

The Association between Health Care Access and Mortality in US Stroke Survivors

Kristine A. Mulhorn, PhD, MHSA, Deborah A. Levine, MD, MPH;



US Stroke Survivors

- 5.7 million US stroke survivors (2005)
- Increased risk of CVD events and mortality
- Reduced access to health insurance, physician care and medications
- MI survivors with reduced access to care have increased adverse health outcomes
- Little is known regarding relationship between health care access and mortality in US stroke survivors
- Information is needed regarding predictors of mortality among non-institutionalized community-dwelling stroke survivors

Study Aims

In a recent national sample of US stroke survivors:

1. To assess the association of health care access and mortality.
2. To determine whether this association differs for disabled and non-disabled US stroke survivors.
3. To identify factors associated with increased mortality that may inform potential health policy solutions.

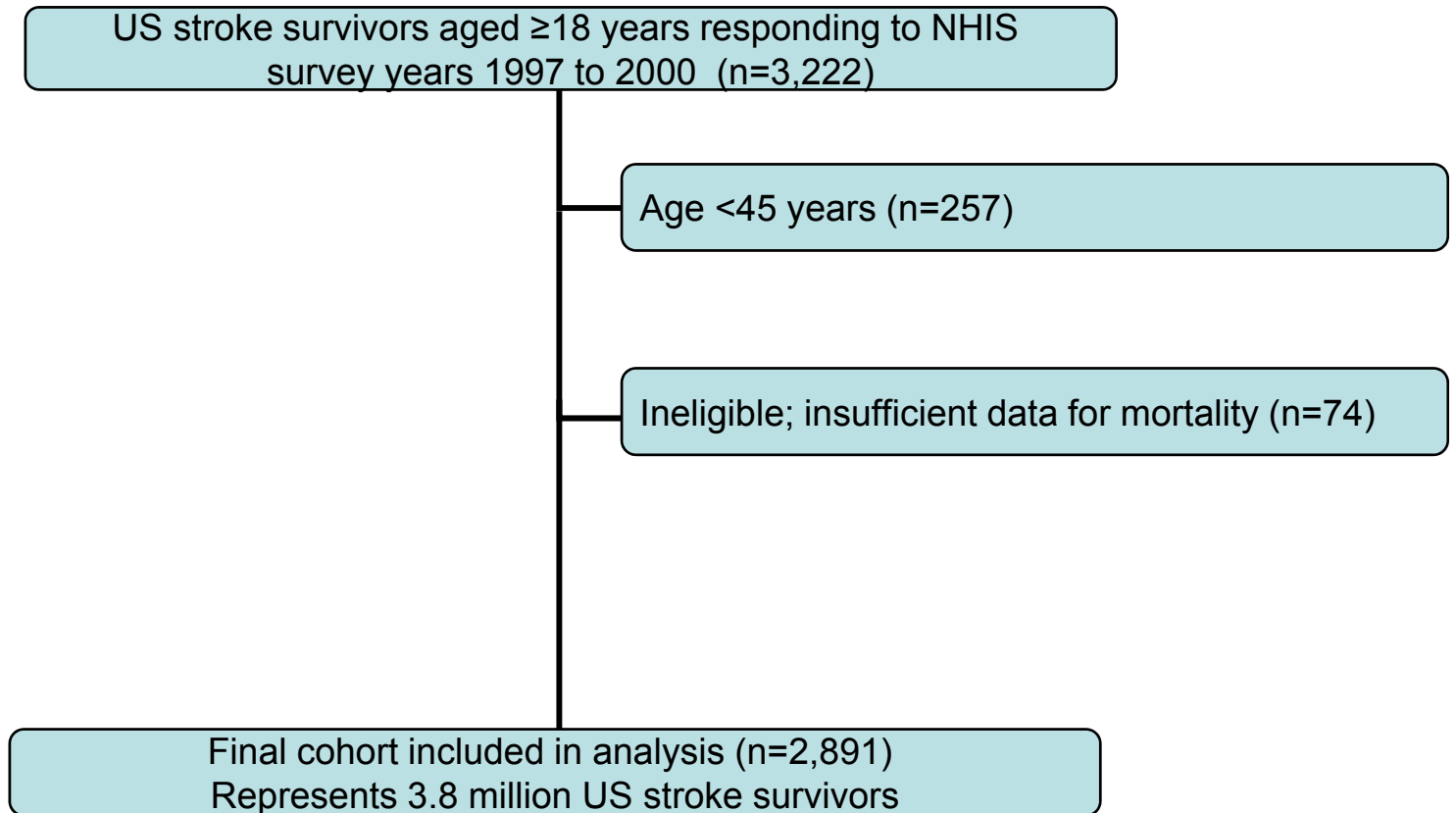
Hypotheses

1. Higher mortality is associated with no health insurance and reduced access to care
2. The relationship does not differ by neurological disability.
3. Several factors are associated with mortality among stroke survivors (co-morbidity, health status, poverty, low education, neurological disability, Southern residence).

