programs, implementation of laws, and research and data collection at the state and federal levels.<sup>2,3</sup>

The rural population differs from the urban population in key demographics. As of 2017, 19% of the rural population is  $> 65$  years of age (compared with 15% in more urban areas).<sup>4</sup> Rural areas also have lower population growth. Since 2000, the rural population growth rate of 3% trails well behind that of urban (13%) and suburban (16%) areas; half of rural counties have actually seen a population drop in that time frame.<sup>5</sup>

There are slightly higher rates of poverty in rural areas. As of 2016, poverty rates in rural counties averaged 18% compared with 17% in urban areas and 14% in suburban ones.<sup>5</sup> This is explored in more detail in the section "Underlying Causes of Poor Cardiovascular Outcomes in Rural America: SDOH."

Overall, rural areas are more racially and ethnically homogeneous than urban areas; as of 2016, whites make up almost 80% of the rural population compared with 68% of the suburban and 44% of the urban population.<sup>5</sup> However, there is great racial and ethnic diversity in rural America by geography, with a high proportion of non-Hispanic black individuals in the rural South, Hispanic individuals in the Southwest, and American Indian/Alaska Natives in Oklahoma, the Great Plains, the American Southwest, and Alaska. In fact, 54% of the nation's 5.2 million American Indian

and Alaska Natives live in rural or reservation locations, whereas 68% of all indigenous populations live in close proximity to their homelands, which are located predominantly in rural America.<sup>6</sup>

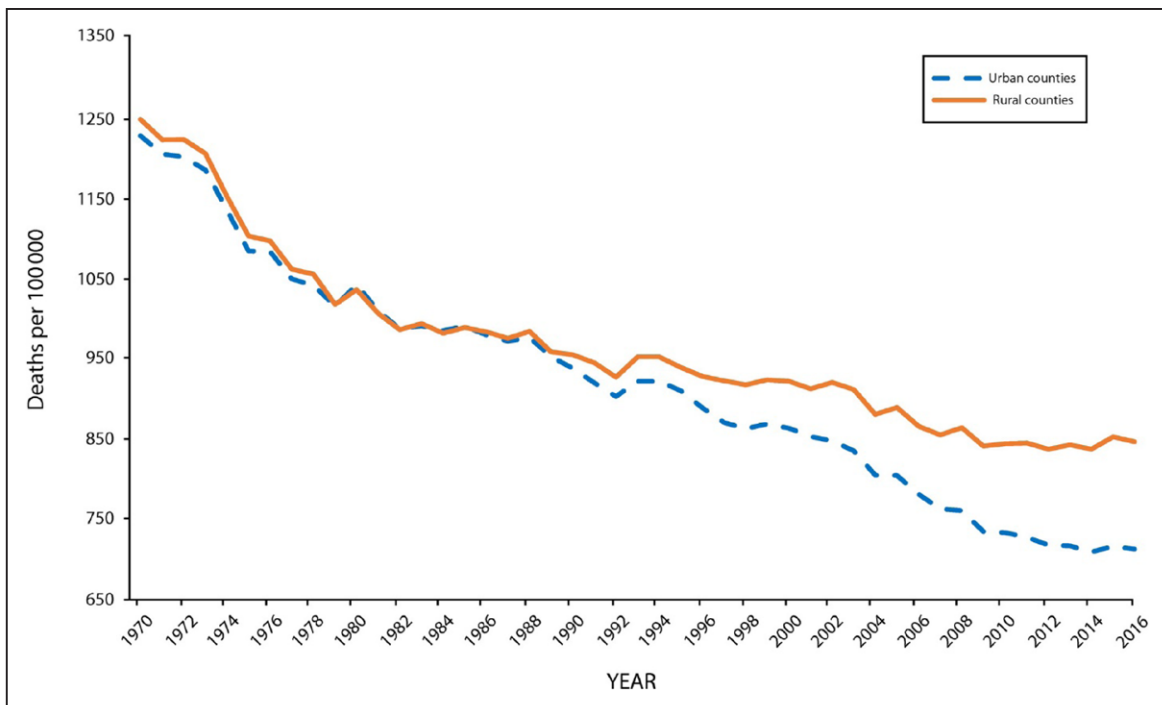
## OVERVIEW OF HEALTH OUTCOMES IN RURAL AMERICA

Gaps in health outcomes have widened markedly between rural and urban areas over the past 3 decades, and health outcomes are now significantly worse in rural than in urban areas. In the mid-1980s, rural and urban deaths per 100 000 population were approximately equal, but by 2004, there was a gap of 77 excess deaths per 100 000 in rural areas, and by 2016, this had nearly doubled to 134.7 excess deaths per 100 000, a nearly 20% disparity (847.7 versus 713.0; Figure 1).<sup>7</sup>

Life expectancy gaps between rural and urban areas are also increasing. Life expectancy was 0.4 years higher in urban than rural areas in 1971, but this gap rose to 2.0 years by 2009<sup>8</sup> and  $> 3$  years by 2014 (77.6 years versus 74.5 years for men and 82.4 years versus 79.7 years for women).<sup>9</sup> Some specific populations are at even higher risk; for example, indigenous peoples' life expectancies are 5.5 years lower than that of the general population, related largely to heart disease, diabetes mellitus, cancer, and unintentional injuries.<sup>10</sup>

Similar patterns have been seen for CVD and cardiovascular mortality. Data from the 2017 Centers for Disease Control and Prevention (CDC) National Health Interview Survey showed a 40% higher prevalence of heart disease among rural residents (14.2%) compared with their counterparts in small metropolitan (11.2%) and urban (9.9%) areas, a gap that has grown over the past decade.<sup>11</sup> Rural areas have higher death rates for CVD and stroke than urban areas, and gaps are widening here, too.<sup>12,13</sup> One study found that heart disease-attributable mortality declined 42% in urban areas between 1999 and 2009 but only 35% in rural areas.<sup>14</sup> From 2010 to 2015, the coronary heart disease death rate was significantly higher in rural areas compared with urban areas (118.2 versus 106.2 per 1 million people).<sup>15</sup> Rural residents have a 30% increased risk for stroke mortality compared with urban residents,<sup>16</sup> and recent national increases in stroke mortality are steepest in the rural South.<sup>17</sup> As with other health outcomes discussed, rural women face higher maternal mortality rates (29.4 maternal deaths per 100 000) compared with urban women (18.2 maternal deaths per 100 000); the growth in maternal mortality over the past 3 decades is driven largely by an increase in cardiovascular deaths.<sup>18</sup>

Other measures of health are also showing concerning trends for rural versus urban areas. Rural emergency department (ED) visits increased by  $> 50\%$  from 2005 to 2016 (from 36.5 to 64.5 visits per 100 people),



**Figure 1. Trends in rural and urban age-adjusted (all-cause) mortality for the United States (1970–2016).**

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outpacing rates in urban areas during that same time frame (from 40.2 to 42.8 visits per 100 people).<sup>19</sup>

## UNDERLYING CAUSES OF POOR CARDIOVASCULAR OUTCOMES IN RURAL AMERICA: INDIVIDUAL FACTORS

A number of factors likely contribute to the worse cardiovascular outcomes seen in rural versus urban areas. One group of such factors is demographic and individual-level health factors.

### Traditional Cardiovascular Risk Factors: Behavioral Risk Factors, Diabetes Mellitus, Obesity, and Hypertension

Rural areas have significantly higher rates of uncontrolled traditional cardiovascular risk factors compared with urban areas. As noted, rural populations are significantly older than urban and suburban populations.<sup>5</sup> They also have higher rates of diabetes mellitus, obesity, and hypertension.

Tobacco use is higher in rural areas than urban areas. Data from the Behavioral Risk Factor Surveillance System suggest that roughly one-quarter of adults living in rural counties report active tobacco use compared with 16% in metropolitan centers.<sup>20</sup> Data from the 2016 National Survey on Drug Use and Health show that rates of smokeless tobacco use are also higher in rural areas: 8.5% versus 3% in metropolitan centers.<sup>21</sup>

Compared with urban populations, rural residents are more likely to be physically inactive; for example, a study showed that 62.8% of rural residents reported being physically inactive compared with 59.3% of urban residents.<sup>22</sup> However, these trends also vary among different regions, which may be the result of differences in social and cultural factors.<sup>23</sup>

Rural populations have a significantly higher prevalence of obesity than urban populations, with 2016 CDC surveillance surveys showing that 34.2% of adults in rural counties were obese compared with 28.7% in metropolitan counties.<sup>24</sup> Even after demographics, diet, and physical activity were controlled for, obesity prevalence was still significantly higher in rural populations, suggesting that these differences are multifactorial.<sup>25</sup> These findings are similar for pediatric obesity; a study conducted in 2012 found that 16.5% of rural children had obesity compared with 14.3% of urban children.<sup>26</sup>

From 1988 to 1994, 6.5% of whites and 9.5% of blacks in rural areas had diabetes mellitus compared with 4.5% of whites and 6.0% of blacks in urban areas.<sup>27</sup> These gaps remain as the prevalence of diabetes mellitus grows nationwide; 2017 CDC data demonstrate rates of 11.4% in rural areas compared with 9.1% in suburban and 8.0% in urban areas.<sup>11</sup>

Rural populations are also at an increased risk of developing hypertension.<sup>27</sup> CDC data from 2017 estimate that 29.0% of rural residents had hypertension compared with 26.1% of suburban and 22.8% of urban residents.<sup>11</sup> One study found that this risk is affected by access to health care, race, socioeconomic status, age,

and geography.<sup>28</sup> These differences are even more pronounced among certain racial and ethnic groups; data from the National Health and Nutrition Examination Survey reported that 36% of rural non-Hispanic black individuals compared with 28.8% of urban blacks were diagnosed with hypertension, whereas 28.5% of rural whites and 23.3% of urban whites were diagnosed with hypertension.<sup>27</sup> Rural populations also have higher rates of high cholesterol, with 42.4% of rural populations having elevated lipids compared with 38.8% in metropolitan areas.<sup>29</sup>

Some rural subpopulations are particularly affected by these risk factors. Although regional and tribal variations exist, multiple studies have demonstrated high rates of obesity, diabetes mellitus, and hypertension; high rates of tobacco use; and low levels of physical activity in the American Indian/Alaska Native population.<sup>30,31</sup> For example, Native American communities have diabetes mellitus rates of >20% on average.<sup>10</sup>

### Other Cardiovascular Risk Factors: Mental Health and Substance Use

In addition to less favorable physical health, rural areas experience less favorable mental and behavioral health, which has been tied to CVD incidence, prevalence, and mortality in both adults and children.<sup>32,33</sup> Rates of depression and suicide are higher in rural areas compared with urban areas.<sup>34–37</sup> Among children, suicide rates are nearly twice as high in rural as in urban locations, and these differences are increasing over time.<sup>38</sup> Overall, studies suggest that individuals living in rural areas report similar or lower rates of adverse childhood events compared with people in urban areas.<sup>39,40</sup> However, certain groups such as the American Indian/Alaska Native population experience significantly higher levels of adverse childhood events.<sup>41</sup> Despite the perception that rurality is associated with isolation, research suggests that social isolation and loneliness do not differ significantly between urban and rural areas, although there is limited research in this area.<sup>5</sup>

In addition, although alcohol use in children is higher in rural than urban areas, rural individuals overall are less likely to report heavy alcohol use compared with their urban or suburban counterparts.<sup>20</sup> In addition, although rates of heavy alcohol use and alcohol-attributable mortality by American Indian/Alaska Native populations were once 2 to 6 times higher than those of the US general population or other rural groups,<sup>42,43</sup> recent data now show that rates are decreasing and are lower than in the general population.<sup>44</sup>

Historically, rates of drug use were lower in rural than urban areas.<sup>45</sup> However, in recent years, there has been a marked increase in drug misuse and in drug overdose deaths in rural areas, such that by 2015, drug overdose death rates per 100 000 population were higher in rural

areas (17.0 per 100 000) than in urban areas (16.2 per 100 000), and this divergence has continued.<sup>46</sup> This is in large part integrally related to the opioid crisis, which has disproportionately affected specific rural areas. From 1999 to 2016, reports suggest that opioid-related mortality increased 740% in nonmetropolitan areas and only 158% in central metropolitan areas. Specific parts of the country such as the rural Midwest (1600% increase) and rural Northeast (1141% increase) experienced much higher increases in mortality than other areas of the United States.<sup>47,48</sup> This has implications for access to treatment services in rural areas that suffer from inadequate availability of both basic and specialized treatment options. Travel distances to care, discussed in the sections “Transportation,” “Distance to the Hospital and Mode of Transportation,” and “Outpatient and Postacute Care,” can affect the likelihood of treatment completion, and potential lack of anonymity in group settings in small communities can act as a deterrent to seeking treatment.

