North Florida Is Part of the Stroke Belt

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Synopsis

Florida is the only State in the southeastern United States that is not part of the "stroke belt." The National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health, defines the stroke belt as those States with an age-adjusted stroke mortality rate for the years 1979 to 1981 that is more than 10 percent above the national annual rate of 40.3 per 100,000 population.

By reproducing at the county level the methods that were used at the State level to describe the stroke belt, the authors identified a group of 34 contiguous northern Florida counties (population exceeds 2 million) with an age-adjusted stroke mortality rate of 47.2 per 100,000—higher than 3 of the 11 stroke belt States. They concluded that north Florida is part of the stroke belt and should be included as a priority region for stroke prevention programs. County-level analyses that are methodologically comparable with those used by NHLBI to describe the stroke belt may be a useful technique for identifying high stroke-rate regions within States which might be missed when needs assessment is based only on State-level data.

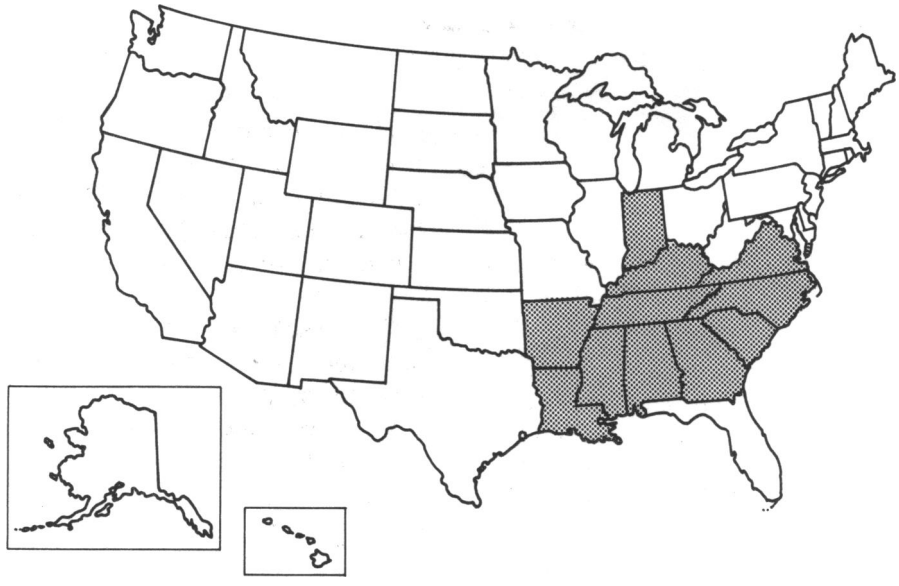
THE NATIONAL HEART, Lung, and Blood Institute (NHLBI) has described a "stroke belt," which includes the 11 States whose age-adjusted annual stroke mortality rates for the entire population for the years 1979–81 were more than 10 percent above the national rate of 40.3 per 100,000 (*1*). The stroke belt, as defined by 1979–81 data, includes all of the southeastern States—Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee, and Virginia—except Florida, which ranked 26th in age-adjusted stroke mortality rate nationwide.

Stroke mortality rates among the stroke belt States ranged from a high of 57.6 per 100,000 in Georgia to a low of 46.3 per 100,000 in Kentucky and Virginia. Stroke mortality rates have been known to be high in southeastern States since at least 1960 (*2*), and data for 1986 confirm that stroke belt States continue to have stroke mortality rates higher than almost all other States (*3*).

Stroke risk factors are known to be more prevalent in stroke belt States than elsewhere. For example, 82 percent of older black women in the South reportedly have high blood pressure, compared with 70 percent or less in the Northeast, Midwest, and West (*1*); and telephone survey data have consistently shown cigarette smoking and obesity among adults to be more prevalent in stroke belt States than elsewhere (*4–6*).