Patient Population

- National Health Interview Survey, a population-based survey
- Years 1997 to 2000
- Stroke survivors
 - “Have you ever been told by a doctor or other health professional that you had a stroke?”
- NHIS Mortality Files linked to National Death Index
- Mortality follow-up from interview date through December 31, 2002

Study Population



Analysis Overview

- Assess 2-year mortality by insurance type stratified by age and (<65 years and ≥ 65 years) and, within age, by neurological disability due to stroke
- Logistic regression analysis of 2-year mortality
- Survival analysis of mortality
- SUDAAN 9.01

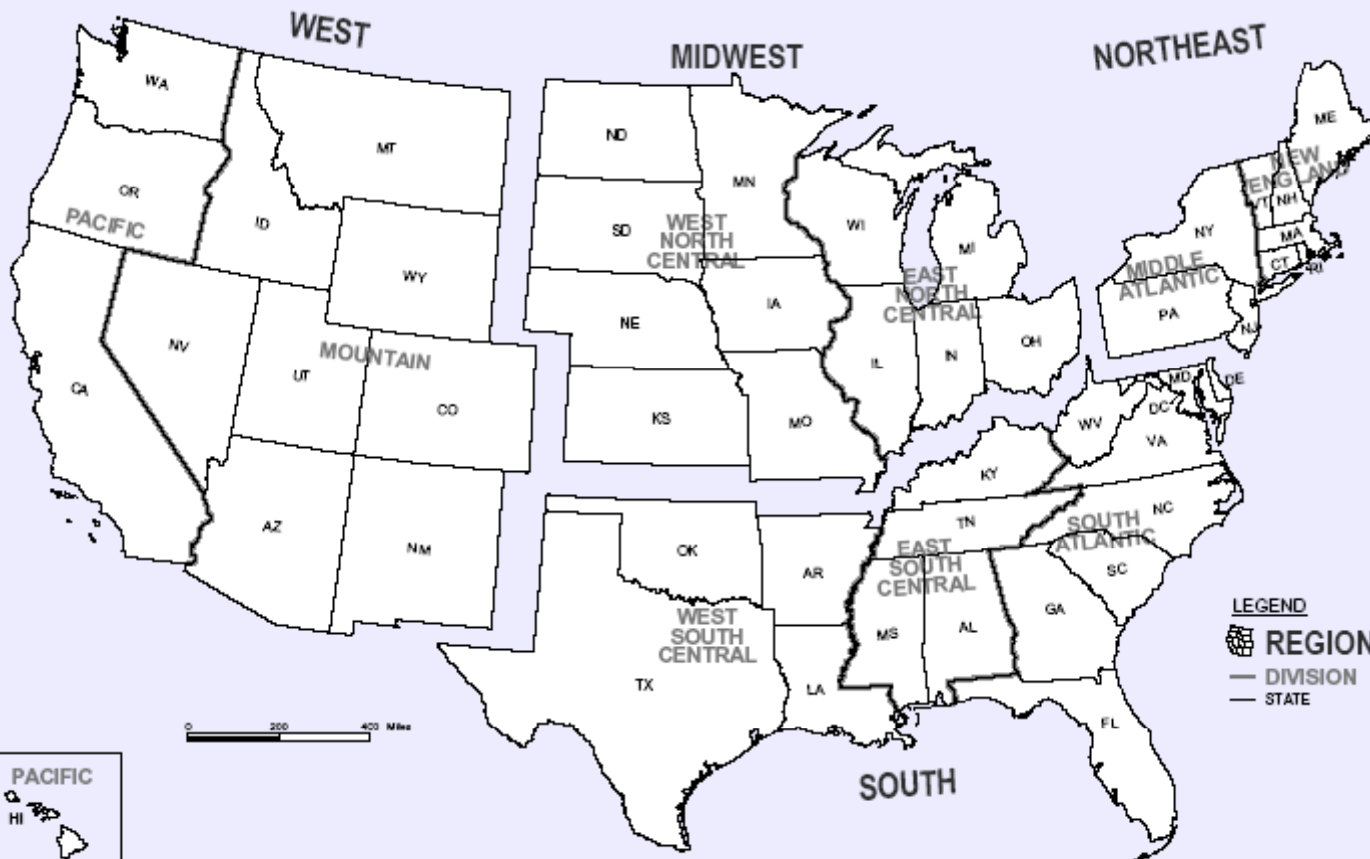
Analysis 1: Logistic Regression Analysis Stratified by Age (<65 years and ≥65 years) and by Neurological Disability due to Stroke