Compounding these problems is a lack of access to mental health care in many rural areas. Although 20% of the US population is rural, <10% of mental health professionals practice in rural areas. Consequently, >60% of rural Americans live in areas with a mental health professional shortage (defined by the supply of psychiatrists, psychologists, clinical social workers, psychiatric nurse specialists, and family therapists).<sup>21</sup> Among certain subpopulations, these differences are even more striking. For example, rural veterans are 70% less likely to receive mental health services than urban veterans despite a similar or higher prevalence of mental health conditions.<sup>49</sup>

Native Americans are particularly affected by mental health risk factors and likewise by much higher rates of suicide than other groups. Suicide rates among Native Americans have been increasing since 2003, and at least one-third of all deaths by suicide in Native American populations are in the 0- to 25-year age group.<sup>50</sup>

### UNDERLYING CAUSES OF POOR CARDIOVASCULAR OUTCOMES IN RURAL AMERICA: SDOH

One important set of factors to consider when trying to understand differences in health between rural and urban populations is SDOH. It is widely accepted that SDOH has a profound impact on cardiovascular outcomes.<sup>1</sup> Income, education, employment, housing, transportation, and food insecurity are all related to health outcomes, as is access to care, to which a section is dedicated below. Rural Americans face unique challenges in each of these areas. Inequalities in CVD, in part, relate back to the ways in which SDOH can negatively affect rural populations.

## Income

From 2013 to 2017, the median household income in mostly rural counties was \$47 020, \$10 000 less than the national median household income, and the poverty rate was 16.3% in these rural counties.<sup>51</sup> In addition to the consequences of lower income on individuals and families, lower income for individuals means a lower tax base for local government.<sup>52,53</sup> Nationally, nearly 20% of rural children live in poverty, although this varies by region from 12% in the Northeast to 22% in the South.<sup>54</sup> Forty-five percent of rural single-parent families headed by a woman are living in poverty.<sup>55</sup> Members of racial and ethnic populations living in rural areas and small towns are disproportionately affected by poverty, with rates of 28%, 30%, and 34% among those who are Hispanic, Native American, and black, respectively. Low income and neighborhood poverty have been linked to poor self-reported health in rural women.<sup>56,57</sup> Native American children are 3 times more likely to live in poverty, and many of the most impoverished counties in the United States are reservation counties.<sup>58</sup>

## Education

Higher educational attainment is associated with lower odds of mortality in US adults across age category, sex, and racial/ethnic subpopulations.<sup>59</sup> These relationships also hold for CVD in particular: Educational attainment is inversely proportional to lifetime risk of developing CVD,<sup>60</sup> and low educational attainment is associated with a higher prevalence of CVD risk factors among rural white and black women and men.<sup>61,62</sup> Educational attainment is also associated with income and employment. School-aged children in rural areas of the United States perform comparably to their peers on standardized tests and graduate from high school at higher than national rates<sup>54</sup>; however, among rural students of color, graduation rates are significantly lower.<sup>63</sup> High school graduation notwithstanding, overall educational attainment is lower in rural compared with urban areas. Students from rural high schools are less likely to go to or to graduate from college; in 2017, only 20% of rural adults  $\geq 25$  years of age had a bachelor's degree or higher compared with 34% in urban areas.<sup>64</sup> Health literacy has also been shown to be lower in rural areas.<sup>65</sup>

## Employment

Employment is linked to income, as described in the section "Income," but likely also affects health through more direct channels. For example, certain occupations concentrated in rural areas such as surface mining and working on hog farms have been associated with CVD mortality.<sup>66</sup> Rural employment has shifted away from agrarian and toward service-based professions and

now largely reflects the national workforce.<sup>55,67</sup> In 2011 to 2015, only  $\approx 1$  in 10 rural jobs was in agriculture, mining, hunting, fishing, or forestry, whereas nearly a quarter were in education, health, and social services and 12% were in manufacturing.<sup>55,67</sup>

The restructuring of the rural economy has been a source of stress in the rural United States. Unemployment in rural areas nearly doubled from 2000 to 2010, worse than the national trend.<sup>55</sup> Although urban areas have seen significant recovery in unemployment since the end of the Great Recession, rural areas have been slower to recover jobs.<sup>70</sup> By the second quarter of 2016, urban employment had surpassed its prerecession peak by 4.8%, whereas in rural areas, employment remained 2.9% below its prerecession level.<sup>70</sup> As of 2017, unemployment rates were 4.4% in rural areas compared with 4.1% in urban areas,<sup>4</sup> and employment growth remains slower in rural areas. Employment factors are also contributing to population losses in rural areas. According to a 2018 survey,<sup>71</sup> the top reason adult children cited for moving away from rural areas was employment opportunities elsewhere. The second reason was that they encountered difficulty finding a good, long-term job.

Many of the sectors in which there has been growth have low-wage, limited-opportunity jobs.<sup>72-74</sup> These issues also intersect with the growing opioid epidemic; rural areas are harder hit by drug use, and a significant number of potential applicants may not pass drug tests for jobs that are available.

## Housing

Housing is another critical component in understanding social risk in urban versus rural areas. Housing directly affects health, with substandard housing being linked to an increased risk of chronic disease.<sup>75</sup> For example, lead exposure causes hypertension and may be associated with an increased risk of CVD.<sup>76</sup> Risk factors for CVD are also more prevalent among homeless people, and CVD mortality is higher among homeless adults than among those with permanent housing.<sup>77</sup> According to 2011 to 2015 American Community Survey data, rental options are limited in rural areas<sup>55</sup> and housing options in rural areas are often poor quality; almost 6% of rural homes are moderately or severely substandard, with inadequate heating or plumbing systems, leaks, or pests.<sup>78</sup> These conditions are linked to increasing childhood asthma in rural areas, which may impede school attendance during periods of exacerbation.<sup>79</sup> These issues present significant housing challenges for low-income rural families. The latest national survey of homelessness revealed that 7% of people without permanent housing live in rural areas.<sup>80</sup> For Native populations,  $\approx 70\%$  of homes located on Native lands in the United States are owner occupied, but there is a low supply of rental properties and a high incidence of

overcrowding in existing housing. Despite the improvement in Native American homeownership rates in the 2000s, securing a mortgage for homeownership on Native American lands continues to be difficult.<sup>81</sup>

## Transportation

Transportation is another social determinant of health that affects health outcomes. Annually, 3.6 million Americans fail to receive medical care as a result of transportation issues.<sup>82</sup> These transportation issues include infrastructure issues, high costs, lack of vehicle access, and long travel distances. Lack of transportation can lead to delays in treatment, inappropriate medical treatment, and unmet healthcare needs.<sup>83</sup> A lack of transportation likely contributes to other SDOH such as food insecurity, education, and employment by increasing barriers to accessing healthy food, attending school, and going to work, respectively. The Robert Wood Johnson Foundation reports that communities with better transportation options are associated with increased physical activity, lower body weight, lower rates of traffic injuries, less air pollution, and improved mobility for nondrivers.<sup>84</sup>

Rural and ethnic populations may be more likely to face transportation issues. The Rural Health Reform Policy Research Center reported that rural residents have to travel farther and are less likely to have access to public transportation compared with urban residents.<sup>85</sup> Another study of barriers to care reported that 39.0% of American Indians faced difficulty with transportation when accessing care compared with 18.2% of non-Hispanic whites.<sup>86</sup>

## Food Insecurity

Food insecurity, defined by the US Department of Agriculture as the “household-level economic and social condition of limited or uncertain access to adequate food,”<sup>87</sup> has been linked to CVD and associated risk factors<sup>88–90</sup> and disproportionately affects rural communities. According to Feeding America, 2.3 million rural households are food insecure, and 84% of the counties with the highest rates of child food insecurity are rural.<sup>91</sup> From 2000 to 2010, ≈25% of all American Indian/Alaska Natives experienced food insecurity and were twice as likely to have food insecurity as whites. Rural areas have significantly fewer available food stores, with less access to affordable chain supermarkets than urban zip codes.<sup>92</sup> Some rural areas such as counties in the Mississippi Delta lack a grocery store entirely, necessitating significant travel to purchase food, which costs time and money.<sup>93</sup> This presents a challenge in rural areas for individuals who do not drive or lack access to a vehicle, given the lack of public transportation infrastructure and aging of the population.

Rural seniors who belong to racial/ethnic populations may be especially at risk of food insecurity; in 2016, 55.7% of black and 48.8% of Hispanic seniors had some level of food insecurity compared with 13.6% among seniors overall.<sup>94</sup> Families and individuals in rural America eligible for the Supplemental Nutrition Assistance Program (formerly and derisively referred to as the Food Stamp Program) or the Special Supplemental Nutrition Program for Women, Infants, and Children may not take full advantage of services because of misconceptions about eligibility, stigma in small communities, and the long distances to stores where they may redeem benefits.<sup>96</sup>

## Physical Environment

The built environment includes all of the spaces and physical components where individuals live and work, that is, homes, buildings, streets, open spaces, and infrastructure. The characteristics of this physical environment are important determinants of health outcomes,<sup>97</sup> influencing people’s level of physical activity and the food choices they make, which directly and indirectly affect their health.<sup>98,99</sup> For example, people living in neighborhoods with physical activity resources such as walking paths and biking lanes have higher odds of having an ideal cardiovascular health status.<sup>100</sup> Missing or deteriorating sidewalks on the main road or roads of a rural community can affect physical activity, and lack of funding for repairs can be a challenge.<sup>101</sup> Creating or enhancing venues for physical activity has been shown to increase physical activity levels and to improve overall health in communities.<sup>101</sup>

## UNDERLYING CAUSES OF POOR CARDIOVASCULAR OUTCOMES IN RURAL AMERICA: DELIVERY SYSTEM FACTORS

Multiple healthcare delivery system factors affect overall and cardiovascular health for rural residents. Hospital and outpatient facility care, clinician supply, insurance coverage, and public health infrastructure all differ between urban and rural areas.

