Stroke Disparities in the Pacific: Update

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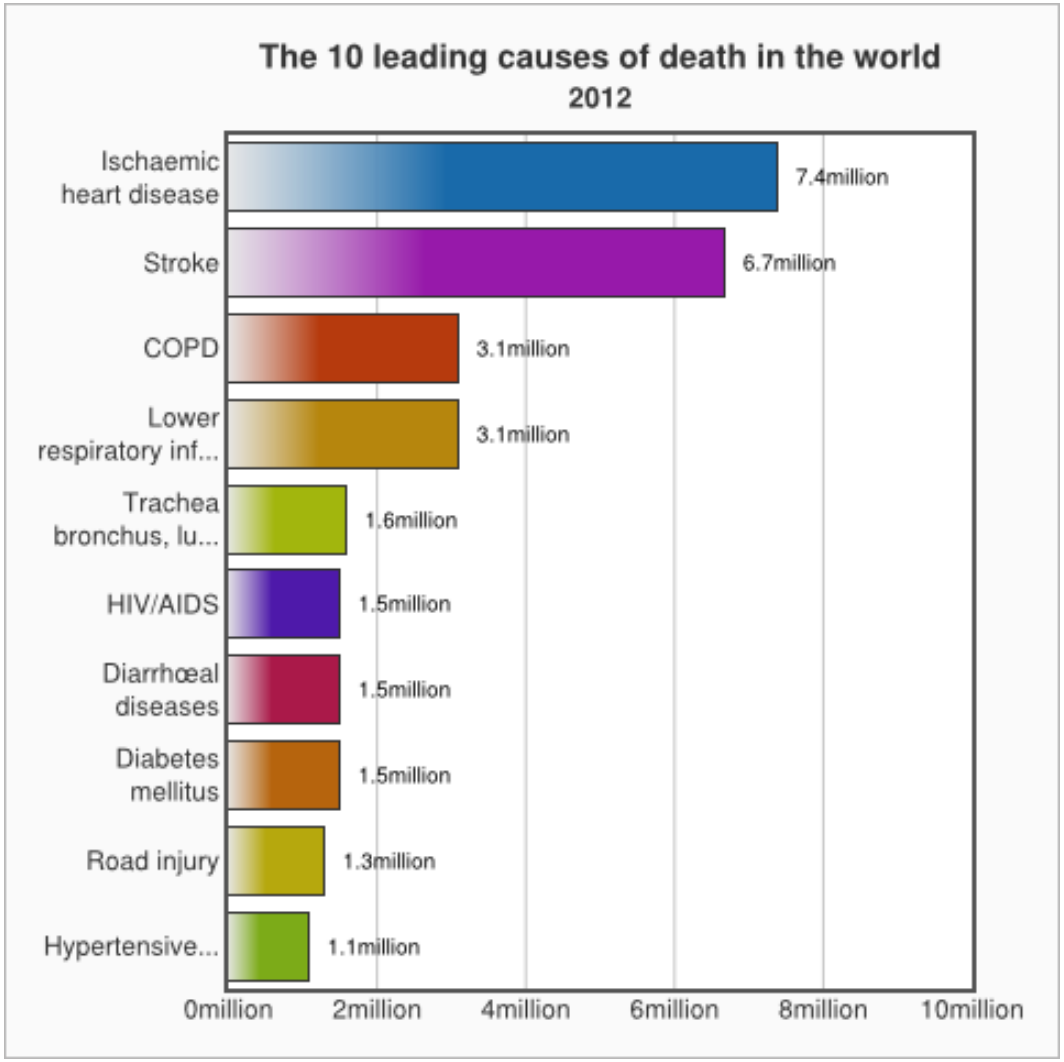
Disclosure

No commercial interest

Research Grants

- NIMHD/NIH (P20MD000173) – Project PI
- American Heart Association (11CRP7160019) - PI
- Hawaii Community Foundation (10ADVC-47086) - PI