Dependent Variables	Main Independent Variable
<p>Primary:</p> <ul style="list-style-type: none">• 2- Year Mortality <p>Secondary</p> <ul style="list-style-type: none">• 1-Year Mortality	<ul style="list-style-type: none">• Health insurance category<ul style="list-style-type: none">– Private with or without Medicare– Medicaid and Medicare– Medicare only– Other (other governmental, VA)– None

Analysis 2: Regression Analysis (2-Year Survival and Overall Survival) Overall and by Neurological Disability

Dependent Variable	Co-variates	Co-variates
<ul style="list-style-type: none">• Death	<ul style="list-style-type: none">• Age• Sex• Race• Income• Education• Income• Region	<ul style="list-style-type: none">• Low health• Neurological disability due to stroke• Coronary artery disease• Diabetes mellitus• Chronic kidney disease• Emphysema• Hypertension• Body mass index

Census Regions and Divisions of the United States



U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau

- LEGEND**
- REGION
 - DIVISION
 - STATE

Prepared by the Geography Division

Participant Characteristics

Variable	n (%) (n = 2,891)
Age 45-64 years	899 (32)
Male sex	1272 (49)
Race	
White	2279 (83)
Black	508 (13)
Other	104 (3)
Education <high school	1207 (39)
Annual household income <\$20,000	1536 (46)
Southern region	1151 (41)

Participant Characteristics

	Age 45-64 years n (%) (n=895)	Age ≥65 years n (%) (n=1987)
Insurance category		
Private with or without Medicare	390 (51)	1146 (61)
Medicaid and Medicare	72 (6)	229 (9)
Medicare only	119 (12)	486 (24)
Other	198 (19)	118 (5)
None	116 (12)	8 (0.4)