### Availability and Quality of Hospital and Outpatient Facility Care

#### Availability of Hospital Care

Rural hospitals make up ≈40% of acute care hospitals in the United States but have only 20% of the nation’s hospital beds. Rural hospitals differ from urban hospitals in many important ways. First, rural hospitals are markedly smaller and average lower volumes than urban hospitals. They are often reimbursed differently

from urban hospitals; about one-third of rural hospitals fall under special rural payment programs such as Medicare Dependent Hospital status, Sole Community Hospital status, or Rural Referral Center status. Another 60% of rural hospitals are designated as Critical Access Hospitals (CAHs),<sup>102</sup> and although CAHs vary tremendously in size and capacity, they are typically small ( $\leq 25$  inpatient beds) and distant (35 miles from another hospital or 15 miles in an area with mountainous terrain or only secondary road)<sup>103</sup> or have less capacity to provide intensive care and inpatient rehabilitation services than hospitals without a CAH designation.<sup>104</sup> Despite their special payment programs (which generally increase reimbursements above what they would receive otherwise), margins at rural hospitals are lower than at urban hospitals, and uncompensated care is higher.<sup>102</sup> There are many reasons for this: Rural hospitals provide fewer high-margin services such as advanced cancer and heart care and struggle to achieve economies of scale in the supply chain and for fixed-cost expenditures.

Access to hospital care is critically unavailable locally for many rural residents. Prior work suggests that the average rural resident lives 10.5 miles away from a hospital compared with 4.4 miles for urban individuals.<sup>105</sup> Access continues to worsen nationwide as hospital closures accelerate in an increasingly difficult financial scenario; according to data from the University of North Carolina at Chapel Hill, >100 rural hospitals have closed since 2010.<sup>106</sup> This is especially pronounced for hospitals in states that did not expand Medicaid coverage through the Affordable Care Act and therefore continue to serve a high proportion of uninsured patients.<sup>107</sup> Other research has demonstrated that from 2004 to 2014, 179 rural counties lost hospital obstetric services, leaving almost half of all rural counties without access to these services.<sup>108</sup> Rural hospital closures and closures of rural obstetric units are occurring in communities of color and low-income communities at greater rates than in other communities.<sup>108,109</sup> Furthermore, the occupancy rate of rural hospitals is  $\approx 40$  percent on average (and even lower for small rural hospitals compared with 60%–70% in urban hospitals), suggesting that even more hospitals are at risk of closure in the future.<sup>110</sup>

Data on the impact of a hospital closure on health outcomes have been somewhat inconsistent. One national study of Medicare patients found that closures were associated with no change in admission rates or all-cause mortality and that mortality caused by myocardial infarction (MI) actually decreased in areas with closures, largely as a result of a shift of patients from low-quality to higher-quality hospitals.<sup>111</sup> However, more recent data suggest important differences in the impact in rural versus urban areas, finding no detrimental impact of urban closures but an increase in stroke and acute MI mortality associated with rural closures.<sup>112</sup> These divergent results are likely caused by difference

in local healthcare capacity, in that where there is excess capacity, closures are not harmful and may even be beneficial, whereas in areas with low capacity, closures lead to worse health outcomes and strain the entire system. One study looked at hospitals that were near other hospital closures (called bystander hospitals) and found that when a high-occupancy ED was exposed to a closure, 1-year mortality and 30-day readmission rates for acute MI increased, and the likelihood of receiving percutaneous coronary intervention (PCI) declined.<sup>113</sup>

Furthermore, rural hospitals provide jobs and important infrastructure for rural communities and thus many have importance beyond their healthcare delivery role alone. According to the Institute of Medicine's report *Quality Through Collaboration: The Future of Rural Health*, the financial stability of many rural communities hinges on rural healthcare infrastructure.<sup>114</sup> Businesses and employers may also relocate to and away from communities on the basis of availability and adequacy of healthcare infrastructure, especially hospitals.

### **Distance to the Hospital and Mode of Transportation**

In rural areas, acutely ill or injured individuals may face geographic and other transportation barriers to reaching definitive care expediently. Differential outcomes related to acute MI in rural regions result from lower capabilities of ambulance services; less access to timely, lifesaving specialty procedures; and high reliance on transfers to definitive care.<sup>115,116</sup> These differences are even wider when access to advanced cardiovascular care is considered. A 2006 study found that nearly 80% of the US population lives within a 1-hour drive of a hospital capable of providing PCI, but as the number of PCI-capable hospitals has grown, this proportion has not changed.<sup>117–120</sup> The  $\approx 20\%$  of the population who do not have a nearby cardiac catheterization laboratory are almost exclusively rural. A recent study found that the median driving time to the nearest PCI-capable hospital in the largely rural US state of Arkansas is 28.3 minutes, >2.5 times higher than the US median driving time of 11.3 minutes.<sup>121</sup> This has clinical implications. Studies have found that distance to a PCI-capable hospital is an independent factor in deaths resulting from heart attack.<sup>122–124</sup> A study in Los Angeles County found a 6.5% increase in the risk of death among patients with heart attack for every 1-mile increase in distance to the hospital.<sup>123</sup> Similarly, a Swedish study found the probability of surviving a heart attack declined 2 percentage points for every additional 10 km of distance from a hospital.<sup>124</sup> Living in rural areas also includes geographic challenges in accessing ED care, which that may result in poorer out-of-hospital outcomes such as cardiac arrest survival.<sup>125</sup>

Greater travel distances also limit access to treatment for the estimated 60% of all patients with

stroke who rely on emergency medical service (EMS) for transportation to care.<sup>126–128</sup> In rural areas, access may be even more limited. For example, in 13 rural counties in West Virginia, longer transport time and distances resulted in many patients being received at hospitals well outside of the time period in which fibrinolytic therapy could be administered.<sup>129</sup> Prior studies have shown that treatment at designated stroke centers is associated with higher thrombolytic therapy rates and lower mortality, but rural residents are less likely to have access to such centers than their urban counterparts.<sup>130</sup> As the use of endovascular therapy for stroke grows, such geographic differences are likely to become more pronounced.<sup>131–133</sup>

For less common cardiovascular conditions such as congenital heart disease, these issues are even more stark. Data show that surgical and medical outcomes are generally better for children and adults with congenital heart disease who are cared for at high-volume, specialized centers,<sup>134,135</sup> and AHA/American College of Cardiology guidelines for the long-term management of congenital heart disease suggest that being cared for by an adult congenital heart disease program is associated with better outcomes.<sup>135,136</sup> However, nearly all of the highest-quality centers that specialize in providing care for children with complex congenital heart disease are in major cities,<sup>137</sup> suggesting that the vast majority of rural children with these care needs will be required to travel significant distances to receive care. One study documented an average distance of >50 miles from the nearest congenital heart center specializing in pediatric heart surgery; even more troubling, 15.3% of children had to travel >100 miles away from home to access a congenital heart center.<sup>138</sup> Similar concerns exist for other types of highly specialized cardiovascular care such as heart transplantation, left ventricular assist device implantation, and advanced mechanical circulatory support for cardiogenic shock, all of which are available only in referral centers.

Mode of transportation also matters, particularly for time-sensitive conditions. Despite a national campaign from the National Heart, Lung, and Blood Institute called Act in Time, designed to promote the use of EMS for transporting individuals with a heart attack, the majority of people experiencing heart attack symptoms either have someone else drive them (60%) or transport themselves (16%) to the hospital.<sup>139,140</sup> The National Heart Attack Alert Program recommends using EMS for transporting people with acute MI so that EMS can initiate care during transport and preferentially transport to a PCI-capable hospital, thus shortening the time between initiation of symptoms and initiation of treatment.<sup>141–143</sup> However, EMS availability and staffing patterns range widely across the nation, with 2015 data from the National Emergency Medical Services Information System suggesting that total EMS call times

are 30% longer in rural areas than in urban area.<sup>144</sup> In more than half of the most rural counties in the country, EMS is staffed by volunteers only, which can lead to significant issues with competency, recruitment, and retention at local EMS agencies.<sup>145</sup>

Because of the complexity of transport issues around time-sensitive conditions such as heart attack and stroke, AHA guidelines for ST-elevation MI include a Class IA recommendation that all communities develop a community-based approach to the patient with ST-elevation MI that includes transport to higher-technology hospitals as a key component.<sup>146</sup> Nationally, a growing number of communities have developed regional EMS-hospital networks as part of their heart attack systems of care.<sup>147,148</sup>

### Quality of Hospital Care

Quality of care and outcomes for cardiovascular conditions in rural hospitals may be worse than for urban hospitals, at least in some domains. For example, prior studies have shown higher mortality for patients with acute MI,<sup>115,149–151</sup> heart failure,<sup>149,150,152</sup> atrial fibrillation,<sup>153</sup> and stroke<sup>154</sup> in rural compared with urban hospitals, although recent data suggest that some of these gaps in in-hospital quality and outcomes may be narrowing for acute MI.<sup>155</sup> One study from the Get With The Guidelines—Coronary Artery Disease program demonstrated similar quality and outcomes for coronary artery disease among urban and rural hospitals participating in the program, suggesting that such efforts may be crucial to ensuring quality in rural areas.<sup>156</sup> The worse outcomes for rural hospitals for high-acuity disease are likely mediated at least in part by volume, given that small hospitals are typically much lower volume than larger ones and therefore may lack experience with certain cardiovascular conditions. Rural hospitals may also lack certain key technologies, specialist physician coverage, and skilled team-based care constituents (discussed below), which also might contribute. In addition, it is hard to measure and track outcomes of rural hospitals for many conditions because volumes are often sufficiently low so as to preclude any conclusions from being drawn about performance for any individual site.

It is worth noting that rural hospitals have some distinct strengths compared with urban hospitals. According to the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) Survey, patient satisfaction at rural hospitals is higher than at urban hospitals.<sup>157,158</sup> Similarly, rates of patient safety events such as postoperative infections tend to be lower at rural than urban hospitals.<sup>159</sup> Although lowering mortality rates in rural hospitals should be a top priority, some attractive facets of rural hospital care could serve as the foundation for broader quality improvement efforts.

