Racial Disparities in Stroke Prevalence: insights from the National Health and Nutrition Examination Survey

Muhammad Saad

## Preamble:

* **Reference Papers:**
  + [M. Talha et al. 2024](https://journals.sagepub.com/doi/10.1177/17539447241239814)
* **Study Objective**: To examine racial and ethnic disparities in stroke prevalence and outcomes among young to middle-aged adults in the United States.
* **Data Source**: Cross-sectional analysis of the National Health and Nutrition Examination Survey (NHANES) from 2005 to 2018.
* **Population**: Adults aged 20-64 years with self-reported cases of stroke.
* **Race Categories**:
  + Non-Hispanic White (NH White)
  + Non-Hispanic Black (NH Black)
  + Hispanic
* **Outcome**:
  + Prevalence of Stroke
* **Statistical Analysis**: Multiple logistic regression was used to assess the independent association of race/ethnicity with stroke prevalence adjusted for:
  + Demographics: Age, sex, race/ethnicity, insurance coverage, and waist circumference.
  + Medical History: Hypertension, diabetes mellitus, hyperlipidemia, cancer, coronary artery disease, heart failure, chronic obstructive pulmonary disease (COPD), and arthritis.
  + Lifestyle Factors: Smoking status
* **Software:** All statistical analyses were conducted using R Version 4.4.1, incorporating sampling weights, primary sampling units, and strata to ensure the accuracy and generalizability of the results.

## Baseline Table:

| **Characteristic** | **Non-Hispanic White adults** N = 1,668,028*1* | **Non-Hispanic Black adults** N = 610,671*1* | **Hispanic adults** N = 317,584*1* | **p-value***2* | **Overall** N = 2,596,283*1* |
| --- | --- | --- | --- | --- | --- |
| Unweighted Sample, n |  |  |  |  |  |
| 1 | 225 (100%) | 225 (100%) | 120 (100%) |  | 570 (100%) |
| Age | 54 (47 – 60) | 54 (48 – 59) | 52 (43 – 58) | 0.34 | 54 (47 – 60) |
| Age groups |  |  |  | 0.71 |  |
| 20-39 | 26 (11%) | 17 (11%) | 10 (15%) |  | 53 (11%) |
| 40-64 | 199 (89%) | 208 (89%) | 110 (85%) |  | 517 (89%) |
| Sex |  |  |  | 0.23 |  |
| Men | 98 (40%) | 97 (38%) | 56 (51%) |  | 251 (41%) |
| Women | 127 (60%) | 128 (62%) | 64 (49%) |  | 319 (59%) |
| Education level |  |  |  | 0.003 |  |
| Less than 9th grade | 24 (7.4%) | 12 (6.2%) | 29 (21%) |  | 65 (8.7%) |
| 9-11th grade (Includes 12th grade with no diploma) | 37 (12%) | 49 (21%) | 26 (21%) |  | 112 (15%) |
| High school graduate/GED or equivalent | 75 (34%) | 58 (26%) | 32 (27%) |  | 165 (31%) |
| Some college or AA degree | 58 (26%) | 73 (33%) | 26 (24%) |  | 157 (27%) |
| College graduate or above | 31 (20%) | 33 (14%) | 7 (7.6%) |  | 71 (17%) |
| Marital status |  |  |  | <0.001 |  |
| Divorced | 52 (17%) | 37 (15%) | 22 (20%) |  | 111 (17%) |
| Living with partner | 23 (13%) | 15 (7.1%) | 5 (4.2%) |  | 43 (10%) |
| Married | 105 (52%) | 78 (34%) | 61 (48%) |  | 244 (47%) |
| Never married | 21 (9.6%) | 54 (26%) | 16 (16%) |  | 91 (14%) |
| Separated | 5 (2.2%) | 19 (8.5%) | 9 (7.5%) |  | 33 (4.3%) |
| Widowed | 19 (7.0%) | 22 (9.0%) | 7 (3.6%) |  | 48 (7.0%) |
| Insurance | 187 (86%) | 188 (84%) | 83 (63%) | <0.001 | 458 (83%) |
| BMI |  |  |  | 0.30 |  |
| <18.5 | 5 (4.1%) | 4 (1.3%) | 1 (1.2%) |  | 10 (3.1%) |
| 18.5–24.9 | 42 (20%) | 38 (17%) | 14 (11%) |  | 94 (18%) |
| 25–29.9 | 51 (26%) | 54 (23%) | 34 (32%) |  | 139 (26%) |
| ⩾30.0 | 109 (50%) | 119 (58%) | 59 (56%) |  | 287 (53%) |
| Waist circumference |  |  |  | 0.36 |  |
| Normal | 48 (26%) | 56 (26%) | 33 (37%) |  | 137 (27%) |
| High | 151 (74%) | 145 (74%) | 72 (63%) |  | 368 (73%) |
| Smoking status |  |  |  | 0.006 |  |
| Never | 59 (34%) | 83 (38%) | 61 (53%) |  | 203 (37%) |
| Past | 46 (20%) | 53 (22%) | 36 (26%) |  | 135 (21%) |
| Current daily/nondaily smoker | 120 (47%) | 89 (40%) | 23 (21%) |  | 232 (42%) |
| *1*n (unweighted) (%); Median (Q1 – Q3) | | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | | |

## Comorbidities Table:

| **Characteristic** | **Non-Hispanic White adults** N = 1,668,028*1* | **Non-Hispanic Black adults** N = 610,671*1* | **Hispanic adults** N = 317,584*1* | **p-value***2* | **Overall** N = 2,596,283*1* |
| --- | --- | --- | --- | --- | --- |
| Hypertension | 146/225 (64%) | 172/225 (75%) | 88/119 (72%) | 0.076 | 406/569 (67%) |
| Mean systolic blood pressure | 123 (110 – 134) | 133 (116 – 144) | 124 (112 – 139) | 0.006 | 124 (111 – 137) |
| Mean diastolic blood pressure | 73 (67 – 81) | 75 (67 – 85) | 75 (66 – 82) | 0.29 | 73 (67 – 81) |
| Diabetes | 61/219 (25%) | 71/215 (31%) | 44/115 (29%) | 0.42 | 176/549 (27%) |
| Hyperlipidemia | 114/207 (53%) | 115/208 (54%) | 61/105 (49%) | 0.84 | 290/520 (53%) |
| Cancer | 42/225 (18%) | 28/225 (11%) | 15/120 (11%) | 0.11 | 85/570 (15%) |
| Coronary artery disease, n/N (weighted %) | 87/224 (36%) | 57/224 (26%) | 32/118 (19%) | 0.008 | 176/566 (32%) |
| Heart Failure | 37/224 (14%) | 28/223 (12%) | 14/119 (9.0%) | 0.59 | 79/566 (13%) |
| COPD | 77/225 (33%) | 37/224 (18%) | 12/120 (8.9%) | <0.001 | 126/569 (27%) |
| Arthritis | 131/225 (54%) | 112/225 (48%) | 57/120 (42%) | 0.17 | 300/570 (51%) |
| Obesity | 109/208 (49%) | 119/215 (58%) | 59/109 (56%) | 0.33 | 287/532 (52%) |
| *1*n (unweighted)/N (unweighted) (%); Median (Q1 – Q3) | | | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | | | |

## Multivariable Logistic Regression:

### Prevalence of Stroke:

#### Unadjusted ORs

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Race/Ethnicity |  |  |
| Non-Hispanic White adults | — |  |
| Non-Hispanic Black adults | 1.96 (1.62 to 2.37) | <0.001 |
| Hispanic adults | 0.77 (0.59 to 1.01) | 0.058 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

#### Adjusted ORs

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Race/Ethnicity |  |  |
| Non-Hispanic White adults | — |  |
| Non-Hispanic Black adults | 1.99 (1.56 to 2.53) | <0.001 |
| Hispanic adults | 1.29 (0.90 to 1.84) | 0.17 |
| Age | 1.03 (1.02 to 1.05) | <0.001 |
| Sex |  |  |
| Men | — |  |
| Women | 1.44 (1.09 to 1.91) | 0.010 |
| Insurance |  |  |
| No | — |  |
| Yes | 0.86 (0.65 to 1.14) | 0.30 |
| Waist Circumference |  |  |
| Normal | — |  |
| High | 0.98 (0.66 to 1.46) | 0.92 |
| Smoking Status |  |  |
| Never | — |  |
| Past | 0.94 (0.66 to 1.33) | 0.71 |
| Current daily/nondaily smoker | 2.04 (1.51 to 2.77) | <0.001 |
| Hypertension | 2.45 (1.75 to 3.43) | <0.001 |
| Diabetes Mellitus | 1.50 (1.07 to 2.12) | 0.021 |
| Hyperlipidemia | 1.00 (0.74 to 1.35) | >0.99 |
| Cancer | 1.55 (1.09 to 2.20) | 0.015 |
| Coronary Artery Disease | 5.41 (3.36 to 8.72) | <0.001 |
| Heart Failure | 1.94 (1.21 to 3.12) | 0.007 |
| COPD | 1.57 (1.10 to 2.25) | 0.014 |
| Arthritis | 1.48 (1.07 to 2.05) | 0.017 |
| Obesity | 1.04 (0.72 to 1.52) | 0.82 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |