From Sea to Shining Sea
What Is It About Where You Live and Your Stroke Risk?

Virginia J. Howard, MSPH

On May 21, 2007, Dr Darwin Labarthe (CDC HDSP), Dr Janet Collins (CDC NCCDPHP), Dr Ed Sondik (CDC NCHS), and others presented a report to Assistant Secretary for Health ADM John O. Agwunobi on the nation’s progress toward achieving the Healthy People 2010 Focus Area 12: Heart Disease and Stroke goals and objectives. They reported that target reductions in stroke deaths, coronary heart disease deaths, and high blood cholesterol levels were met or exceeded. Although control of blood pressure has improved, it is still approximately 50% below target and the prevalence of high blood pressure has increased. The progress report also showed that the race/ethnicity, sex, and geographical disparities in cardiovascular deaths and associated risk factors remain. Although it is good news that we may be living longer and healthier (cardiovascular) lives, it is unfortunate that geographic (and racial) disparities in stroke mortality have been so persistent. However, the poor state of knowledge of the causes (or even mechanisms) of the Stroke Belt is underscored by the lack of information addressing even fundamental issues such as whether the higher stroke mortality in the Southeast is a product of higher incidence or higher case-fatality in the region. It could be argued that because we have such a poor understanding of the causes of these disparities, it would be surprising if we can be effective at reducing them.

These results by Rich et al from the Physicians’ Health Study are consistent with mortality data that document the existence of the Stroke Belt, traditionally defined as the 8-state region (North Carolina, South Carolina, Georgia, Tennessee, Alabama, Mississippi, Arkansas, and Louisiana) within the Southeast that has stroke mortality approximately 30% to 40% higher than the rest of the United States. Rich and colleagues note a crude stroke incidence approximately 15% higher in the Southeast than the rest of the nation. Although on the surface this seems to suggest that incidence contributes only approximately half of the effect of the Stroke Belt, the US census definitions of geographic regions were used in their report, categorizing the “Southeast” to include several states with lower stroke mortality (ie, Delaware, Maryland, Washington, DC, Virginia, West Virginia, Kentucky, and Florida) that are not included in the usual definition of the Stroke Belt, and several states normally included in definitions of the Stroke Belt were included in the “Midwest” (ie, Arkansas and Louisiana.) That the regions in the report of Rich et al do not align with the traditional definition of the Stroke Belt would tend to attenuate differences between regions and makes their findings even more striking.

A strength of the cohort used in this analysis is its national scope and a structure that is not tied to specific communities...
such as longitudinal cohort studies that use clinical centers or the primary sampling units used by NHANES. This geographic heterogeneity, including individuals in a broad spectrum of communities, strengthens the findings. In addition, the participants (physicians) in the cohort have obvious ready access to healthcare facilities, and hospital-based programs have the advantage of access to hospital data to quantify stroke subtype and severity (but require hospitalization for the stroke to detect events). The other cohort studies also provide less precise estimates of incidence as a result of limitations of sample size.

As Rich and coauthors acknowledge, a major limitation of this study is that it includes only upper-middle to high socioeconomic class, highly educated, primarily white men. Clearly, it is potentially problematic to suggest that these findings can be generalized to the general US population. In this weakness, however, also lies a great strength of the report. There are as many as 10 hypothesized causes of the Stroke Belt, many of which have strong advocates. Among these, it has been hypothesized that regional differences in socioeconomic status could contribute to the Stroke Belt through a large number of mechanisms, including that the disadvantaged have poorer access to health care and healthy lifestyle, poorer lifestyle choices (diet, exercise, and so on), less control of risk factors, and less access to medications. The regional differences in stroke incidence in this relatively homogeneous physician population make the contribution of socioeconomic status seem less likely.

Stroke prevalence data by state are now available for 2005 based on participant self-report from the Behavioral Risk Factor Surveillance System (BRFSS) survey. Across all 50 states plus the District of Columbia and Puerto Rico, the overall prevalence of stroke in 2005 was 2.6% (95% CI, 2.5 to 2.7). The average prevalence of stroke in the 8 Stroke Belt states was 3.2%, ranging from a high of 4.3% in Mississippi (the highest among all regions) to 2.8% in North Carolina. It is noteworthy that not only is the average Stroke Belt prevalence 23% above the national average, but the Stroke Belt state with the lowest prevalence was even above the national average. The same forces that drive disparities in mortality, and that Rich and colleagues report may be driving disparities in incidence, are also potentially driving disparities in prevalence. These higher stroke prevalence rates in the Southeast are likely directly related to higher public health and personal burden among this larger group of stroke survivors from the region.