There is also a lack of rural-specific quality metrics, which hampers both quality measurement and quality



improvement.<sup>160–162</sup> Many quality metrics require large sample sizes to be reliable and valid and are therefore difficult to apply to small rural hospitals. There is an inadequate number of rural-oriented measures such as appropriate transfer rates or appropriate triage decisions. The National Quality Forum and others have recognized these issues, and this is an active area of ongoing research and measure development.<sup>163</sup>

### Outpatient and Postacute Care

Outpatient care (including primary care, specialty care, and other services) in rural settings may also be more difficult to access. Travel distances likely affect access to outpatient care, although there are fewer quantitative data in this area. One study that reviewed recent literature on healthcare transportation barriers in general found mixed results between urban and rural residents, with some studies reporting no difference in transportation issues and some reporting that rural residents encounter increased barriers to transportation.<sup>83</sup>

In addition to what private practice presence exists in rural America, there are 2 types of federally designated outpatient clinical care facilities to increase access to primary care in rural settings: Federally Qualified Health Centers (FQHCs) and Rural Health Clinics (RHCs).<sup>164,165</sup> FQHCs qualify for enhanced reimbursement from Medicare and Medicaid and in return serve an underserved area or population, offer a sliding fee scale, and provide primary care and other comprehensive services.<sup>166</sup> Of the 1400 FQHCs with 12 000 service delivery locations operating in the United States, 45% are rural<sup>167</sup>; together, they serve 1 in 5 rural residents. RHCs must be located in a US Census Bureau–defined nonurbanized area and serve an area that has been designated by the Health Resources and Services Administration in the past 4 years as underserved or having a primary care shortage.<sup>168</sup> As of May 2019, there are ≈4500 RHCs in the United States.<sup>169</sup> These clinics typically serve counties with incomes lower than the US median and have a higher proportion of older adults and a higher proportion of people living below the poverty level.<sup>170</sup> Like FQHCs, RHCs serve a high proportion of individuals who are uninsured or on Medicaid; compared with FQHCs, RHCs serve more Medicare beneficiaries, and these beneficiaries are more likely to be older and white.<sup>171</sup>

Transportation challenges and long distances to services in rural areas can result in fewer preventive or chronic care visits, which can affect cardiovascular health.<sup>172</sup> For example, <50% of rural women have access to perinatal services within a 30-mile drive, with 10% of rural women being ≥100 miles from perinatal services.<sup>173</sup> As a result, rural women are less likely to access these services during the first trimester than their urban and suburban counterparts<sup>173</sup>; American Indian/Alaska Native women are 2 times as likely to report receiving late or no prenatal care.<sup>174</sup> During prenatal

visits, women are counseled on addressing cardiovascular health, as well as mental health and substance abuse. Distance also affects rural women's access to postpartum visits, which may lead to delays in or lack of treatment for cardiovascular conditions that are discovered or emerge during pregnancy. Given that more than one-third of pregnancy-related deaths are cardiovascular in nature, many of them occurring in the postpartum period, this likely has significant implications in rural areas.<sup>18</sup> Rurality also poses challenges in access to and participation in postacute care and rehabilitation services. For example, patients living at a distance from a cardiac or stroke rehabilitation program are less likely to participate.<sup>175,176</sup>

### Rural Clinicians

Only 9% of US physicians practice in rural areas, despite 20% of the population living in rural areas. In 2016, 77% of rural counties were reported as Primary Care Health Professional Shortage Areas.<sup>177</sup> Rural hospitals also struggle with staffing; 75% of rural hospital chief executive officers reported physician shortages in a 2010 survey, with 70% specifying an insufficient supply of ≥2 primary care disciplines; other reported specialty shortages included psychiatry, general surgery, neurology, cardiology, and obstetrics and gynecology.<sup>178</sup> These shortages are expected to worsen in coming years as the population ages and the demand for primary care physicians continues to rise.<sup>179,180</sup> FQHCs and RHCs, which play a large role in the provision of primary care, dental, and mental health services in rural areas, struggle to recruit and retain clinicians, in particular family physicians, who represent 89.4% of Community Health Center physicians.<sup>181</sup> Nurse practitioners (NPs) and physician assistants (PAs) are more likely to practice in rural areas than physicians; in 2016, NPs constituted 25.2% of clinicians in rural practices compared with 23.0% in nonrural practices.

Clinicians in rural settings may provide a broader array of services than what might be considered customary in urban and suburban settings. For example, family medicine–trained physicians provide most of the obstetrical care in rural hospitals<sup>182</sup> and emergency care in rural EDs.<sup>183</sup> Similarly, general surgeons practicing in rural hospitals provide critical care services and perform endoscopic, orthopedic, and obstetric procedures, as well as procedures more commonly performed by surgical subspecialists in urban settings.<sup>184</sup> Hospice care and palliative care are also in shorter supply in rural areas.<sup>185</sup>

The provision of emergency care in the rural United States also faces challenges related to personnel. Nationally, there were >145 million ED visits in 2016, or 45.8 visits per 100 people.<sup>186</sup> There is a national shortage of emergency medicine–trained physicians,<sup>187</sup> a particularly large challenge in rural areas where EDs are

often staffed by non-emergency medicine residency-trained physicians.<sup>183,188</sup> In addition to the challenge of attracting emergency medicine-trained and board-certified clinicians, the low volume of patients presenting to rural EDs creates issues related to hospital revenue and maintenance of clinicians' skills.<sup>187,189</sup>

Adequate provision of acute care is further complicated by the national shortage of registered nurses, which is more significant in rural areas than urban, again leading to potential quality and access issues.<sup>190,191</sup> The national nursing shortage also affects staffing in skilled nursing facilities and home health agencies. Patients discharged from rural hospitals who need postacute care are more likely to receive it in skilled nursing facilities than through home health services.<sup>192</sup> In addition, there is a relative shortage of physical therapists, occupational therapists, and speech-language pathologists in underserved areas.<sup>193</sup>

Rural primary care and specialty physicians generally report better practice climates relative to their urban peers, although some studies have demonstrated higher career dissatisfaction and intent to leave patient care among rural physicians.<sup>194,195</sup> It is unknown whether the move toward value-based payment programs, with their requirements for electronic medical record use and quality measure reporting, will negatively affect rural physician practices, given that they typically have less technology infrastructure with which to meet these requirements. Recent work from the RAND Corporation suggests that participation in outpatient value-based payment programs may present major problems for small- or solo-practice physicians in rural areas.<sup>196</sup>

### Insurance Coverage/Payer Composition

In addition to issues with access to care in terms of clinicians and hospitals, rural populations have higher rates of uninsurance than people in urban areas. Roughly 12% of nonelderly rural individuals are uninsured compared with 11% in urban areas and 10% in suburban areas; 24% of rural residents are covered by Medicaid compared with 22% of urban and 21% of suburban dwellers.<sup>197</sup> Medicaid is estimated to pay for 50% to 60% of all rural births.<sup>198</sup> In some states such as California, Hawaii, Arizona, and Arkansas, Medicaid rates are >10 percentage points higher in rural than urban areas. States that elected to expand Medicaid have seen a significant decline in uninsurance in rural areas compared with those that did not expand Medicaid (16% uninsured in rural areas in 2013 to 9% in 2015 for expansion states versus 19% to 15% in nonexpansion states).<sup>197</sup> For low-income individuals, uninsurance rates in rural counties dropped from 35% to 16% in expansion states compared with 38% to 32% in nonexpansion states.<sup>199</sup> Many of the most rural states in the

United States are those that have not elected to expand Medicaid, a decision that has a significant adverse impact on rural communities.

Failure to expand Medicaid has likely had a negative effect on rural communities in terms of financial strain. Acute cardiovascular events such as heart attacks and strokes can lead to financial strain or bankruptcy; an estimated 85% of uninsured individuals hospitalized for acute MI and 75% hospitalized for stroke experience catastrophic healthcare expenditures (defined as >40% of postsustenance income).<sup>200</sup> Among patients with CVD overall, 1 in 4 low-income families experiences a high financial burden (out-of-pocket expenses >20% of income) or catastrophic financial burden annually.<sup>201</sup> Health insurance mitigates patients' financial risk, particularly for emergency, high-cost conditions such as acute MI, and prior analyses have shown that Medicaid expansion is associated with reductions in financial strain and bankruptcies.<sup>202,203</sup> In states that expanded Medicaid, the proportion of admissions for acute MI in people lacking insurance decreased from 18% to 8% between 2012 to 2016, whereas in nonexpansion states, it decreased only from 26% to 21%,<sup>204</sup> suggesting that expansion has likely had a largely favorable impact on financial toxicity for patients with CVD and the facilities that serve them.

Failure to expand Medicaid has also likely contributed to the widening gaps in health between urban and rural areas. A growing body of evidence demonstrates that Medicaid expansion has been associated with improvements in healthcare access and outcomes. Expansion is associated with greater access to primary, preventive, and specialist care.<sup>205,206</sup> Identification and treatment of cardiovascular risk factors such as diabetes mellitus and hypertension have improved in states that have expanded Medicaid.<sup>207–209</sup> In addition, use of and adherence to prescription cardiovascular medications have increased.<sup>205,210</sup> Downstream effects on population health, including reduced mortality rates, have also been documented.<sup>202,205,206,211–214</sup> One recent study showed that even when demographic, clinical, and economic differences are accounted for, counties in expansion states had 4.3 fewer deaths per 100 000 residents per year resulting from cardiovascular causes after Medicaid expansion (an ≈2.5% difference) than if they had followed the same trends as counties in nonexpansion states.<sup>215</sup>

Private insurance markets operate less efficiently in rural areas, leading to difficulties in the availability of affordable private plans. For example, among individuals purchasing private insurance on federal or state Marketplaces, premiums are significantly higher in rural than urban areas; 25% of rural individuals live in areas where the lowest-cost plan available costs on average >10% of income compared with only 5% for people in urban areas.<sup>216</sup>

Veterans Affairs (VA) hospitals and the Indian Health Service (IHS) play a disproportionate role in rural health-care provision. In terms of the VA, ≈4.7 million of the nearly 20 million veterans in the United States live in rural areas, and rural veterans are more likely to use VA services than urban veterans (58% versus 37%).<sup>217</sup> A 2015 study found that the VA cares for a population with a higher burden of CVD such as ischemic heart disease and cardiovascular risk factors such as diabetes mellitus and hypertension than the population cared for by civilian providers, as well as higher rates of mental health conditions. This presents unique opportunities and challenges for care delivery, including ensuring that veterans living in rural and remote areas have geographic access to comprehensive health care.<sup>218</sup>

Similarly, ≈60% of the nation's nearly 4 million American Indians and Alaska Natives use the IHS, which is overwhelmingly rural.<sup>219</sup> The IHS was created as the primary healthcare provider for indigenous peoples through the Snyder Act of 1921 and maintains services and locations in multiple states serving many indigenous individuals and families. As of 2015, the federal system operated by the IHS consisted of 26 hospitals, 59 health centers, 32 health stations, and 33 urban health projects. Self-determination contracts between tribal governments and the federal government have led to the administration of 19 hospitals, 284 health centers, 79 health stations, and 163 Alaska Native village health centers. Since the passage of the self-determination act in 1975, the life expectancy of American Indians/Alaska Natives has improved by 10 years, and mortality rates across a wide variety of diseases have decreased.<sup>219</sup> Despite these gains, and as described throughout this document, indigenous populations still lag behind in overall health statistics.

Payment models for inpatient and outpatient care also differ in rural and urban areas, which has implications in terms of the potential for health reform efforts to improve care in rural areas. For example, CAHs, previously characterized in "Availability of Hospital Care," are excluded from most federal public reporting and value-based payment programs. FQHCs and RHCs have specific, "alternate," and different reimbursement methodologies. Although new rural hospital payment demonstration projects are ongoing in Maryland and Pennsylvania, there is a general paucity of access to or participation in such models in rural compared with urban areas for both hospitals and clinicians. These issues are discussed at more length in "Flexible Payment Models."