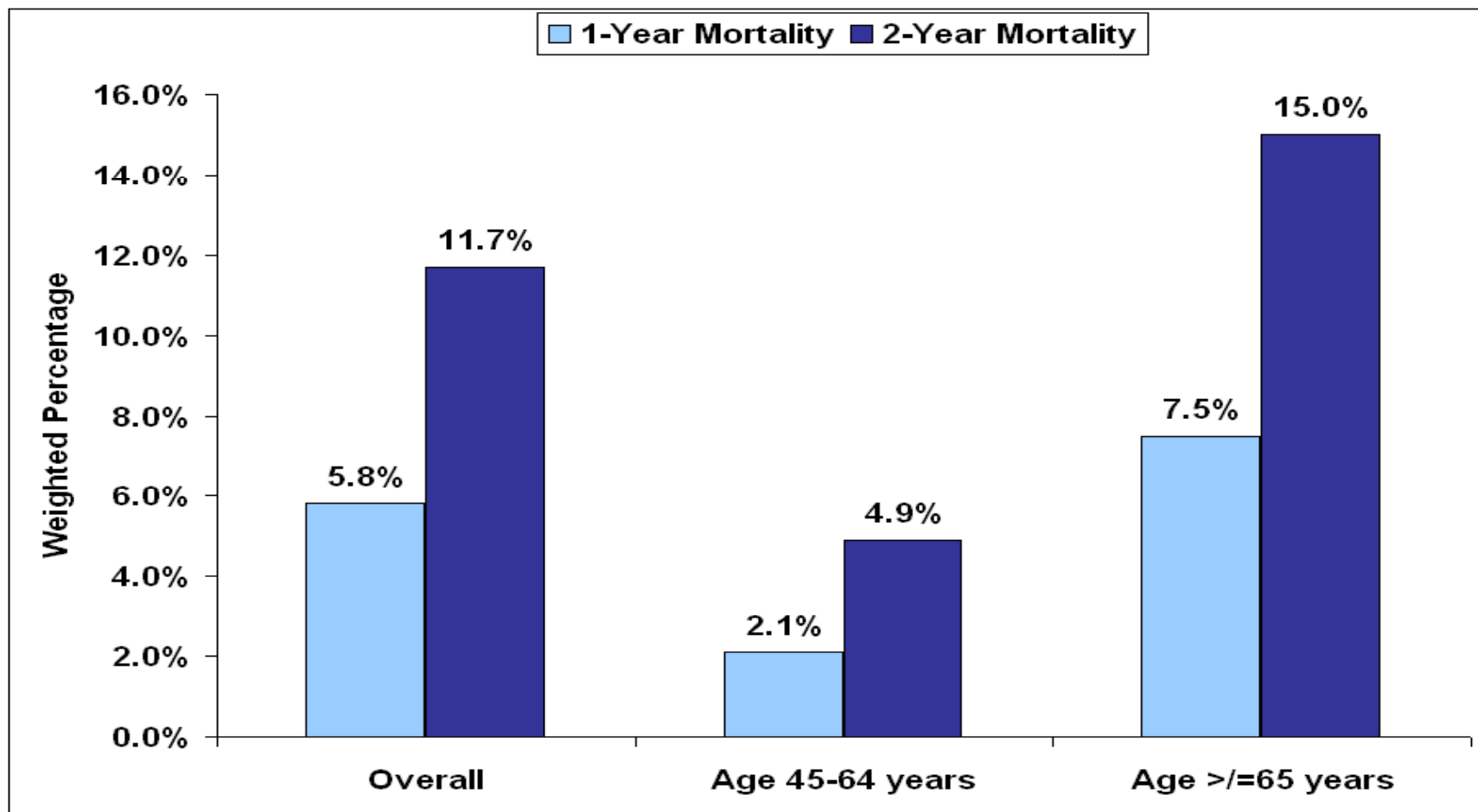
Participant Characteristics

Variable	n (%) (n = 2,891)
Fair/poor health status	1569 (53)
Neurological disability due to stroke	980 (34)
Coronary artery disease	983 (35)
Diabetes mellitus	696 (24)
Chronic kidney disease	263 (9)
Emphysema	266 (9)
Hypertension	2062 (71)