Global Perspective



www.who.int/en/

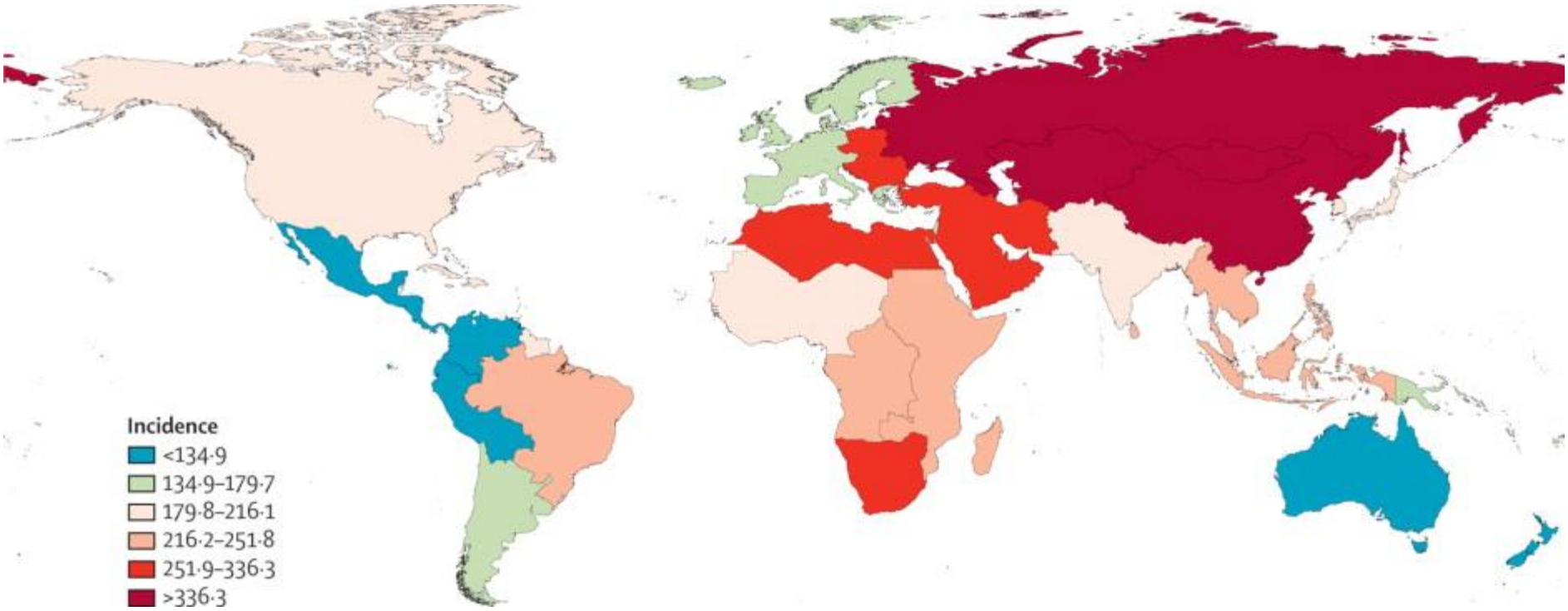
Global Perspective of Stroke

- Worldwide, 2nd leading cause of death.
- In the U.S., 5th leading cause of death.
- In Hawaii, 3rd leading cause of death.
- Stroke incidence is increasing

Feigin V. et al. *The Lancet.* 2014

Global Stroke Disparities

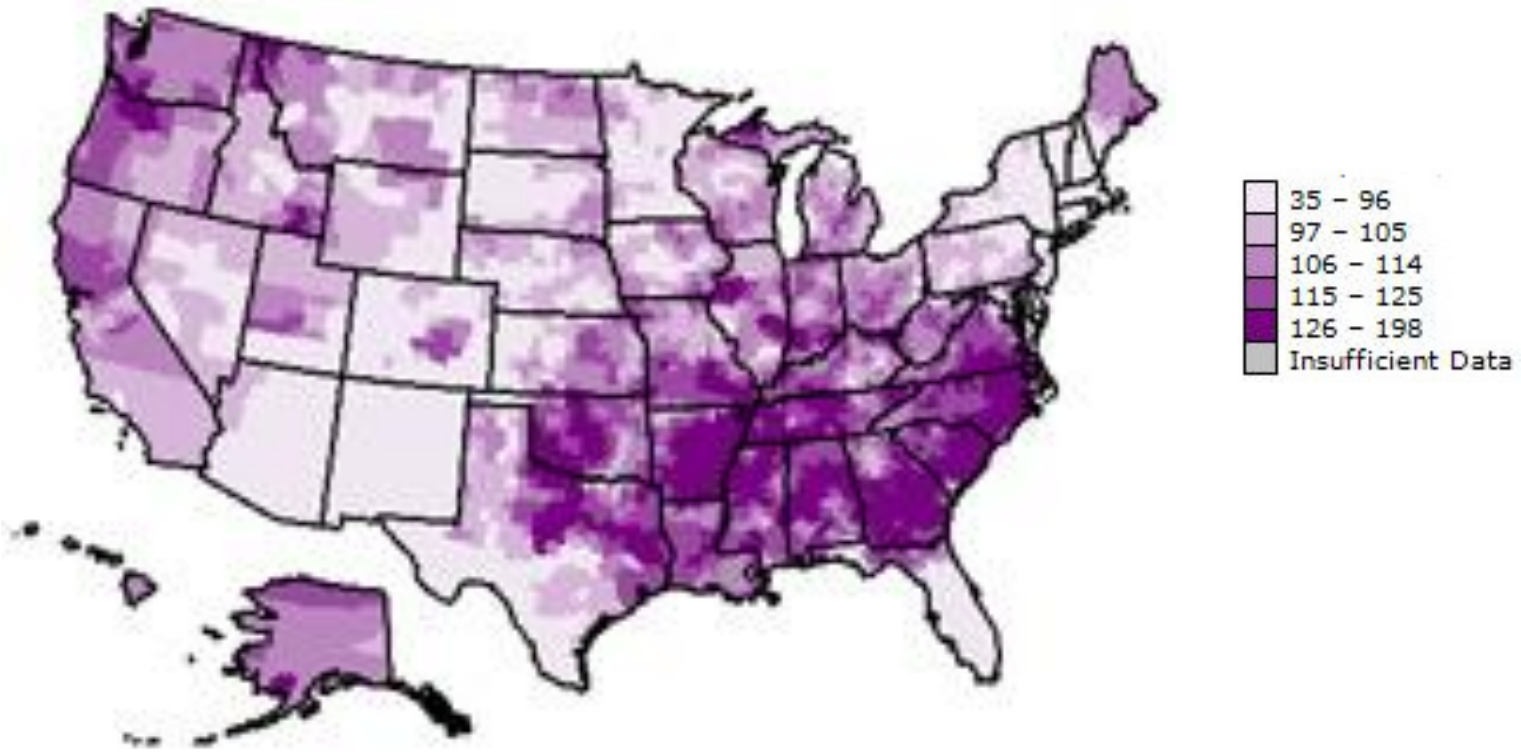
Age-standardized stroke incidence per 100,000 person-years for 2010.



