EPI 210 Epidemiology of Aging

Topic – Cerebrovascular Disease

Jie Hong

02/22/2019

Why this topic

Table 1.2 Leading causes of death: US population ≥65 years of age, 2006

Rank	Cause	Rate per 100,000
1	Diseases of heart	1,297
2	Malignant neoplasms	1,025
3	Cerebrovascular disease (stroke)	297
4	Chronic lower respiratory diseases	279
5	Alzheimer's disease	177
6	Diabetes mellitus	137
7	Influenza/pneumonia	124

Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

- Stroke is the **third leading cause** of death in the United States. Of the more than 700,000 people affected every year, about 500,000 of these are first attacks and 200,000 are recurrent. About 25 percent of people who recover from their first stroke will have another stroke within five years.
- Cerebrovascular disease is **the most common life-threatening neurological event** in the U.S. Intracranial atherosclerosis is responsible for approximately 40,000 of these attacks per year, representing 10 percent of all ischemic strokes.

Why this topic

Table 11.4 The ten leading causes of death for the less developed and the more developed countries: 1990

	Less developed countries			More developed countries	
	Deaths	Percent of total		Deaths	Percent of total
All causes	39,554	100.0	All causes	10,912	100.0
1. Lower respiratory infections	3,915	9.9	1. Ischemic heart disease	2,695	24.7
2. Ischemic heart disease	3,565	9.0	2. Cerebrovascular disease	1,427	13.1
3. Cerebrovascular disease	2,954	7.5	3. Trachea, bronchus,	523	4.8
4. Diarrheal diseases	2,940	7.4	4. Lower respiratory infections 385	3.5	
5. Conditions arising during the perinatal period	2,361	6.0	5. Chronic obstructive pulmonary disease	325	3.0
6. Tuberculosis	1,922	4.9	6. Colon and rectal cancers	277	2.5
7. Chronic obstructive pulmonary disease	1,887	4.8	7. Stomach cancer	241	2.2
8. Measles	1,056	2.7	8. Road traffic accidents	222	2.0
9. Malaria	856	2.2	9. Self-inflicted injuries	193	1.8
10. Road traffic accidents	777	2.0	10. Diabetes mellitus	176	1.6

Source: Murray and Lopez (1996), Table 2, p.18. Copyright © 1996 World Health Organization. Reprinted with permission
Deaths in thousands. "All causes" includes remaining causes not listed among the first ten causes