## Public Health and Health Services Infrastructure

Public health infrastructure, which is crucial for community health and prevention efforts, also differs between

urban and rural areas. In 2016, survey data showed that 62% of local health departments (LHDs) are classified as rural and small, serving <50 000 people per jurisdiction, with 17% (439) serving a population of <10 000 people.<sup>221</sup> These small LHDs tend to employ few full-time staff, and the combination of limited staff numbers and limited skill sets has implications for the types of public health services and programs that rural residents are offered.<sup>221</sup>

In addition to traditional public health services such as communicable disease outbreak control and septic system regulation, rural LHDs provide direct patient care and do so more often than urban LHDs.<sup>221</sup> Health departments often provide services such as immunizations and screening for and treatment of tuberculosis and sexually transmitted diseases, but more comprehensive primary care is much less commonly offered.<sup>221</sup> Despite the limited capacity and services, in many small communities, the LHD functions as the safety net provider.

Of the population-based primary prevention services offered by rural LHDs, 72% have programs focused on tobacco, 70% on nutrition, 55% on physical activity, and 50% on chronic disease.<sup>221</sup> However, only 29% are involved in school or childcare policies that promote physical activity, and only 35% are involved in policies related to access to healthy food resources.<sup>221</sup> Yet *Rural Healthy People 2020* survey respondents ranked nutrition and weight status second, heart disease and stroke sixth, and physical activity and health seventh as rural health priorities.<sup>222</sup> Clearly, there is interest among rural residents in improving their own health and that of their communities. Given the limited resources of rural LHDs, partnerships with the healthcare system, local school districts, large and small employers, and a diverse array of community organizations become critical to protect health, to prevent disease, and even to improve health.<sup>223,224</sup>

## SOLUTIONS: OVERVIEW

The AHA believes that addressing the unique needs of rural populations to improve health and well-being is critically important for the overall health and well-being of the nation. As this article has laid out, the issues are multifactorial and highly complex; therefore, fully discussing the details of proposed solutions is beyond the scope of this document. Broad, innovative, and sustained approaches are needed that address the tough underlying structural, social, and policy issues that have challenged other areas of the country and healthcare systems but have manifested themselves as particularly severe and vexing in rural areas and populations. Improving rural health will necessitate new approaches to care delivery, complementary policy reforms, and supporting research.

## SOLUTIONS: EXPANDING THE WORKFORCE AND FOSTERING TEAM-BASED CARE

### Addressing the Shortage of Rural Healthcare Professionals

As documented, there is a clear shortage of healthcare professionals in rural areas. To address this shortage and to meet the unique needs of rural populations, multiple workforce-related changes are needed.

First, the supply of clinicians in rural areas must be addressed; most rural areas are health professional shortage areas. Recent data suggest that there are 35 medical schools with programs focused on rural medicine and >100 rural residency programs.<sup>225</sup> Supporting schools with a mission to train and support rural physicians and ensuring that medical schools provide exposure to rural medicine via externships or clinical rotations could expose trainees to such practice and increase the likelihood that some might pursue rural health after graduation.<sup>183,226,227</sup> The type of medical school may also matter; physicians who are trained in osteopathic medicine are more likely to practice in rural areas (18.1% versus 11.5%).<sup>183</sup> Consideration should be given to direct financial incentives for medical schools that recruit, educate, and retain students who go into primary care. Because there is a national shortage of primary care providers, ways to attract medical students to rural areas and retain them there as physicians such as payment incentives, flexible staffing models including respite time, and ongoing educational support must be considered.

Specialist supply is another key issue for rural areas. Rural rotations in specialty residencies and fellowships could increase exposure to rural health. Using the National Health Service Corps and other mechanisms that already exist to include key specialty areas could facilitate recruitment of specialist clinicians where the need is greatest. Full use of the J-1 visa program is another key strategy because clinicians entering the United States via the J-1 visa are more likely to settle in rural areas. However, for many specialty areas, rural areas simply lack the volume of patients to support a clinical practice; in these cases, digital support of health care and other options, discussed in “Telehealth and Digitally Enabled Health Care” and “Regionalization of Care,” are more durable solutions.

It is also important to increase the number of other health professionals in rural areas, including NPs, PAs, nurses, medical assistants, and many other allied health professionals. Although training for some health occupations can be attained at community colleges, not all rural communities have access to a community college.<sup>228</sup> However, enhanced training and degree opportunities, course availability (including long-distance or

virtual courses), and competent faculty are necessary for rural healthcare workforce development. For especially remote areas such as many Native American communities, specialized scholarship and training programs for different health professionals may be particularly helpful in attracting and increasing clinician supply.

Loan forgiveness programs for clinicians who agree to serve in rural communities such as those administered through the Health Resources and Services Administration can be effective to increase clinician supply in rural areas. The National Health Service Corps Loan Repayment Program offers loan repayment to physicians (including psychiatrists), PAs, NPs, Licensed Clinical Social Workers, some oral health professionals, and other behavioral health professionals and is a mechanism that can be leveraged and expanded.<sup>229</sup> Anecdotal evidence suggests that extending the time period for repayment may help to keep physicians in rural communities by providing time for the physicians to acclimate and to build community around a clinician. Consideration should be given to more direct incentives to attract clinicians to rural areas, particularly primary care clinicians.

Area Health Education Centers, also supported by the Health Resources and Services Administration, play a role in workforce development and could be expanded where they are found to be particularly successful. Area Health Education Centers focus on community-based programs for health professions training, continuing education for health professionals, and community development activities aimed at promoting health. Area Health Education Center “pipeline” programs are particularly important; studies show that individuals who are from rural areas are more likely to end up working in rural areas. Identification and support for individuals from rural areas interested in careers in medicine should start early, including encouraging rural medicine as a career path among high school students.

### Developing New Rural-Specific Team-Based Care Models

Expanding team-based care is another way to improve access to clinical care in rural areas. For example, EMS providers are increasingly serving in expanded roles referred to as community paramedicine.<sup>230,231</sup> Services vary according to state regulations but may include health education, medication management, postappointment or post-hospital discharge follow-up, and chronic disease management.<sup>232</sup> Currently, at least a third of community paramedicine programs operate in rural areas.<sup>233</sup> A related strategy, EMS-based care coordination, in which paramedics screen and refer patients for services and support basic support services such as transportation, food, and insurance, appears to be a

promising model for helping residents who have no other source of clinical and social support.<sup>234</sup>

Pharmacists can also play expanded roles in care delivery. Following the federal model in which pharmacists employed by the Department of Defense, Department of Veterans Affairs, and IHS have long provided preventive services and direct patient care,<sup>235</sup> pharmacists in community settings are working in collaboration with physicians and healthcare teams engaged in the Million Hearts campaign to improve cardiovascular health through initiatives such as medication adherence education programs and blood pressure screenings.<sup>236</sup> Pharmacist-led models have also been successful in other settings for hypertension management.<sup>237–239</sup> However, in some areas, the shortage of pharmacists is even more acute than shortages of other healthcare professionals; in these cases, telepharmacy opportunities could be explored.

Community health workers (CHWs) are another crucial piece of care delivery in rural settings, and expanding their use could improve access to health care in rural areas. A CHW is defined by the American Public Health Association as “a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served.”<sup>240</sup> CHWs can serve in bringing care to the home, of particular use with rural populations. The AHA has recognized the importance of CHWs for CVD prevention and treatment, including in a recent policy statement.<sup>241</sup> Similarly, the Community Preventive Services Task Force in 2015 recommended the use of CHWs in interventions to prevent CVD among individuals at increased risk, specifically in health education and outreach to increase physical activity, healthy eating, and smoking cessation. Studies have shown that CHWs can cost-effectively help patients reduce their risk of developing CVD by influencing lifestyle and behavioral changes, including adherence to healthier diets.<sup>242–244</sup> Programs specifically targeting cardiovascular health and stroke have demonstrated that CHW-led efforts can improve heart health and stroke recovery outcomes in rural areas.<sup>245–247</sup> Further evidence via grants and pilots is necessary to support the expanded use and scale of these expanded teams.

An additional benefit to expanding CHW programs is increasing health literacy within communities, which could engage rural and remote communities more deeply in health and encourage improved medical and health knowledge among groups that might lack access or be unlikely to pursue post-secondary education programs in health care. It also creates employment opportunities in areas where they can be scarce. However, CHW programs currently face a number of barriers to implementation, including the need for more stable funding, as well as coverage and reimbursement by payers.<sup>246,248,249</sup> Enhancing funding and support for

CHW programs is a crucial piece of improving community health in rural areas.

## Ensuring That Scope of Practice Laws Facilitate Rural Workforce Development

Professional scope of responsibility frequently becomes a topic of discussion during the consideration of workforce changes to expand and improve care delivery in rural areas. The 2010 Institute of Medicine report on the future of nursing offered recommendations that included improving nursing education and ensuring that nurses practice to the full extent of their training.<sup>250</sup> Scope of practice laws, however, differ markedly by state and in some states limit the ability of NPs and PAs to provide care without direct physician oversight. Among NPs and PAs practicing rural primary care, professional autonomy and factors related to degree of responsibility such as prescriptive and clinical decision-making authority are key factors in job satisfaction.<sup>251,252</sup>

Prior research demonstrating that advanced practice providers (NPs and PAs) deliver comparable quality of care as, and in some cases better risk factor management than, physicians delivering outpatient CVD care supports policies and regulations that allow these clinicians to practice at the top of their capability.<sup>253,254</sup> However, it is also important to measure and monitor the quality of care delivered. Although it may be appropriate for advanced practice clinicians to deliver many aspects of primary and preventive care, it is important that these practitioners are supported by generalist and specialist physicians to optimize care for patients who may benefit from a broader range of expertise. Patients with complex CVD, for example, may benefit from comanagement with a cardiologist. In some cases, such support may not be available in person but could be provided via telehealth or other mechanisms.

Similarly, policy that clearly defines scope of practice for pharmacists and EMTs and allows these professionals to practice with a reasonable degree of autonomy (eg, with standing delegation orders) has an important role to play in expanding access to care in rural communities. As pharmacist-led care, community paramedicine, and CHW-led health delivery interventions continue to grow, providing oversight and ongoing quality measurement as needed while supporting full scope of practice when appropriate is crucial.

States with large rural and remote geographies may benefit from different scope of practice laws than those states with primarily urban population centers. All states should be encouraged by not only the medical professional disciplines but also federal regulatory bodies and federal fund providers to consider multiple approaches to scope of practice requirements.

## SOLUTIONS: EXPLORING NEW MODELS AND SITES OF CARE DELIVERY

### Telehealth and Digitally Enabled Health Care

Increasing use of telehealth and digitally enabled health care, or health care supported by mobile devices and wireless technology and a subset of digitally enabled tools, may improve access to health services for rural populations by connecting across geographies. Telemedicine technology can help increase access to clinicians, increase clinical care efficiency for patients in rural settings, and reduce the need for long-distance travel for in-person visits.<sup>255</sup> Digital tools are currently being used to various degrees in rural communities.