Feigin V. et al. *The Lancet.* 2014

Regional Stroke Disparities

"Stroke Belt"



Stroke Subtypes

Ischemic Stroke (85%)

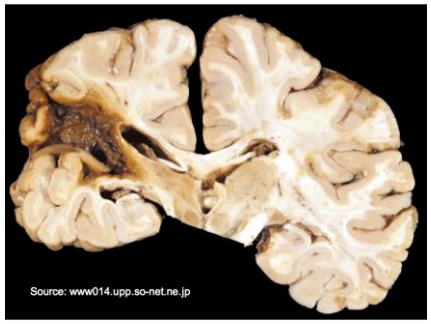
•Blockage of the artery

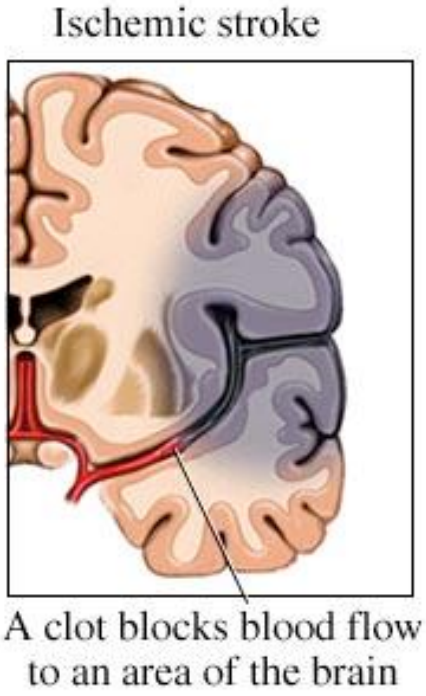
•Causes lack of oxygen to the brain supplied by that artery.

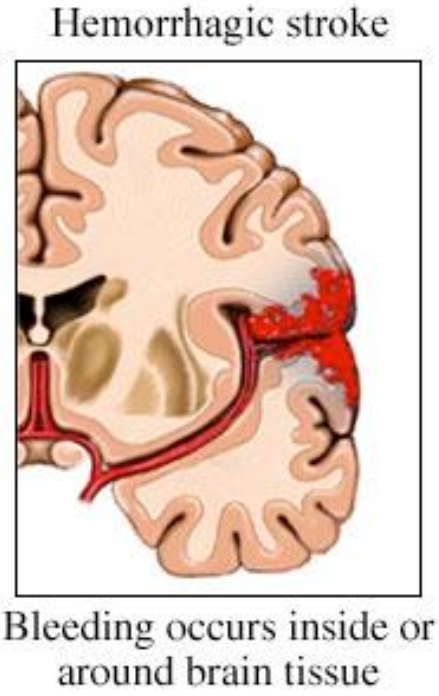
Hemorrhagic Stroke (15%)

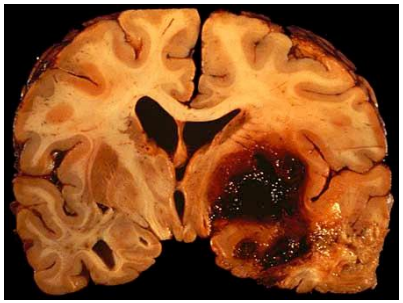
•“Intracerebral Hemorrhage” or “ICH”

•Rupture of the artery, causing bleeding and hematoma formation.