What is it about where you live that impacts your cardiovascular risk? Is it the culture of the area? Is it environmental factors? Is it differences in the proportion of the population making healthy lifestyle choices? Can the findings of Rich and colleagues be generalized to the nonphysician populations? If you live the first part of your life in one area of the country but move later in life to another area with a different stroke risk, does your personal risk of stroke change? How do we reconcile the reports of geographic differences in risk factors seen in some studies but not seen in the report of Rich et al? Are these potential differences in risk factor profile contributing to the Stroke Belt? There is still so little that we understand regarding the Stroke Belt, and without this understanding, making changes to reduce the geographic disparity is simply “shooting in the dark.”

Other studies are coming online that have been designed to address these issues, including the REasons for Geographic And Racial Differences in Stroke (REGARDS) study funded by the National Institute of Neurological Disorders and Stroke. This is a national, population-based longitudinal study planned to enroll 30,000 participants, half black and half women by design, and half from the Stroke Belt states. As this cohort of individuals from 1000s of communities across the United States matures, additional insights to the causes of the Stroke Belt will be provided. Other government-funded efforts completed or underway to further the understanding and reduction of the Stroke Belt include National Heart, Lung, and Blood Institute pilot projects funded in 1991 in the 11 states in the Southeast that had stroke mortality rates that were more than 10% higher than the 1980 US average age-adjusted mortality rates. Project accomplishments and lessons learned from these projects are available on the Internet. With a focus on community-based initiatives to reduce the burden of stroke, in 2004, a request for proposal from the Secretary of Health and Human Services (entitled the Stroke Belt Elimination Initiative) was released to award funding to three Stroke Belt states to: (1) increase community awareness and knowledge of hypertension and stroke, (2) enhance early detection of high blood pressure and stroke with early referral to care, (3) increase the community’s adoption and use of lifestyle behaviors toward prevention and control of hypertension and stroke, and (4) increase blood pressure control rates among community persons who are known to have hypertension and see healthcare providers. The Centers for Disease Control has supported the Tri-State Stroke Consortium (1997; www.tristatestrokenetwork.org) and the Delta States Stroke Consortium (2002), comprising the traditional 8 Stroke Belt States, to bring together public health professionals across regions to share resources and experiences. Although not in the Stroke Belt region, recently the Great Lakes Regional Stroke Network was funded (2004) to also coordinate stroke awareness, prevention, and treatment activities in the Great Lakes states of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Although not supported by government funds, the Stroke Belt Consortium (www.strokebelt.org) is a self-sustaining group that has been in existence since 1994 under the leadership of Dr. Mark J. Alberts. Comprised of over 350 members from diverse organizations and disciplines, the overall goal of the Stroke Belt Consortium is to “improve both public and professional education on stroke for people who live in the Stroke Belt.” Besides supporting annual educational events, this consortium has also worked with individual state-based initiatives and funded small pilot grants and demonstration projects.

Collectively, these efforts should provide additional information to further the understanding of the causes of the Stroke Belt, and with this understanding, interventions to reduce these disparities can be better directed. For example, REGARDS is approaching completion of recruitment of the cohort, but accrual of enough stroke events to assess differences in incidence by relatively rare risk factors will require the continued follow up of the cohort for a number of years. Today, however, the Physi-
cians’ Health Study has up to 22.5 years of follow up on a cohort of over 20,000 individuals, and using this remarkable resource, Rich and colleagues have provided great insights to the mechanism of the Stroke Belt. Congratulations and thanks to these authors for the insights made possible through this report.

Disclosures

None.

References

From Sea to Shining Sea: What Is It About Where You Live and Your Stroke Risk?
Virginia J. Howard

Stroke. 2007;38:2210-2212; originally published online June 28, 2007;
doi: 10.1161/STROKEAHA.107.490425
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2007 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://stroke.ahajournals.org/content/38/8/2210

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published
in Stroke can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office.
Once the online version of the published article for which permission is being requested is located, click
Request Permissions in the middle column of the Web page under Services. Further information about this
process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Stroke is online at:
http://stroke.ahajournals.org/subscriptions/