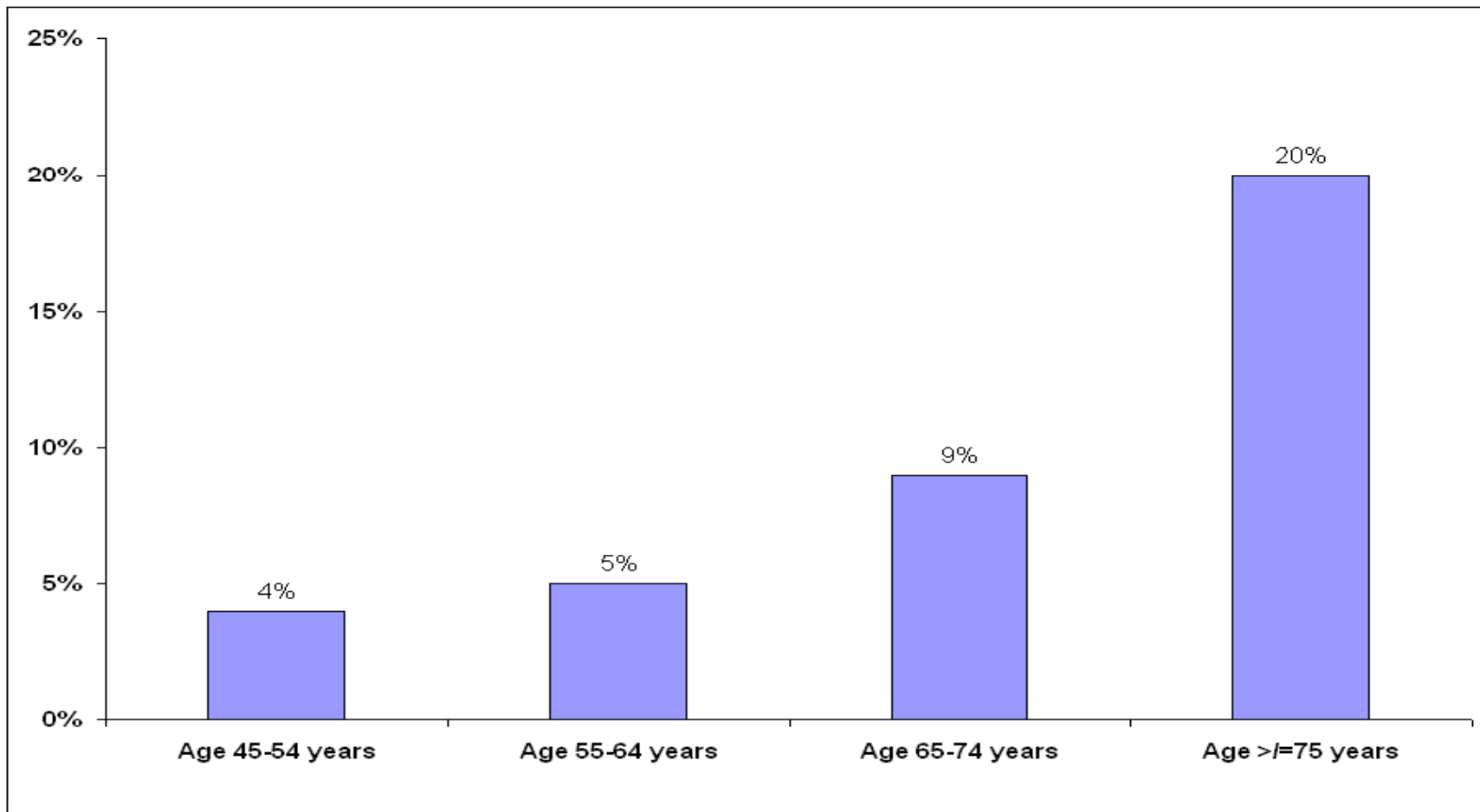
Participant Characteristics

Variable	n (%) (n = 2,891)
BMI category	
Underweight (<18.5 kg/m²)	107 (4)
Normal (18.5-24.9 kg/m²)	1022 (36)
Overweight (25-29.9 kg/m²)	1015 (38)
Obese (≥30 kg/m²)	665 (23)
Tobacco use	
Current	583 (19)
Ever	1720 (61)

One-Year and Two-Year Mortality for US Stroke Survivors Overall and by Age: National Health Interview Survey 1997-2000, National Death Index, 1997-2002



Two-Year Mortality for US Stroke Survivors by Age: National Health Interview Survey 1997-2000, National Death Index, 1997-2002



**Association of Insurance Status and 2-Year Mortality by Age:
National Health Interview Survey 1997-2000, National Death Index,
1997-2002**