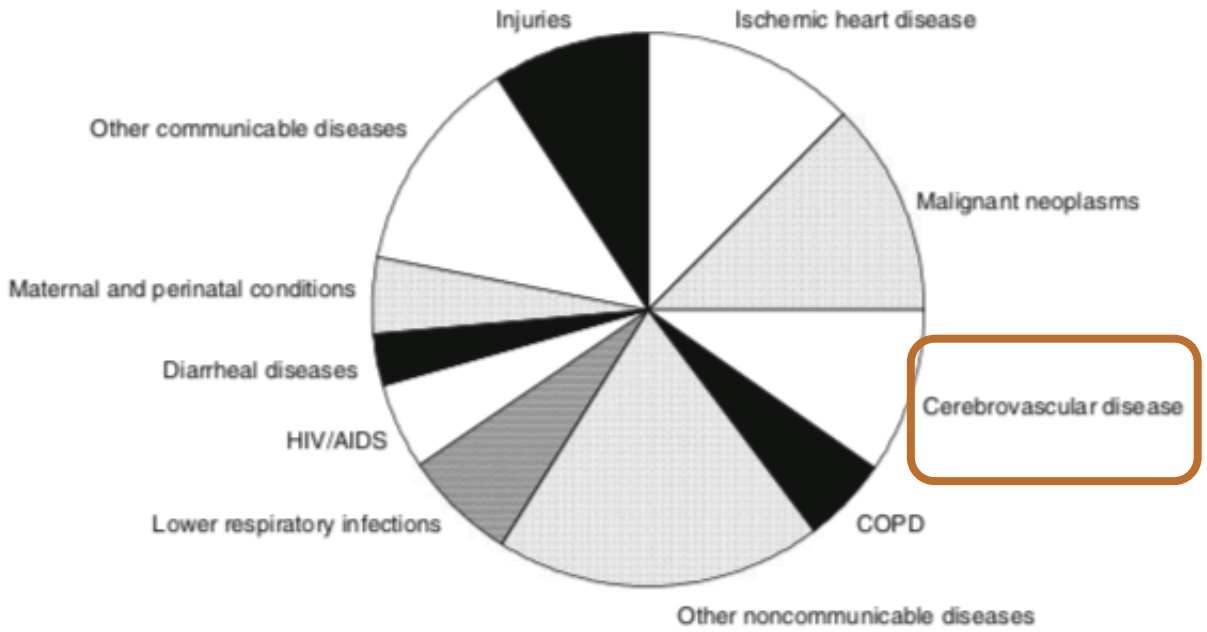


Fig. 11.4 Global deaths by leading cause: 2002 (Note: UNAIDS/WHO revised the estimate of the number of deaths from HIV/AIDS. Its current estimate is 1.9 million rather than the earlier 2.8 million. It is not known whether the difference should be removed from the total number of deaths or assigned to another cause; Source: Based on World Health Organization (2004), Annex Table 2. Used with permission of the World Health Organization)

Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

Outline

- cerebrovascular disease classification
- incidence and mortality rates and risk to aging population
- review the risk factors for stroke
- review methods in related research

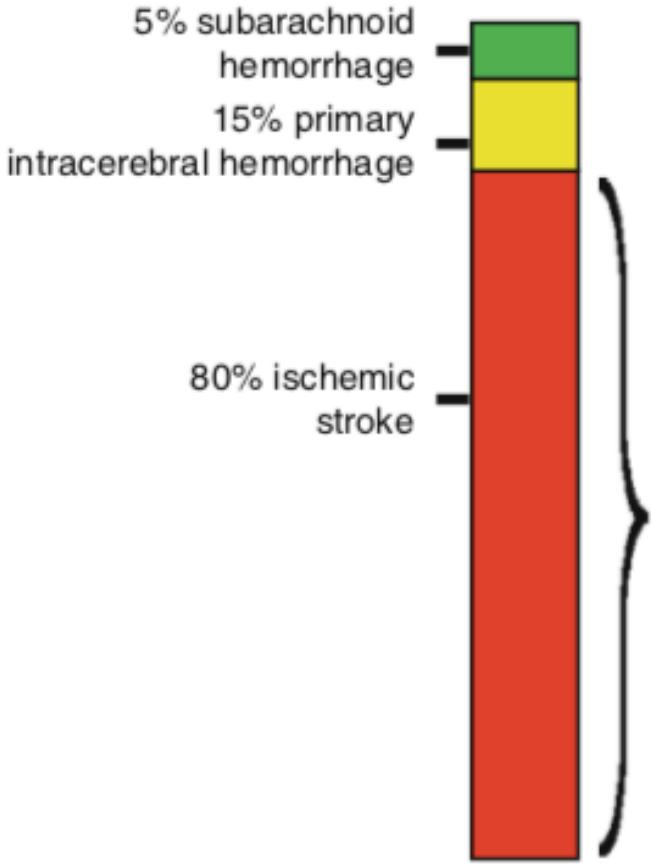
Define the condition

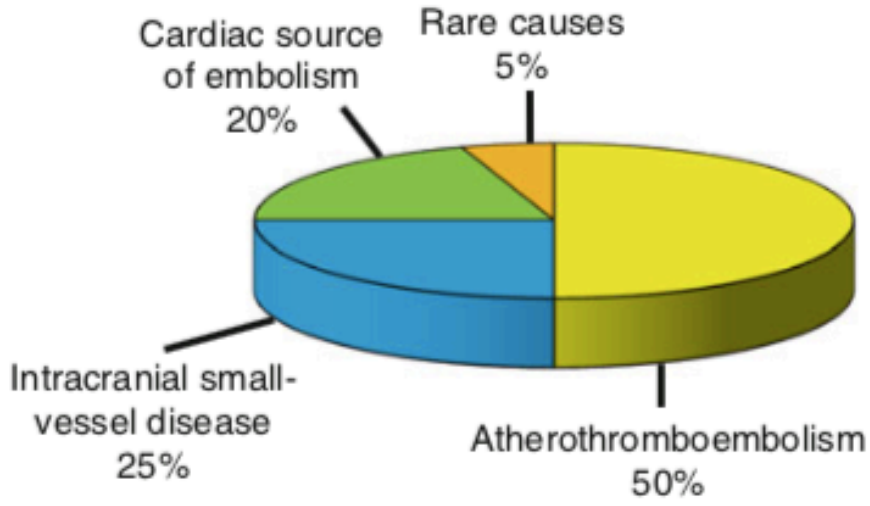
Cerebrovascular Disease

Cerebrovascular disease – injury to the brain due to altered bloodflow due to **ischemia** or **hemorrhaging → Stroke**