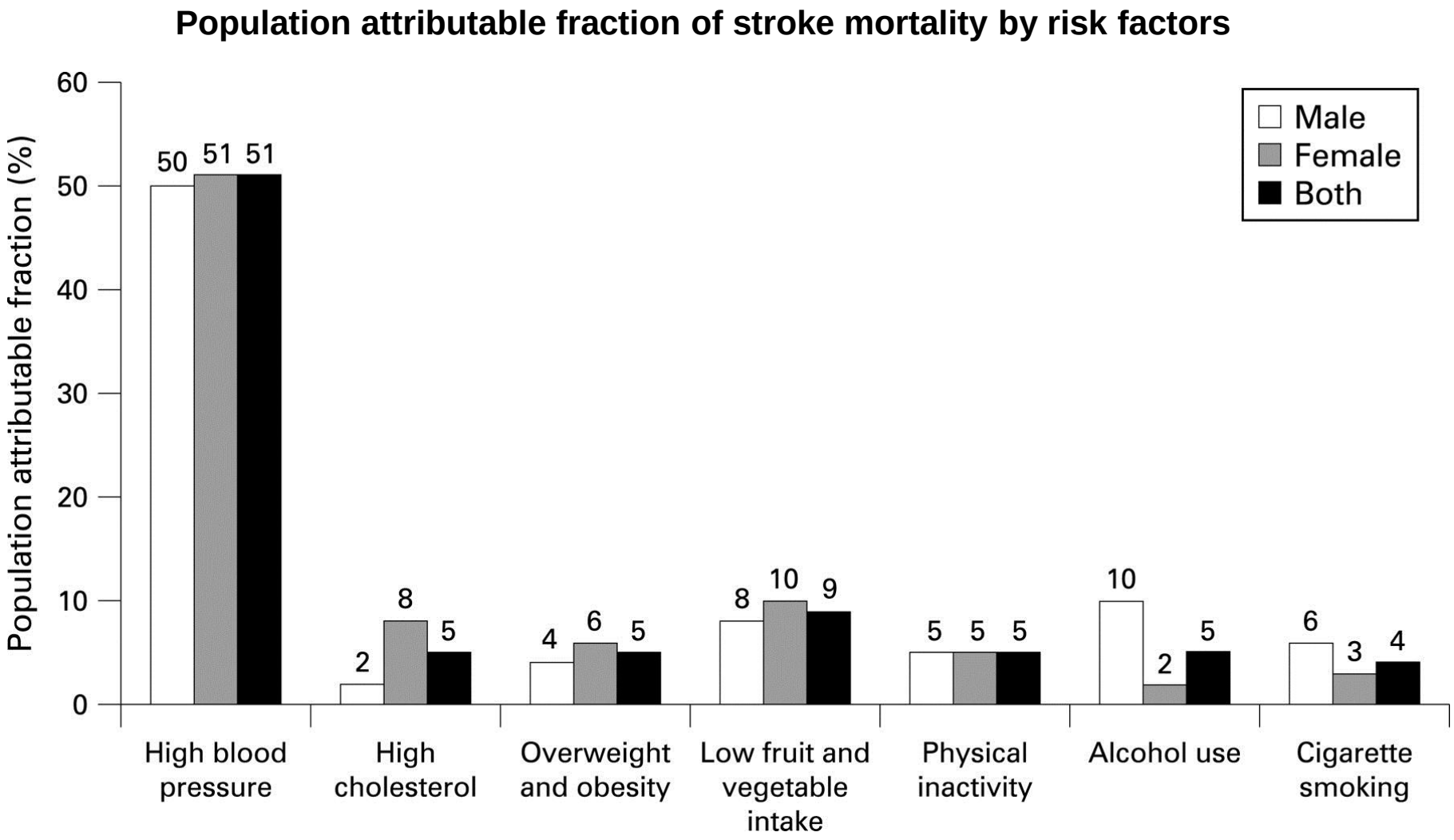


Pick Your Battle

Stroke Risk Factors (Primary)

- Hypertension
- Diabetes
- Dyslipidemia
- Obesity
- Low fruit and vegetable intake
- Physical inactivity
- Cigarette smoking
- Alcohol use