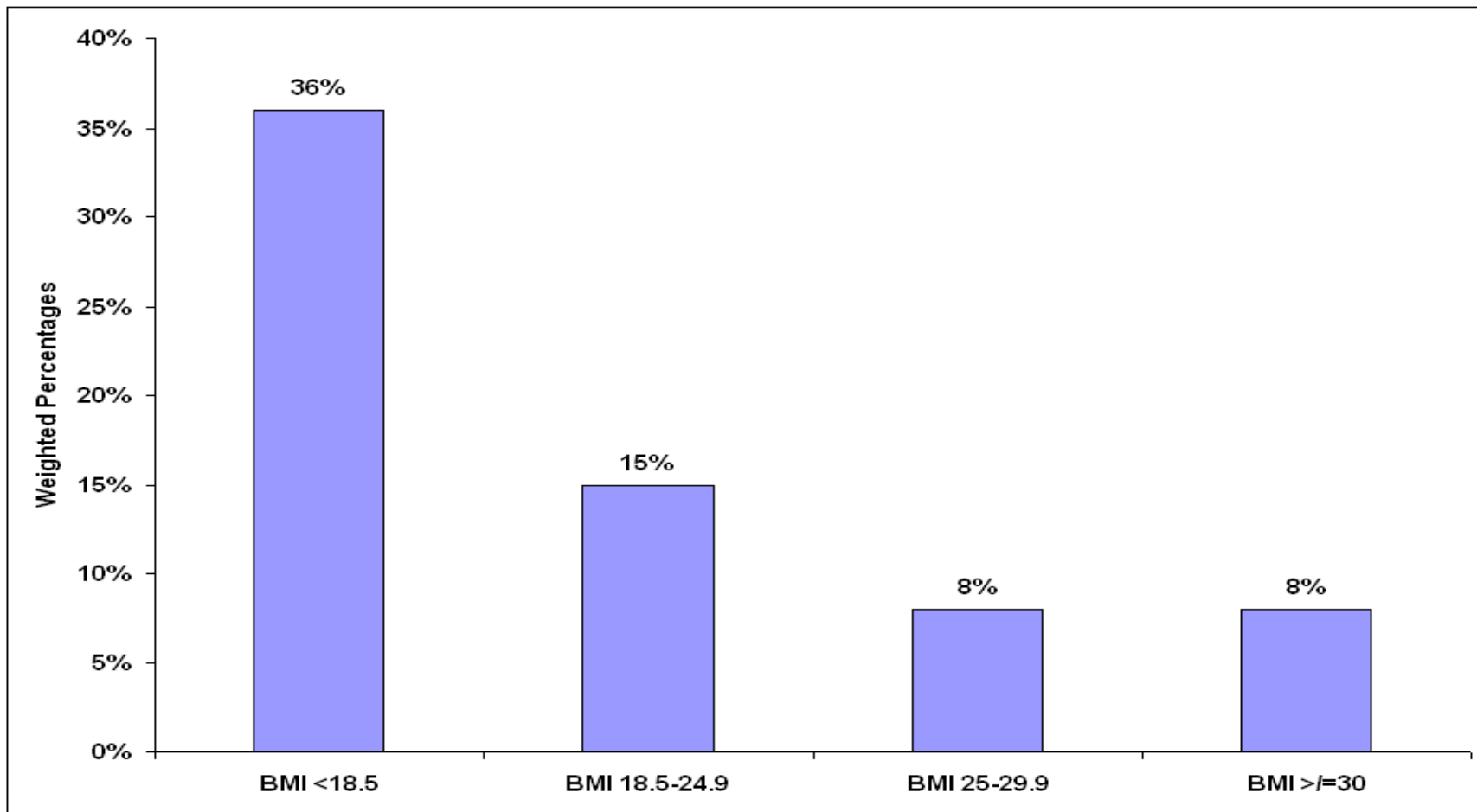
	Two-Year Mortality	
	Age 45-64 years n (%) (n=47/895)	Age ≥65 years n (%) (n=293/1987)
Insurance category		
Private with or without Medicare	21 (5)	164 (15)
Medicaid and Medicare	3 (3)	37 (18)
Medicare only	7 (5)	76 (16)
Other	10 (4)	14 (12)
None	8 (7)	2 (25)
P-value	0.80	0.65

Two-Year Mortality for US Stroke Survivors by Condition: National Health Interview Survey 1997-2000, National Death Index, 1997-2002

Condition	Two-Year Mortality	
	Condition present	Condition absent
Neurological disability due to stroke*	15%	10%
Fair/poor health status*	14%	10%
Coronary heart disease*	15%	10%
Chronic kidney disease*	22%	11%
Diabetes mellitus	14%	11%
Income <\$20,000	13%	11%
Education <high school	13%	11%

*P≤0.001

Two-Year Mortality for US Stroke Survivors by BMI: National Health Interview Survey 1997-2000, National Death Index, 1997-2002



Adjusted Odds Ratios and 95% Confidence Intervals for 2-Year Mortality: National Health Interview Survey 1997-2000, National Death Index, 1997-2002

	OR (95% CI) for 2-Year Mortality
Age	1.08 (1.06-1.10)
Male sex	1.43 (1.04-1.97)
Neurological disability due to stroke	1.42 (1.03-1.96)
Coronary artery disease	1.46 (1.06-2.00)
Diabetes mellitus	1.49 (1.04-2.15)
Chronic kidney disease	2.18 (1.38-3.44)
BMI category	
Underweight (<18.5 kg/m²)	2.94 (1.58-5.48)
Normal (18.5-24.9 kg/m²)	1.00
Overweight (25-29.9 kg/m²)	0.53 (0.37-0.75)
Obese (≥30 kg/m²)	0.67 (0.44-1.04)

Sub-group analyses

- Neurological disability due to stroke
- Recent stroke (<2 years) (n=344)
 - Age (P<0.001), CKD (P=0.06), Low BMI (P<0.001), South (P=0.07)

Limitations

- Validation of stroke
- No stroke type, severity
- Limited information on stroke date
- Community-dwelling, non-institutionalized stroke survivors only

Conclusions

- Health care access variables not associated with mortality.
- Stroke disability does not alter the association.
- Mortality among community-dwelling stroke survivors is higher among those with neurological disability due to stroke, coronary artery disease, diabetes mellitus, chronic kidney disease, and low BMI (<18.5).