Organizational models such as the hub-and-spoke model, which virtually connects specialists in urban centers (hubs) with clinicians in rural hospitals or clinics (spokes), as well as forming connections between regional rural centers and more remote rural locations, for education, consultation, and treatment, can be expanded to deepen systems of care in rural areas. Many states have already developed telestroke systems of care to improve stroke care in rural areas, and these programs can be spread to other states and to other conditions. For example, Project ECHO (Extension for Community Healthcare Outcomes) supports primary care physicians in providing care for their patients with complex medical conditions such as hepatitis C and diabetes mellitus that is typically provided by specialists in metropolitan areas; this can support treatment for rural residents who may otherwise lack access to this specialty care.<sup>256</sup> Telehealth can also be used to directly connect patients in rural areas with clinicians via smartphone, tablet, or computer for urgent care, counseling, or case management or video access to urgent care clinics through telemedicine kiosks in retail outlets.<sup>257</sup>

Digital health tools can also be used to remotely support positive behavior change related to diet, physical activity, smoking cessation, and weight loss, as well as improved management of hypertension, diabetes mellitus, and medication adherence.<sup>258</sup> To engage rural women in prenatal care, Wyoming's Medicaid program uses digital tools to help pregnant women monitor their weight, to connect them to community services, and to access clinicians.<sup>259</sup> Expanding home-based services is another potential way to increase access to and use of services such as cardiac rehabilitation in rural communities. Prior research determined that home-based cardiac rehabilitation is equally effective as, no more expensive than, and engenders better adherence and completion rates than facility-based cardiac rehabilitation, and these programs have continued to grow with telecardiology support.<sup>260–263</sup>

Technology may be useful in other ways as well. For example, automated external defibrillators sent via

drones to bystanders have been estimated to treat cardiac events faster than current in-person responders in remote areas and could be another way that technology could improve care in rural communities.<sup>264</sup>

A number of barriers to broader implementation of mobile or digital health technologies and telemedicine exist. Crucial infrastructure gaps need to be filled to facilitate the expansion of mobile health services. The effectiveness of mobile health and telehealth/telemedicine strategies is predicated on an adequate digital technology infrastructure. As of early 2019, only 63% of rural Americans have home broadband access compared with 75% of urban and 79% of suburban residents. Similar gaps exist for smartphones (71% for rural versus 83% for both urban and suburban) and home computers (69% versus 73% for urban and 80% for suburban).<sup>265</sup> Increasing public sector funding or private sector investment for telecommunications infrastructure in rural and remote areas could reduce that gap. Ensuring that rural individuals and clinicians are not left behind in the changing care delivery paradigm will require federal and private sector commitments to full broadband or mobile services throughout the country.

Another barrier to digital health integration is training the workforce.<sup>266</sup> Integrating telehealth into health professional training programs may help address this issue and improve telehealth use in rural areas.<sup>267,268</sup> Digital technology can be an effective tool for clinician education; examples have shown that it can help improve prehospital management of stroke and expand community programs that support education and clinical support.<sup>269,270</sup> In addition, tools that efficiently integrate mobile and wearable technology outputs into electronic health records are necessary so that clinicians are able to synthesize and use the data in productive ways to improve health care.

Payment is another important barrier to digital medicine and the broader adoption of telehealth. Currently, payment models for these technologies are in flux. Medicare recently added billing codes for telemedicine, which may help facilitate its widespread use. However, some of the Centers for Medicare & Medicaid's (CMS's) telehealth codes can be used only if the originator (patient or requesting clinician) is in a rural area, whereas others can be used more broadly.<sup>271</sup> Because these are new regulations, their use and application remain unknown, so monitoring these changes will be important in understanding how they affect telehealth adoption.

Prior studies have shown that telehealth in cardiology is cost-effective for multiple types of interventions, including video consultations and home-based, telephonic behavioral interventions.<sup>272–275</sup> Advances in technology could make telemedicine even more cost-effective if the technology becomes less expensive. Furthermore, under new payment models, clinicians would have more incentive and greater flexibility to

adopt these interventions; this is discussed in more detail below.

Beyond telemedicine, funding remains a major issue for many mobile health initiatives. Although some paramedicine programs in rural communities are funded through mechanisms by various levels of government, most are self-funded or receive grants, with only some reimbursement by insurance plans.<sup>276</sup> Unstable funding may lead programs to cease operations temporarily, highlighting the importance of developing stable funding sources for digital medicine. Failing to address these barriers could lead to a widening of disparities between rural and urban areas as digital health technologies take hold.

### Rural-Specific Care Delivery Sites

In addition to innovative approaches, models that use existing infrastructure and leverage it to support the health and healthcare needs of the community can reduce the need for new facilities and ensure that care is accessible and delivered efficiently in the community. Each community may have unique cornerstone organizations, so identifying these alternative routes is crucial. Already discussed infrastructure includes CAHs, FQHCs, and RHCs in the clinical realm, as well as medical schools with rural medicine commitment and community colleges in the training and education realm. CAHs, FQHCs, and RHCs should be supported, and increasing their numbers in rural America should be explored.<sup>165</sup> Another important existing infrastructure is within the VA, which has a large number of rural sites.

Using “circuit-riding” specialists and visiting consultant clinics or outreach clinics is another strategy to ensure access to specialty care in rural communities. A recent study demonstrated that this strategy significantly improved patients’ geographic access to outpatient cardiology services in Iowa.<sup>277</sup> Similarly, mobile health clinics may have promise for delivering care in remote areas; some studies suggest that these clinics can deliver high-quality care cost-effectively.<sup>278–280</sup>

Enhancing care delivery in rural health departments could improve preventive care in rural areas. Many rural health departments are small, understaffed, and underfunded and, as a result, lack the ability to deliver high-quality, evidence-based services and preventive care that reach people outside typical healthcare settings (eg, schools, workplaces, and places of worship). Adequate funding of public health infrastructure and workforce in rural areas could complement health improvement efforts and the delivery of health care in new and innovative ways, even in communities that might lack a more typical healthcare delivery organization.

A rapidly evolving aspect of place-based care is the use of pharmacy and shopping retail areas as clinics,

especially to deal with common risk factors, medication adherence, and behavioral issues. Walmart’s recent announcement of a program to subsidize the education of employees to obtain degrees in nursing signifies an intent to use the ubiquitous facilities to deliver health care in a convenient manner. This approach raise the issue of integration of these different service methods into a coherent system that could optimally serve the patients and the community. An example could be the creation of economic zones in which colocation of services could lead to job creation and associated service businesses.

School-based health centers offer another existing, promising care delivery model that leverages team-based care in school settings to overcome healthcare access barriers such as transportation, lack of clinicians or insurance coverage, and the need for children and parents to miss school or work to get to appointments. In school-based health centers, interdisciplinary teams provide comprehensive medical services within a school or on school grounds.<sup>281</sup> School-based health centers are a growing source of care for rural youth, in particular for black and Hispanic students, students with public or no health insurance, and students with disabilities.<sup>282–285</sup> Thus, the expansion of school-based health centers (and consideration of offering care to nonstudent patients) in rural communities could be an important part of the solution to care delivery in rural communities, especially for vulnerable youth who may not have access to care in other venues.

Churches and other faith-based organizations, often cornerstones of rural communities, are another network of facilities and people that could be used to support rural populations. Engaging faith communities in the delivery of care and the religious buildings as delivery sites not only provides geographic convenience, as noted by the National Rural Health Association, but also leverages the experience and competencies that these religious institutions have in engaging community members and delivering other social services (eg, meals, counseling). Practitioners may find religious leaders and congregation health ministries to be natural allies in health promotion and disease prevention efforts, and they could serve to connect individuals to other services to meet their overall health needs.<sup>286,287</sup> Partnerships between faith-based organizations and healthcare organizations, when appropriate for the community, could provide the data infrastructure and Health Insurance Portability and Accountability Act expertise to help these groups improve community health.

The IHS also has significant established rural infrastructure that could potentially be leveraged more broadly for the community. However, specialized approaches to American Indian/Alaska Native health delivery are also crucial. For example, the self-governance and self-determination approach to healthcare delivery

that allowed tribal governments to become the drivers and administrative backbone for healthcare delivery has proved highly successful. Since self-determination in health care, there have been noted and documented improvements in decline in disease prevalence and decline in mortality caused by several diseases. Learning from those efforts is important, not just for indigenous peoples but for the United States as a whole. The existing resources in each rural community are unique, and interventions that build on local strengths are most likely to be successful.

## Regionalization of Care

Regionalization of care can help improve outcomes and reduce urban-rural disparities in care by formally connecting healthcare provider organizations and clinicians in rural areas to larger urban systems with greater resources that patients can access when needed. Initiatives such as the AHA's Mission: Lifeline, which aims to coordinate care delivery to improve systems of care for acute life-threatening cardiovascular events such as acute MI and stroke, have demonstrated success in improving outcomes.<sup>288-291</sup> Broadening participation to include even more small rural hospitals has the potential to improve care and outcomes in rural areas that are currently not part of regional networks for acute cardiovascular illnesses and should be pursued nationally. Of course, there are important tradeoffs between regionalization and preserving adequate volume at local facilities; any regionalization schemes need to recognize the importance of maintaining local expertise when feasible.

Another cardiovascular condition for which regionalization has the potential to improve outcomes in rural areas is congenital heart disease. As noted, surgical and medical outcomes are generally better for children and adults with congenital heart disease who are cared for at high-volume, specialized centers,<sup>134,135</sup> and AHA/American College of Cardiology guidelines for the long-term management of congenital heart disease suggest that being cared for by an adult congenital heart disease program is associated with better outcomes.<sup>135,136</sup> However, given the lack of availability of such specialized care in most rural areas, there is a need for a systematic approach to regionalization of care. As opposed to many conditions, the precise number of children with congenital heart disease can be counted and placed in a geospatial construct, making optimization of facility and specialist location possible for the entire population. Creating referral networks to ensure that all individuals with congenital heart disease are seen at centers with the expertise to care for them and can have any necessary surgical procedures performed at a high-volume, high-quality center should be a priority.

Partnerships between primary care clinicians and adult congenital heart disease centers could also help improve long-term outcomes for rural children and adults with congenital heart disease. These partnerships can be formed to anticipate, research, and address distinct issues faced by rural primary care providers, who often will manage the long-term follow up of these individuals. Recent guidelines from the American Academy of Pediatrics provide primary care clinicians with general advice on caring for this population but do not specifically note issues that may be of particular salience to rural primary care.<sup>292</sup> Telemedicine and other tools may play an important role in allowing adult congenital heart disease centers to provide support for local practitioners to deliver high-quality care for this complex population and to ensure that individuals with congenital heart disease can receive high-quality care close to home and are not lost to follow-up because of their rural location. These relationships must ideally be a 2-way street; that is, primary care clinicians in rural areas should know the importance of linking complex patients to referral centers, and referral centers should prioritize communicating with the local clinician and supporting care delivered locally in return.