The absence of Florida from the stroke belt is geographically conspicuous (fig. 1), and there is reason to suspect that if northern Florida were a separate State, it would be a stroke belt State. For example, stroke mortality rates for the northern part of the State have been shown to be higher than for the rest of the State for white and nonwhite males (*7*), as well as for whites' ages 35–74 (*8*). Northern Florida is in some ways sociodemographically more similar to neighboring (stroke belt) States than is the rest of the State, further reason to suspect that the age-adjusted stroke mortality rate for northern Florida might be as high as or higher than that in some of the stroke belt States. For example, there are proportionately more blacks in northern Florida than in the rest of the State: all of Florida's seven counties with more than 25 percent black population are in the northern part of the State, whereas statewide, less than

Figure 1. The stroke belt



SOURCE: Reference [1]

15 percent of the population is black (*9*).

Designated stroke belt States have been targeted for special prevention activities, such as the "Strike Out Stroke" Program, which emphasizes effective delivery of medical and educational services to high stroke-risk populations. We believed it would be important to determine whether northern Florida, with more than 2 million inhabitants, constitutes an as yet unidentified stroke belt region.

Methods

Data on stroke deaths ICD-9 (International Classification of Disease, 9th Revision) codes 430–434 and 436–438 in Florida residents for 1979 to 1981 were obtained from the Florida State Vital Statistics Service. Florida population data for 1980 were obtained from the State's Office of Planning and Budgeting, Economic Analysis Unit.

We calculated stroke mortality rates for Florida and each of its 67 counties using the same method used to describe the stroke belt, that is, annual stroke mortality rate for 1979–81, age-adjusted by the direct method to the 1940 U.S. population according to standard 10-year age groups. We then prepared a map of county-specific stroke mortality rates to determine whether there might be a group of contiguous counties with total population above 1 million and with an aggregate stroke mortality rate higher than the stroke belt threshold rate—44.3 per 100,000.

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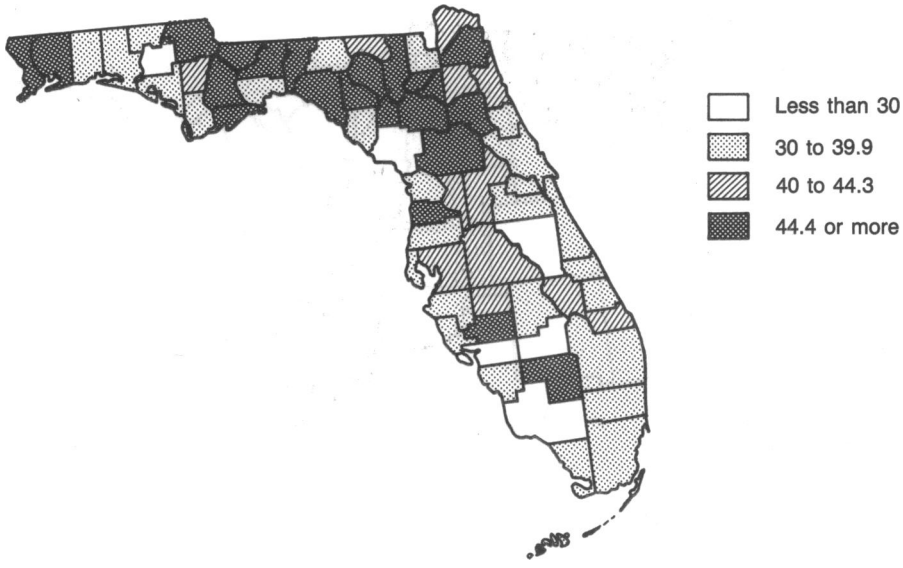
Results

We calculated a stroke mortality rate for Florida of 37.3 per 100,000 population per year, the same figure reported by NHLBI. For 33 (49 percent) of Florida's 67 counties, the stroke mortality rate was above the national rate (40.3 per 100,000), and for 22 (33 percent) the rate was above the stroke belt threshold value (44.3 per 100,000). Most of these high-mortality-rate counties were in the northern part of the State (fig. 2).

When all of these high-rate northern counties and the intervening counties are considered as a single 34-county region, (total population more than 2 million), the stroke mortality rate is 47.2 per

Figure 2. Age-adjusted stroke mortality rate per 100,000, Florida, by county, 1979-81



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100,000 (fig. 3). This rate, above the stroke belt threshold, is higher than the rate in three of the stroke belt States—Virginia, Kentucky, and Indiana.