- 3rd leading cause of death in the U.S. (following heart disease and cancer) and most prevalent neurologic disorder
- The brain is a highly aerobic tissue, requiring a constant supply of oxygen and glucose through the blood
  - **Hypoxia** – **impaired oxygenation** to the tissues by lowered PO_2, impairment of the blood's oxygen-carrying capacity, or inhibition of O_2 use by the tissues
  - **Ischemia** – transient or permanent **interruption of normal circulatory bloodflow** due to a reduction in perfusion pressure (e.g., hypotension) or small-/large-vessel obstruction
    - **Global cerebral ischemia** – a **generalized reduction** of cerebral perfusion (e.g., **hypotension**)
    - **Focal cerebral ischemia** – follows a **reduction or cessation of bloodflow to a localized area** due to a small-vessel disease (e.g., vasculitis; occlusion secondary to arteriosclerotic lesions with hypertension) or large-vessel disease (e.g., embolic or thrombotic arterial occlusion associated with artherosclerosis)
  - **Infarction** – **necrosis** caused by impaired oxygenation from an obstruction to bloodflow
- **Hemorrhage** – results from ruptured blood vessels due to hypertension or aneurysms

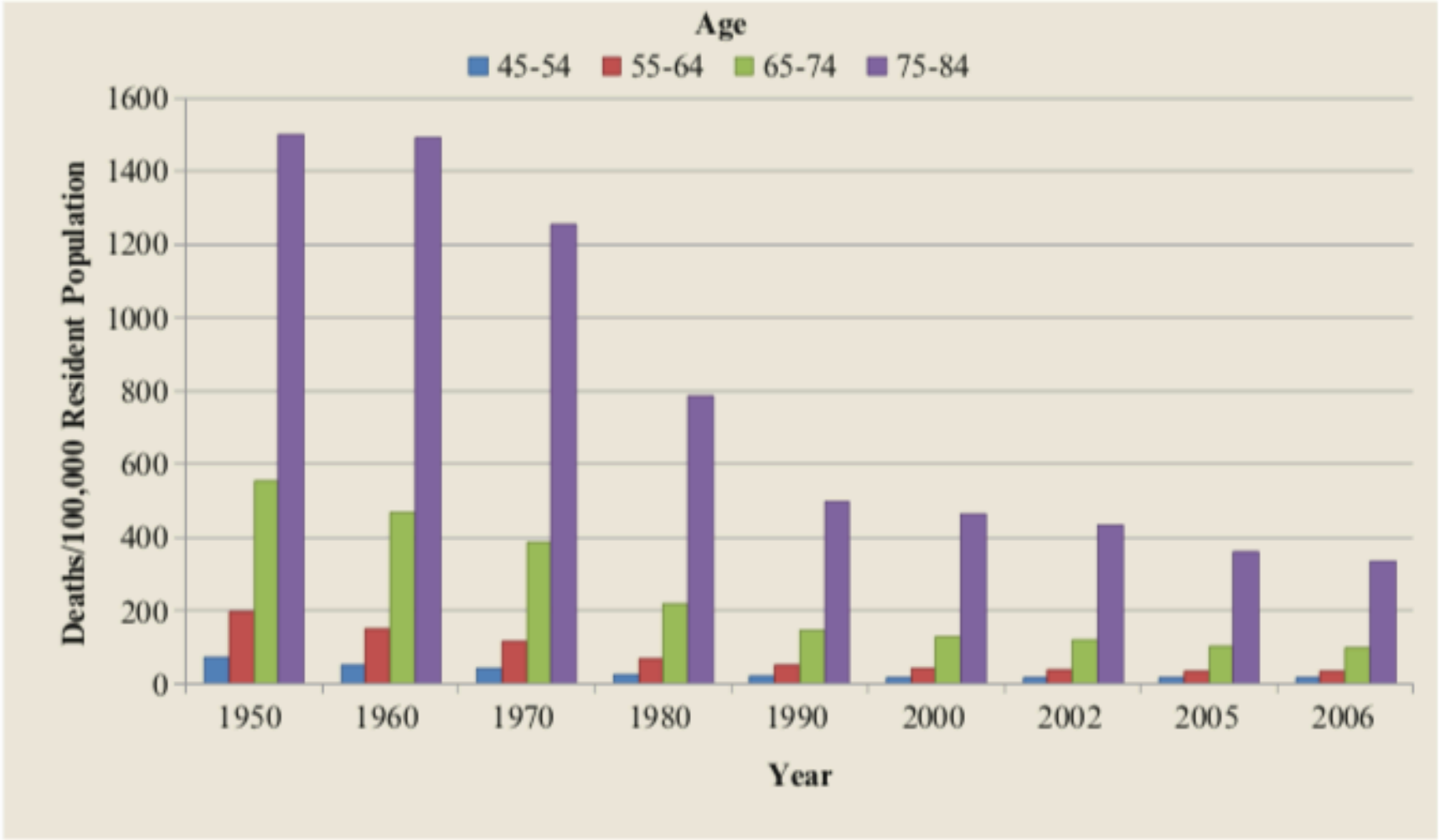
Approximate frequency of three main pathological types of stroke (in white populations) and of main subtypes of ischemic stroke as shown by population-based study





Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

Death rates for cerebrovascular diseases in the United States according to age (1950–2006)



Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

Lifetime Risk

Table 30.1 Age- and sex-specific, mortality-adjusted, 10-, 20- and 30-year and lifetime risk estimates for the development of stroke (all types) and ischemic stroke [21]

Sex	Age (years)	Number: all strokes (and ischemic strokes)	Initial stroke, all types (875 events)			
			Short-term and intermediate-term risks			
			10-year	20-year	30-year	Lifetime risk
Women	65	462 (400)	4.6 (3.8–5.5)	13.2 (11.8–14.5)	19.5 (17.8–21.1)	20.6 (19.0–22.3)
	75	347 (303)	10.5 (9.1–11.9)	18.3 (16.5–20.1)	–	19.7 (17.8–21.6)
	85	140 (123)	13.4 (11.1–15.6)	–	–	15.8 (13.3–18.2)
Men	65	293 (251)	7.0 (5.8–8.2)	14.1 (12.5–15.8)	16.5 (14.7–18.3)	16.8 (15.1–18.6)
	75	166 (145)	10.4 (8.6–12.1)	13.8 (11.8–15.8)	–	14.3 (12.2–16.4)
	85	38 (30)	8.5 (5.7–11.3)	–	–	9.8 (6.7–12.8)

Table 30.2 Expected remaining lifetime (years) for 1-week survivors after stroke according to age at stroke onset and time period [12]

Sex, time period	50 years	60 years	70 years	80 years	90 years
Women					
1978–1981	14.2	9.5	5.4	2.6	1.1
1998–2001	17.6	13.5	8.8	4.9	2.3
Men					
1978–1981	13.2	8.5	4.8	2.4	1.0
1998–2001	17.2	12.5	7.8	4.3	2.1

Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

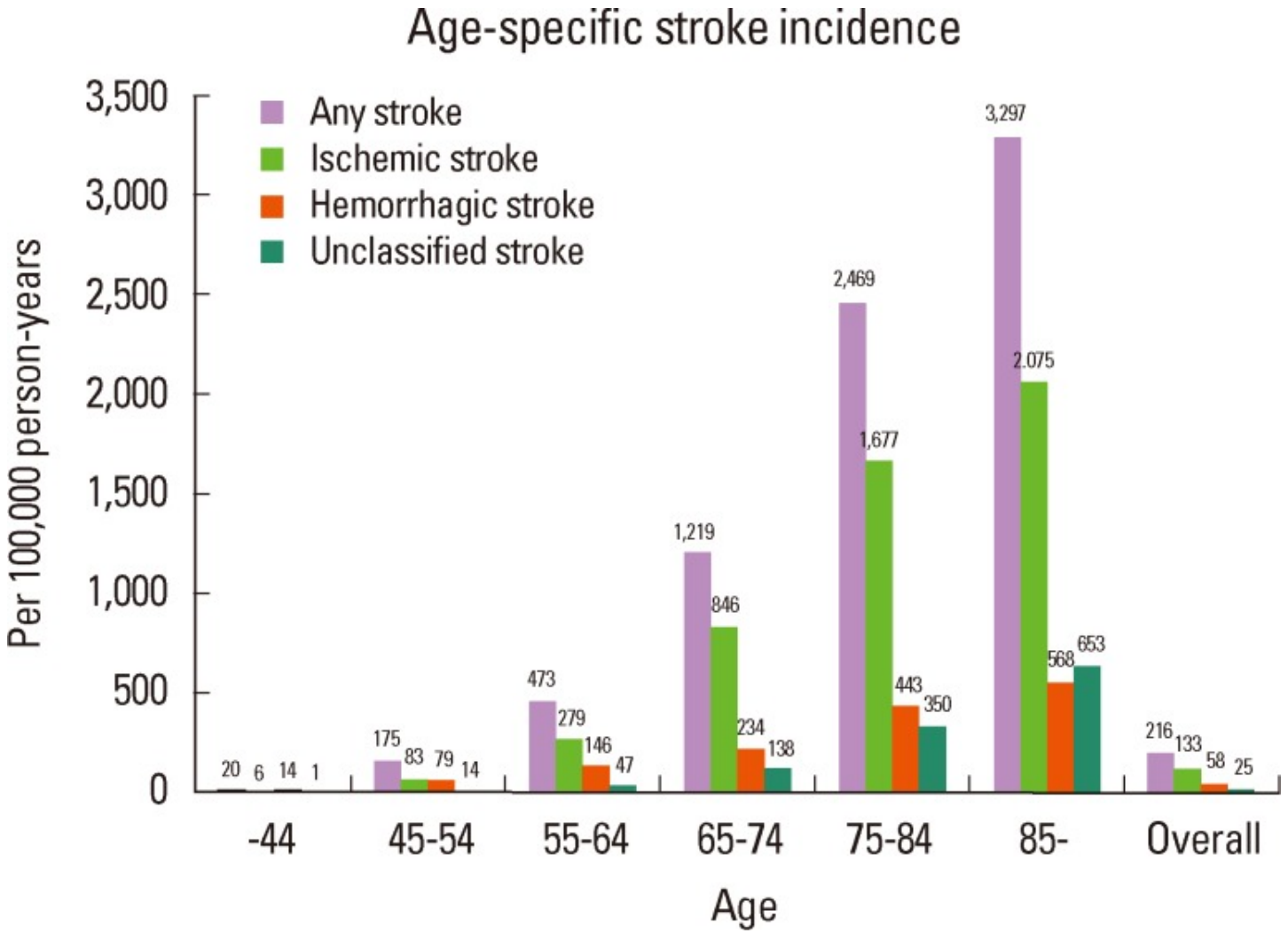
Risk Factors for Stroke

Common risk factors	INTERSTROKE (all stroke, 3,000 cases; 3,000 controls	INTERHEART (acute myocardial infarction; 15,152 cases; 14,820 controls
Hypertension	34.6% (30.4–39.1)	17.9% (15.7–20.4)
Smoking	18.9% (15.3–23.1)	35.7% (32.5–39.1)
Waist-to-hip ratio (abdominal obesity)	26.5% (18.8–36.0)	20.1% (15.3–26.0)
Diet		
Diet risk score	18.8% (11.2–29.7)	–
Fruits and vegetables daily	–	13.7% (9.9–18.6)
Regular physical activity	28.5% (14.5–48.5)	12.2% (5.5–25.1)
Diabetes	5.0% (2.6–9.5)	9.9% (8.5–11.5)
Alcohol intake	3.8% (0.9–14.4)	6.7% (2.0–20.2)
Psychosocial factors		
All psychosocial factors	–	32.5% (25.1–40.8)
Psychosocial stress	4.6% (2.1–9.6)	–
Depression	5.2% (2.7–9.8)	–
Cardiac causes	6.7% (4.8–9.1)	–
Ratio of apolipoproteins B to A1	24.9% (15.7–37.1)	49.2% (43.8–54.5)

Newman, Anne, and Jane A. Cauley, eds. *The epidemiology of aging*. Springer Science & Business Media, 2012.

Uncontrollable risk factor- Age

People of all ages, including children, have strokes. But the older you are, the greater your risk of stroke.



Hong, Keun-Sik, et al. "Stroke statistics in Korea: part I. Epidemiology and risk factors: a report from the korean stroke society and clinical research center for stroke." *Journal of Stroke* 15.1 (2013): 2.

Methods concern

-Competing Risks

-False reporting

-Subsequent increased risk of clinical stroke, dementia, depression and disability, especially among older individuals.

-Subclinical cerebrovascular disease.