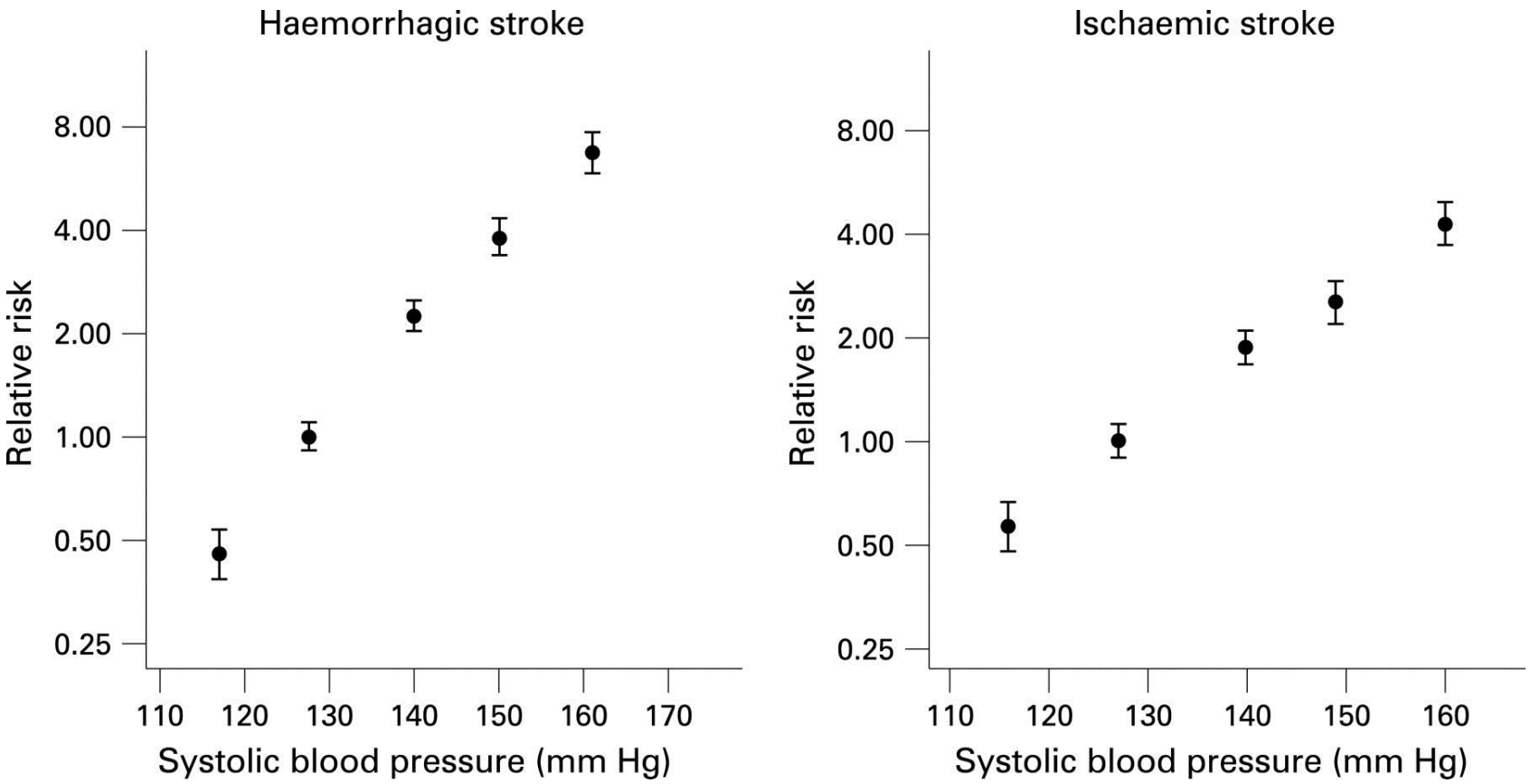
Pick Your Battle



Mensah G A Heart 2008;94:697-705

Risk of Stroke and Blood Pressure

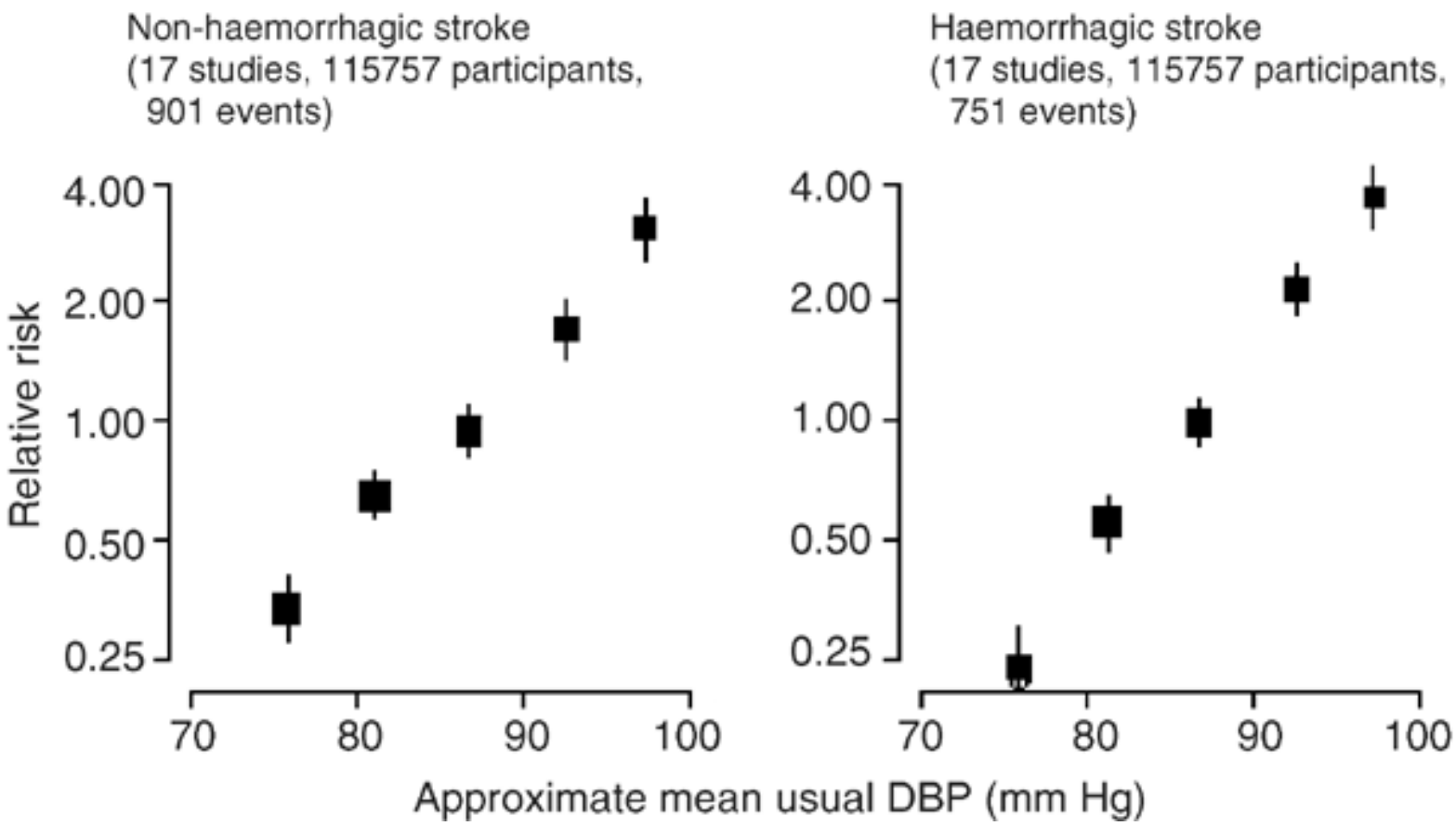
Relative risk of ischemic and hemorrhagic stroke



Lancet, 1998; 352: 1801–1807

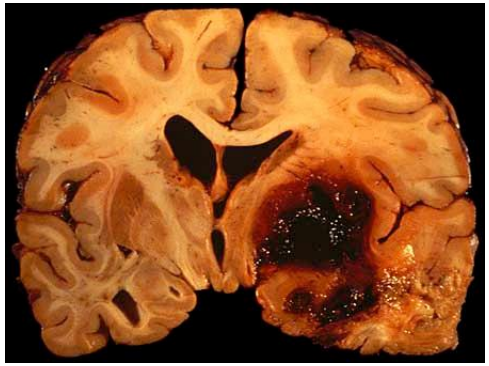
Risk of Stroke and Blood Pressure

Relative risk of ischemic and hemorrhagic stroke



The Lancet, 1998; 352: 1801–1807

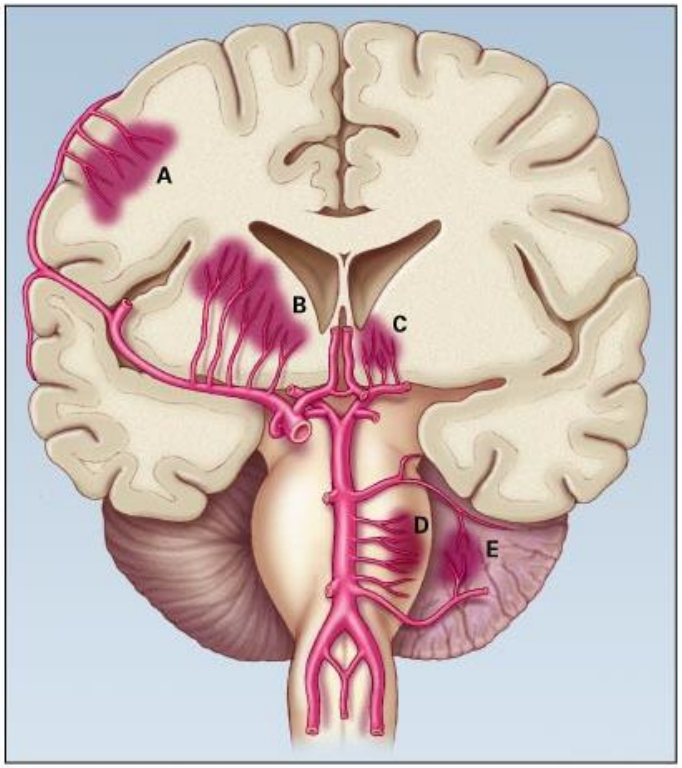
Intracerebral Hemorrhage (ICH)



- Medical Emergency
- High rate of severe disability
- 30-50% death rate
- Hypertension is the major cause (~70%)
- Methamphetamine is another cause

Johnston et al. *Neurology* 50:1413-1418, 1998
Taylor et al. *Stroke* 26:1459-1466, 1996

Mechanism



Spontaneous rupture of small arterioles

Formation of hematoma (“blood clot”)

Mechanical damage to the surrounding brain tissue due to compression.