Discussion

These results confirm that northern Florida is a high stroke mortality area, with an age-adjusted rate higher than 3 of the 11 designated stroke belt States. We believe that northern Florida should be considered a priority region for stroke prevention programs. The size of the population involved in this study (larger than 17 U.S. States) clearly warrants public health attention.

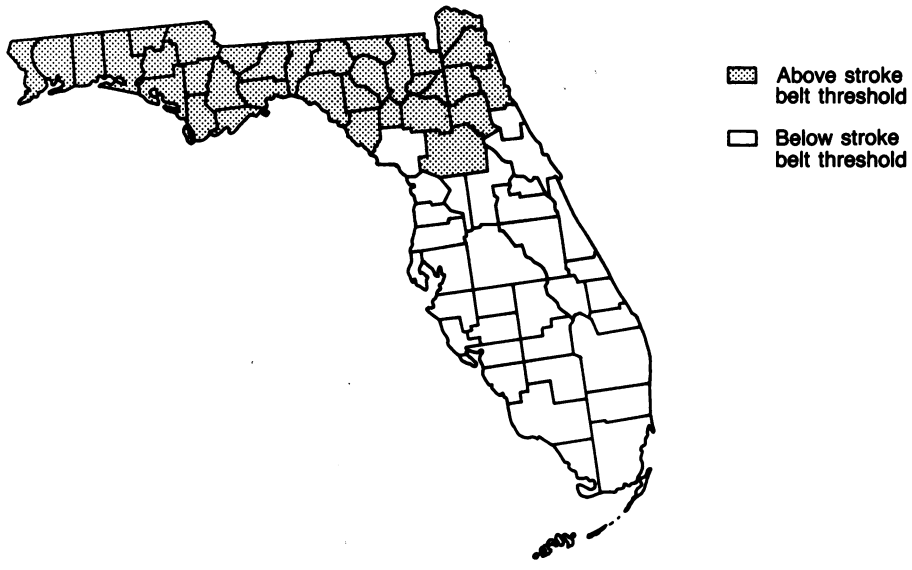
This study serves as an example of how measuring a disease-specific mortality rate for an aggregation of counties can help to identify large populations at risk which may be missed when needs assessment is based only on State-level data. This approach can help provide a basis for more appropriate distribution and use of limited resources for disease prevention programs.

There are several possible explanations for the regional disparity in stroke mortality rates within Florida. This disparity is probably due at least in part to the higher proportion of blacks in the northern counties as compared with the rest of the State. However, lower socioeconomic status and higher prevalence of behavior-related stroke mortality risk factors may contribute to elevated mortality rates above and beyond the effect of disproportionate race mix (*10*). Behavioral risk factors for stroke mortality have been shown to be more prevalent in southeastern States than elsewhere in the United States (*1*). Disproportionate race mix certainly does not explain why age-adjusted mortality rates for whites are higher in the northern part of the State than in the rest of the State (*7,8,10*).

The large migration from northern States to southern and central Florida suggests a tempting hypothesis, namely, that the reasons for the disparity in stroke mortality between northern Florida and the rest of the State are the same as the reasons for the disparity in stroke mortality rates between northern and southern States. Perhaps southern and central Florida constitute in essence a northern State with regard to stroke mortality.

The reasons for the elevated stroke mortality seen in stroke belt States are only partly understood. The higher proportion of blacks in southeastern States, as compared with other parts of the country, accounts for a portion of this excess

Figure 3. North Florida stroke belt region with an aggregate annual stroke mortality of 47.2 per 100,000, 1979–81



mortality; however, the stroke mortality rate for black males in the southeast has been shown to be almost 44 percent higher than for black males in all other regions (*11*). There may be substantial high-risk geographic areas in non-stroke belt States other than Florida which warrant Federal support for stroke prevention programs. Replication of the methods used in the current study could be used to identify such areas.

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