-Adherence to effective therapies in older individuals remains poor, and early symptoms of stroke are often not recognized or treated.

-Cross-sectional study, temporal relationships between stroke and other factors cannot be established.

The Reasons for Geographic and Racial Differences in Stroke Study: Objectives and Design

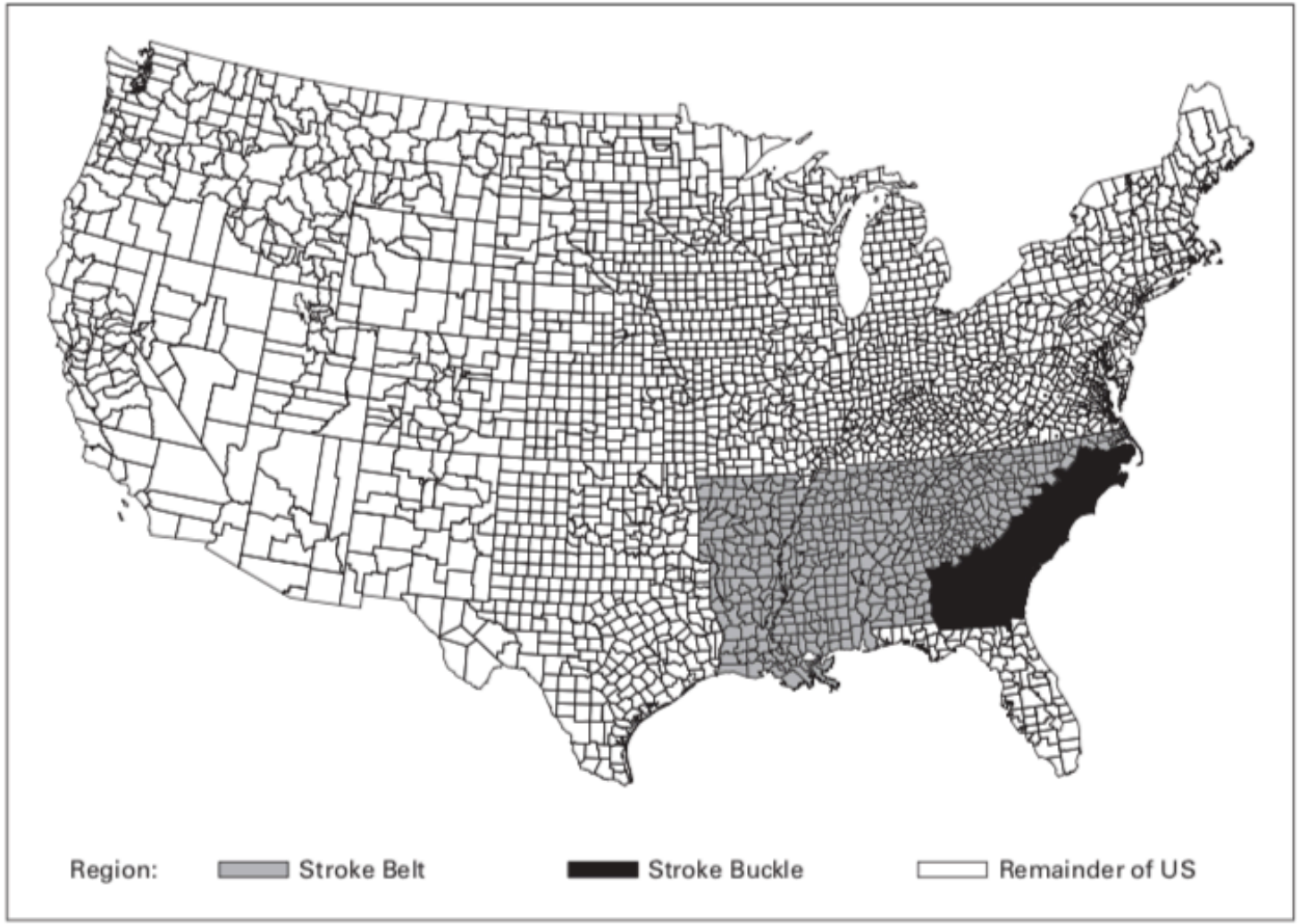


Fig. 1. Map of US counties showing regions in the REGARDS study.

Howard, Virginia J., et al. "The reasons for geographic and racial differences in stroke study: objectives and design." *Neuroepidemiology* 25.3 (2005): 135-143.

Question?