(Qureshi AI et al. N Engl J Med. 2001)

Hypertension related ICH

Normal Blood Pressure

High Blood Pressure

Case

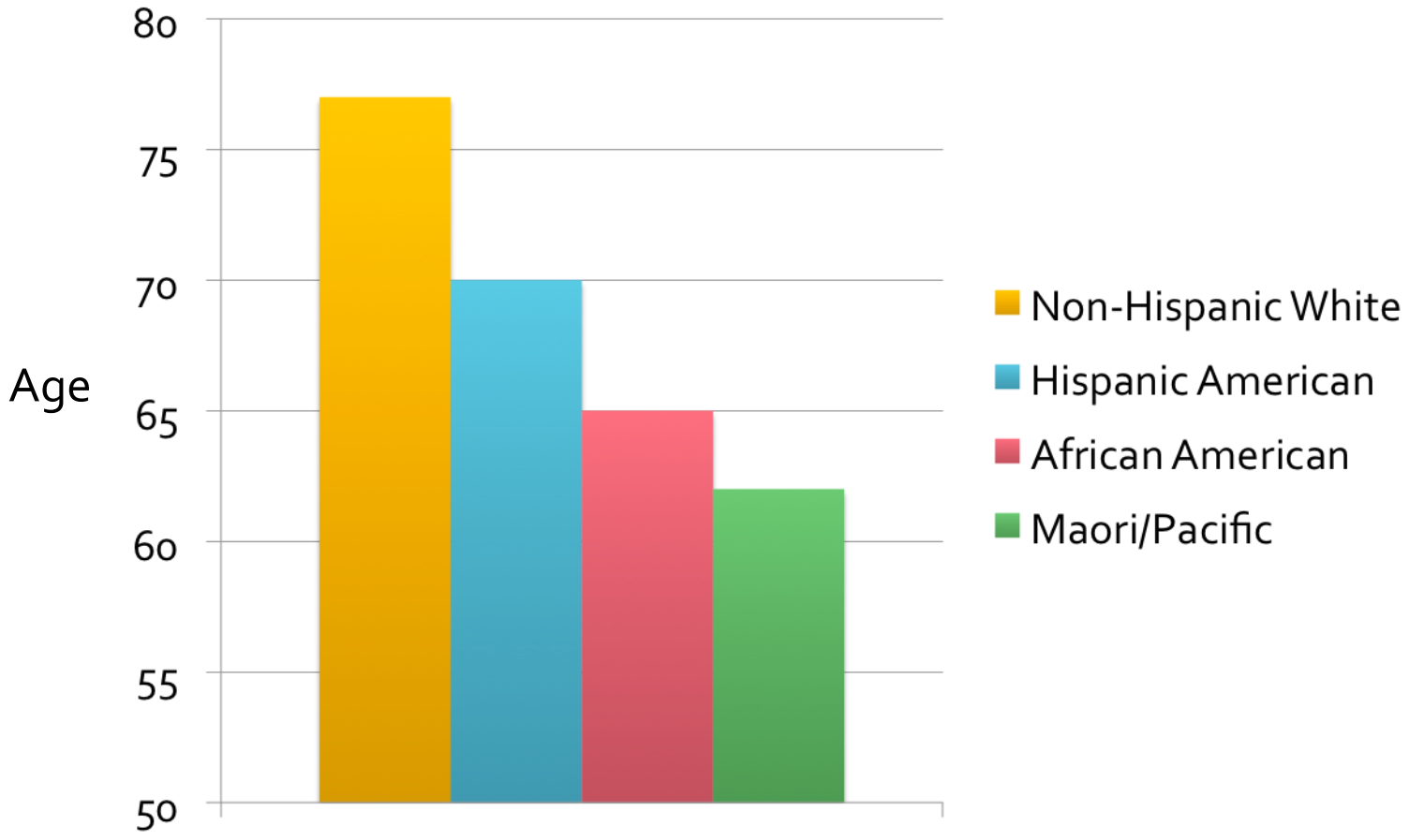
27 yo Native Hawaiian man developed difficulty speaking and right-sided paralysis.

Etiology = uncontrolled hypertension

3-month outcome

- Moderately severe disability
- Unable to walk without assistance
- Unable to attend to own bodily needs without assistance.