Given ongoing improvements in the early care of children with congenital heart disease, there is also an increasing need for expertise in high-risk pregnancy management as more women with congenital heart disease become pregnant. Referral networks may particularly benefit women in rural areas, where such expertise may be less available.<sup>293</sup>

For women with CVD more broadly, perinatal regionalization of care may also be important. Such regionalization has also been used to address maternal health needs and to ensure that pregnant women are connected to timely risk-appropriate care, including transfer to other hospitals as needed. To support this model, the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine have established Levels of Maternal Care to help clinicians identify the most appropriate locations for each birth within their region based on perinatal risk factors<sup>294</sup> that can be used by rural communities to identify and refer women to clinicians with the appropriate skills for their needs. The CDC's Levels of Care Assessment Tool, based on American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine, and American Academy of Pediatrics guidelines, is used to support decision-making about risk-appropriate care at a regional level.<sup>295</sup>

Similar recommendations may apply for other types of highly advanced cardiovascular care, including heart transplantation and left ventricular assist device implantation. Ensuring that regionalization models expand access to specialized care for individuals in rural areas and strengthen and facilitate local capacity in caring for these patients in their home communities is crucial.



## SOLUTIONS: SUSTAINABLE FUNDING MODELS AND FLEXIBLE PAYMENT TO SUPPORT RURAL CARE DELIVERY

### Sustainable Funding Models

Fee-for-service reimbursements should be examined to understand how they contribute to geographic disparities in resources. Reimbursements for cardiovascular treatment services are responsible for as much as 40% of the general revenue for many hospitals, which may put significant pressure on physicians to keep and care for patients with heart attack at local facilities rather than transferring to one with 24/7 PCI capability and cardiothoracic surgical services.<sup>119</sup> The connection between EMS destination protocols and reimbursement therefore should be examined and adjusted to ensure that it supports patients' receipt of high-quality care but also enables rural facilities to remain viable to care for patients when they return to their community. Reduced reimbursement for bypassing the nearest rural hospital in favor of a more urban hospital with resources for heart attack care<sup>296</sup> is detrimental for patient care and may lead to poor health outcomes.

New or altered funding mechanisms could address barriers to sustainability in rural health facility and program funding. With occupancy rates <40%, many rural hospitals simply do not have the volume to sustain their fixed-cost structures in the current fee-for-service environment. Simultaneously, many urban hospitals function at >100% occupancy, which causes potentially unsafe delays in ED admissions and delayed transfers from other hospitals (ie, rural hospitals) and contributes to crowding. Therefore, partnerships in which urban facilities could send patients who need ongoing lower-acuity care to rural facilities would serve the dual purpose of freeing up high-demand urban beds while helping maintain adequate volumes in rural ones. This requires, in part, attention to reimbursement policies for transfers between hospitals for various levels of care.

As hospitalization rates continue to drop in rural areas, it is likely that rural hospital closures will continue. A systematic approach to ensuring that essential cardiovascular services remain available, even if there is no financial model that would support full hospital services, is needed, and this may become even more important as the health system moves away from inpatient hospital-centric delivery systems. For example, having an urgent/emergency care center that can provide basic initial triage, stabilization, and transfer could be one way to preserve access to critical services such as antithrombotic therapies for acute MI or thrombolysis for MI and stroke. Although it is not financially feasible to provide the same array of services at rural as at urban hospitals, there is likely a core set of services that could be prioritized and financially subsidized

when needed. Taking an intentional approach to the location of centers with the capability to perform PCI, for example, could preserve access to this important technology even in more rural areas of the country. If rural hospitals close with no plan for creating a sustainable model for the provision of at least some degree of health care, it is likely that rural health outcomes will continue to worsen.

In addition, financial models need to be established such that, even if the initial hospitalization requires transfer to an urban center, incentives exist to encourage urban hospitals to transfer rural patients closer to their homes once their acute quaternary or tertiary medical care needs have been addressed. For example, many patients with heart failure who initially require stabilization in centers with access to intensive care units and high-tech imaging could be safely transferred to lower-capability hospitals to complete a course of diuresis and begin their rehabilitation. This would also put patients closer to their social support systems and could facilitate discharge and follow-up care transitions. In some communities, an influx of these types of patients could be enough to sustain hospitals that might otherwise be financially nonviable. There is also a growing need for postacute and long-term care in rural communities as rural nursing home closures accelerate. Rural hospitals could therefore be allowed to provide a more flexible array of services (ie, postacute care) while maintaining hospital status, perhaps through changes to current swing bed policies or to the current CAH payment regulations. Linking these flexible systems of care with measures of quality of care for core services will be essential to assure patients that they will achieve good outcomes when referred back to rural facilities with a lower intensity of services.

Another mechanism for ensuring access is via the essential community provider designation, which identifies clinicians who serve high-risk, special-needs, and underserved individuals. Eligibility criteria for such designation could be expanded to explicitly match need and supply (assure adequacy) in rural communities, as a few states have done. An essential community provider designation should include assurance that essential community providers are adequately funded to serve patients.<sup>297</sup>

Policy interventions are needed to promote the formation of partnerships between urban and rural facilities. For example, CAHs currently must meet a set of requirements to maintain their CAH status. Adding a requirement to establish telehealth and referral networks for acute cardiovascular conditions (and other time-sensitive conditions such as trauma and sepsis) could be achieved under CAH regulations. Alternatively, urban hospitals could be incented to create such partnerships if it were counted toward their community benefit requirement to maintain nonprofit status.

This might be an attractive way to provide community benefit while strengthening referral networks for tertiary and quaternary care facilities. In addition to providing training opportunities, medical schools and the academic health centers with which they are affiliated might be encouraged to form academic partnerships with CAHs that enhance training and the delivery of services and systematize regionalized consultation and referral for specialty care. However, within these partnerships, local governance of local facilities should be preserved when feasible.

### Flexible Payment Models

New payment models could also serve to better tie rural and urban facilities together. For example, if rural populations were attributed to urban centers according to partnerships through Accountable Care Organizations (ACOs), bundled payment for tertiary/quaternary care, or other similar payment mechanisms, there would be greater incentive to form partnerships. However, incentive payments must be constructed to ensure that they benefit both the rural and urban facilities in the partnerships.

For rural hospitals and health centers, moving to a global budgeting approach could reduce the variability in revenue associated with low-volume facilities and provide needed money for investment in infrastructure such as electronic health records. The Pennsylvania Rural Health Model, which was recently launched by the Center for Medicare and Medicaid Innovation,<sup>298</sup> is a model in which CMS coordinates a multipayer global budgeting approach to pay for rural hospital care. Participating rural hospitals receive a fixed annual budget to cover all inpatient and outpatient services provided at the hospital. This model is designed to insulate rural hospitals from volatile changes in month-to-month revenue. It also aims to provide hospitals with the financial flexibility and incentive to invest in programs to improve health in the community and to prevent hospitalizations, unlike the current business model, which pays hospitals only when a patient is admitted. In this way, global budgeting for rural hospitals could start to close the gaps in cardiovascular risk factors that exist between urban and rural communities. Building on global budgeting with add-on bundles for high-priority services such as obstetric care is another financial tool that could be used to address care availability while offsetting the financial burden on rural clinicians and facilities.

Increasing participation with value-based and alternative payment models in rural areas can play a role in ensuring adequate infrastructure in rural areas. Although there are a growing number of innovative reimbursement models,<sup>299</sup> overall participation with value-based and alternative payment models is much

less in rural than in urban areas.<sup>300,301</sup> CMS has created a number of initiatives focused on supporting rural groups' participation in these models. For example, the Advance Payment ACO model and the ACO Investment Model provided additional dollars for startup investments in technological and personnel infrastructure necessary for participation in the Medicare Shared Savings Program, CMS's largest ACO program. Of the groups participating in these models, the majority had  $\geq 85\%$  of their delivery sites located in rural areas and included at least 1 CAH or other special-designation rural hospital in their network.<sup>102</sup> Recent evaluations have found that these upfront investments have enabled ACO shared savings contracts with providers and were associated with lower Medicare spending than among non-ACO providers.<sup>302</sup>

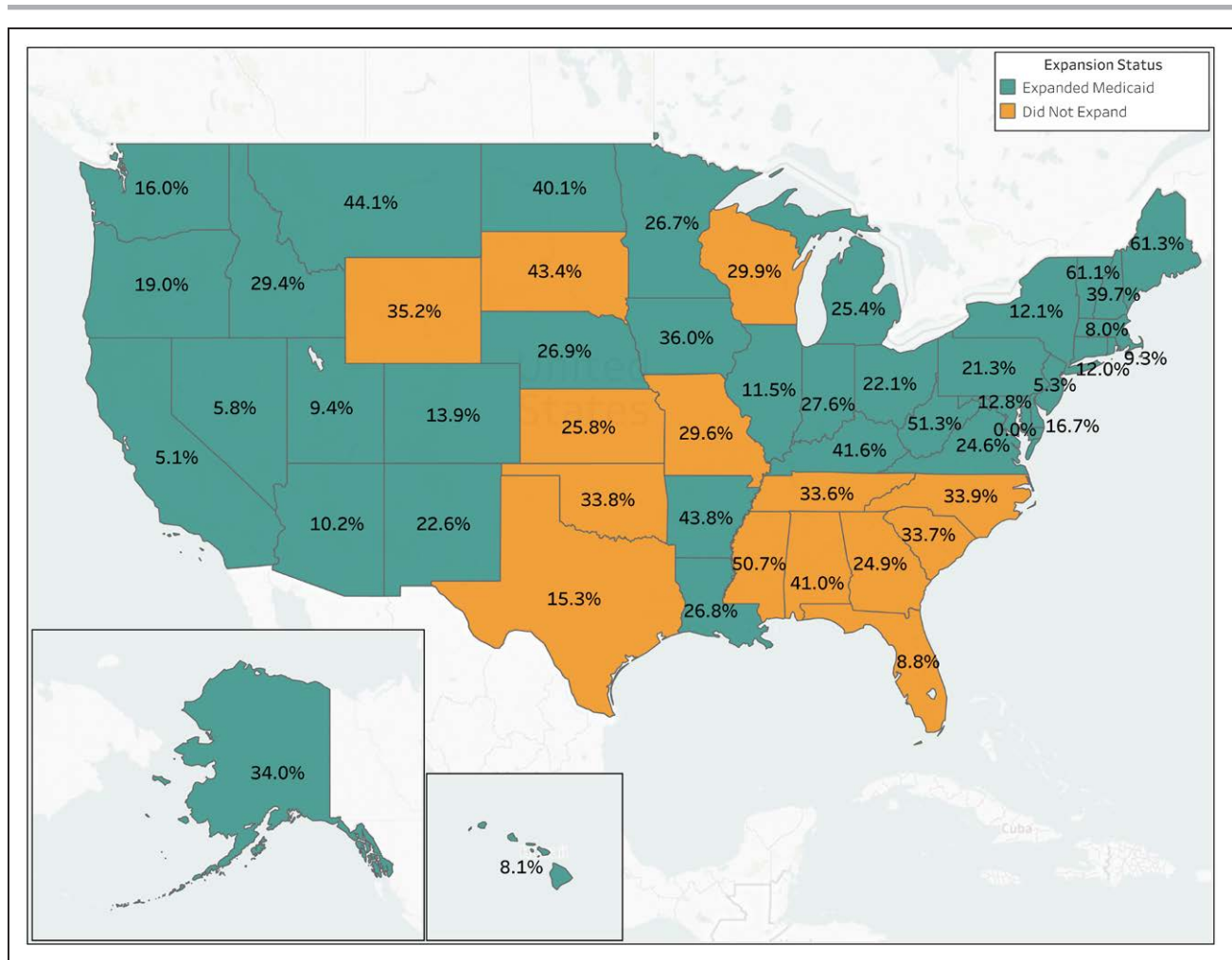
Relatedly, payment models from the Center for Medicare and Medicaid Innovation that address SDOH such as the Accountable Health Communities model may have particular benefits for rural areas, given the significant burden of social disadvantages in these areas.<sup>303</sup> Because CVD, like most chronic diseases, is known to be driven to a large degree by social determinants, there may be a role for the cardiovascular community working with local public health to facilitate community-based interventions for screening, healthy lifestyle promotion, and prevention and treatment of CVD that focus on socially vulnerable populations such as isolated rural individuals or those living in poverty.

Although rural participation in novel payment models remains low, particular features of rural health systems and rural communities may lend themselves to new care models. For example, in many rural communities, hospitals, nursing facilities, and outpatient care are colocated at a single site and may represent the sole healthcare provider in a broad geographic area. Even if other clinicians and facilities are nearby, referral networks are often very small, and relationships are long-standing. Global payment models that focus on care coordination, efficiency, and collaboration specifically for rural health may fit particularly well with this setup.<sup>102</sup>

## SOLUTIONS: INSURANCE COVERAGE AND BROADER ECONOMIC DEVELOPMENT

### Improvement of Health Insurance Coverage in Rural Areas

Policies such as Medicaid expansion and insurance market reform could be particularly impactful in rural areas to improve access to health insurance and healthcare services. As noted, Medicaid expansion is associated with lower financial strain; less poverty; better preventive care, including identification and treatment of



**Figure 2.** Percent of population living in rural areas by state and expansion status.

cardiovascular risk factors; better self-reported health; better mental health; lower rates of cardiovascular events; and, most important, lower cardiovascular mortality.<sup>202–215</sup> It is also associated with lower rates of hospital closure and thus better access to care.<sup>107</sup>

However, many states with large rural populations have elected not to expand Medicaid (Figure 2). This has likely had a significant impact on widening disparities in urban and rural health and a negative effect on rural communities and the hospitals that serve them.

Increasing use of waivers by CMS, which allow states greater flexibility in designing Medicaid eligibility requirements and coverage, may facilitate expansion in a broader number of states, but some waiver provisions may compromise coverage.<sup>304</sup> Because research suggests that Medicaid expansion has economic benefits for states beyond its direct impact on health, including reduced poverty rates and reduced hospital closures,<sup>107</sup> expansion may be a more attractive option even in low-tax, low-spend states. Ballot initiatives brought by community groups may also spur Medicaid expansion in largely rural states where it has not yet taken place, as happened in 2018 in

Idaho, Nebraska, and Utah. Evidence that Medicaid expansion improves access to opioid use disorder treatment may lead nonexpansion states hard hit by opioid use disorder to consider health policy to expand Medicaid.<sup>305</sup>

Rural areas might disproportionately benefit from policies aimed at further reforming the individual insurance market. The intent of the federal and state Marketplaces created under the Affordable Care Act was to create functional markets for individual coverage, but high premiums in areas with few market entrants have limited uptake in rural areas, where the need is particularly high. Reforms such as broadening rating areas, allowing Medicaid or Medicare buy-in, and enhancing consumer support to ensure that individuals are fully taking advantage of subsidies for which they qualify could improve rural insurance markets. High-deductible plans and low-benefit plans that fail to comply with Affordable Care Act coverage requirements (association health plans, short-term plans) should be discouraged because they are unlikely to incentivize patients or clinicians to engage fully in preventive care that could be cost-effective in the long run.

## Broader Economic Development in Rural Areas

The financial sustainability of healthcare systems will also rely on the overarching economic prosperity and revitalization of rural communities. One possibility is to leverage healthcare facilities to create health care–anchored economic empowerment zones, which would serve the dual need of preserving access to health and health care while driving broader economic development. Such zones could promote the collocation of health and healthcare services such as hospital, post-acute, and ambulatory care. Economic development centered on health and health care could also facilitate the delivery of preventive care and public health services if linked to other existing health resources such as EMS, school-based services, and home-based care within communities. Models that tie into rural “health hubs” might provide economies of scale for personnel and electronic health record infrastructure, if payment models could be developed to support their development. Investment in and sustained funding for LHDs serves as another vehicle to support public health activity while enabling communities to execute interventions locally.

Expanding access to health centers (RHCs and FQHCs) could also provide economic security for rural communities. In addition to the community economic benefits associated with Medicaid expansion described earlier, Community Health Centers created more than \$54.6 billion in economic activity and created 405 000 jobs in 2017 according to the National Association of Community Health Centers.

As mentioned, infrastructure gaps, including broadband access, need to be filled to facilitate broader economic development in rural areas. Given that job growth in many industries relies on digital infrastructure, attention and funding to develop this critical infrastructure are necessary.

## RESEARCH NEEDS AND GAPS

To support the investments in workforce, retooling of infrastructure, and policy reforms called for in this document, a major research program is needed to fill current gaps and to examine emerging areas of innovation. There are a number of gaps in the existing research examining which policies are effective at bringing and sustaining a clinical workforce in rural areas, as well as which delivery models are effective, scalable, and efficient across rural populations and geographies. Although research examining the effectiveness of digital medicine is increasing, more is needed, and the pace needs to be accelerated to understand which digital technologies and human interfaces are effective and which are ineffective in rural communities.

Research assessing which types and configurations of clinicians and community-based practitioners are most effective in specific rural populations is also needed. As effective models of clinical care are developed, payment models that best support the inclusion and use of these clinicians in team-based care need to be developed. Across these models, understanding the training and competency to maintain the models, to measure and maintain quality of care, and to continue to recruit new lay health workers and professionals is necessary.

Better and more systematic collection of health data from RHCs and hospitals would also allow better quantification of quality and outcomes of care and identify gaps, opportunities, and successes. Currently, because many of these clinicians and facilities are excluded from federal reporting requirements and are ineligible for the majority of value-based and alternative payment models, little is known about their quality performance or about features that might enable high performance among rural facilities. Even less is known about triage and transfer patterns or partnerships with referral centers and how such relationships may enable quality. To the degree such data could be collected electronically, without the requirement for new personnel to abstract or code data, it could be done without the need for a dramatic investment in new local resources just for data collection. If such data were available, examining these and other care delivery patterns for acute and chronic cardiovascular conditions and linking them with clinical outcomes could inform policies to improve cardiovascular care in rural, underserved communities. Rural quality measurement might require new rural-specific quality measures, as suggested by the National Quality Forum, and ultimately could facilitate the development of rural-specific value-based reimbursement models. Particular concerns include the difficulty in separating random variation from meaningful changes in quality measures in low-volume environments and the complexity of including SDOH in risk adjustment. These issues are amenable to research to find solutions as quality systems are implemented.

Although research aimed at improving rural cardiovascular outcomes is needed, this area of study can be difficult because of small sample sizes and the fact that most research institutions are not located in rural areas. Furthermore, the decreasing commitment of the National Heart, Lung, and Blood Institute to fund clinical trials and a general lack of federal investment in health services research have made research on clinical strategies that might improve rural health difficult to conduct. Making targeted funds available for rural-focused research could have a large impact on research done in these areas. For example, given the demographics of the rural United States, a federal consortium that not only includes the National Institutes of Health but also leverages funds from the Department of Veterans Affairs,

the Department of Defense, the Patient-Centered Outcomes Research Institute, the Health Resources and Services Administration, the Department of Agriculture, and the Agency for Healthcare Research and Quality, among others, could bring significant resources to bear on rural-focused solutions to improve health outcomes.

A community-centered approach to rural research will also be crucial. The solutions that work in an urban area may not work in a rural one, and given the diversity of rural communities in terms of geography (mountainous areas, truly remote areas, farmland, etc) and populations, what works in one rural community may not be applicable to another rural community. Solutions must also be attuned to the particular needs and cultural sensitivities of unique populations such as indigenous peoples and should be addressed via community-centered research approaches.

## CALL TO ACTION

The AHA is committed to leveraging our reach and assets and to working with strategic partners to develop solutions to improve rural health in America. We will use the capacity we have built in research, education, quality improvement, programs, and policy capacities to advance these aims in support of health equity and call on stakeholders across the ecosystem to do the same. Examples of the AHA's commitment include the following:

- Consider virtual expansion of the AHA's quality improvement initiatives to support a system that better serves rural populations and their health needs. This could include bringing existing AHA programs such as Get With The Guidelines, Mission: Lifeline, Target: BP, Check.Change.Control, and Know Diabetes By Heart to bear in rural areas and facilities, as well connecting them together to support a longitudinal and connected system of care.
- Advocate for policy priorities that support an affordable, accessible, and adequate system of care for all residents of the United States. This includes a continued dedication to pursuing and advancing Medicaid expansion efforts across all 50 states and territories, expanding broadband access, securing telehealth payment parity, maximizing AHA's reach in schools in rural communities via the Voices for Healthy Kids program, and pursuing a comprehensive policy agenda in partnership with like-minded organizations aimed at systematically addressing SDOH.
- Seek partnerships with venture and institutional investors interested in supporting technologists and clinical experts in using and applying a wide range of technologies to address health equity and to encourage the ability of technology to drive a more accessible model in health care for all.

- Examine ways to leverage AHA's contribution to funding and disseminating research to build the evidence base to inform and expand the collective understanding of rural healthcare needs and which interventions are effective or ineffective in improving outcomes. This could include supporting early investigators from rural areas and working with the National Institutes of Health and Patient-Centered Outcomes Research Institute to amplify funding for rural health issues.
- Explore governmental partnerships such as with the Center for Medicare and Medicaid Innovation to facilitate demonstrations to develop effective approaches and to examine emerging ideas in cardiovascular care that are particularly relevant to rural areas.
- Encourage stakeholders to identify and support training needs of the variety of healthcare professionals who could serve to meet the health needs of rural populations. Methods considered could include expanding rural residency programs and expanding training of primary care physicians in rural areas or creating referral networks and developing telehealth solutions to improve access to care.
- Work with AHA's guideline development partners to develop principles for innovative clinical interventions that could facilitate their spread and create the basis for these services to be covered by payers.
- Contemplate ways to extend the reach of AHA educational initiatives such as Go Red For Women and Healthy for Good into rural areas through content syndication to leverage predominant media channels used by residents of rural areas.
- Collaborate in hosting inclusive and unifying events and dialogs to expand existing community partnerships, as done in the Strengthening Healthy and Resilient Environments Coalition to build powerful partnerships that empower community members to identify and address the needs of their communities.

## ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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\*Modest.

†Significant.

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