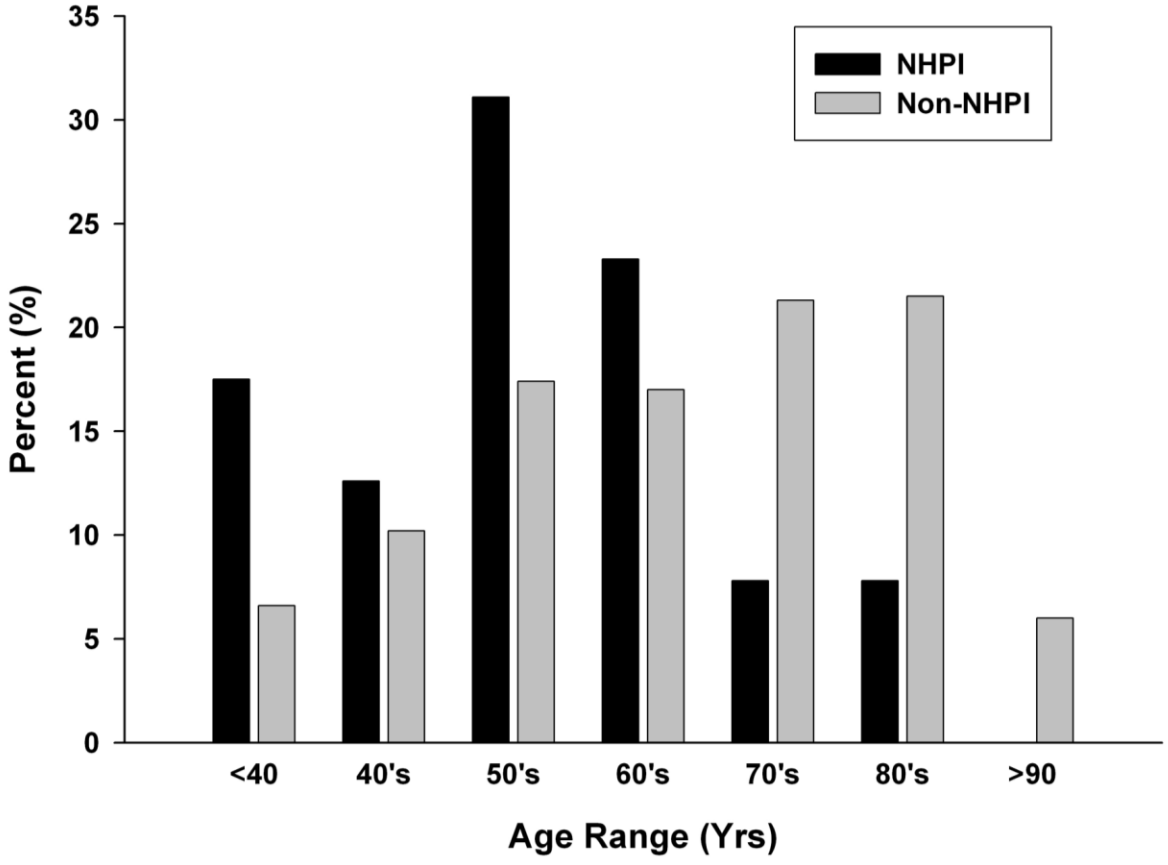
ICH Disparities - 2010



Zahuranec et al. Neurology. 2006.
Kuhlemeier et al. Stroke. 1994.
Feigin et al. Lancet Neuro. 2006

Step 1 – Preliminary Study

•A retrospective cross-sectional study of the stroke database from The Queen's Medical Center between 2004 and 2010 (N=562).



Nakagawa et al. Neu

Results: Disparities in Risk Factors

Table 1. Characteristics of ICH Patients at The Queen's Medical Center: 2004-2010

	NHPI	Asian	White
No. of patients	100	352	92
Transferred from another hospital	27 (27)	64 (18)	22 (24)
Risk factors			
Age, years	**55 ± 16****	67 ± 17	66 ± 16
Female	40 (40)	172 (49)	39 (42)
Diabetes mellitus	**35 (35)***	78 (22)	18 (20)
Hypertension	**77 (77)***	**267 (76)***	59 (64)
Atrial fibrillation/Atrial flutter	10 (10)	41 (12)	16 (17)
Congestive heart failure	0 (0)	4 (1)	2 (2)
Previous stroke or TIA	16 (16)	69 (20)	19 (21)
Coronary artery disease or prior MI	10 (10)	42 (12)	15 (16)
Peripheral vascular disease	0 (0)	5 (1)	1 (1)
Smoking	17 (17)	44 (13)	11 (12)
Dyslipidemia	22 (22)	112 (32)	29 (32)
Prosthetic heart valve	1 (1)	5 (1)	0 (0)
Hospital LOS, days	**13 ± 19***	11 ± 17	7 ± 10
In-hospital mortality	**22 (22)***	91 (26)	33 (36)
Ambulatory at discharge	22 (22)	70 (20)*	28 (30)
Discharged home	27 (27)	57 (16)*	25 (27)

Nakagawa et al. Neurology. 2012

2011

Published Ahead of Print on July 18, 2012 as 10.1212/WNL.0b013e3182608c6f

Racial disparities among Native Hawaiians and Pacific Islanders with intracerebral hemorrhage

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ABSTRACT

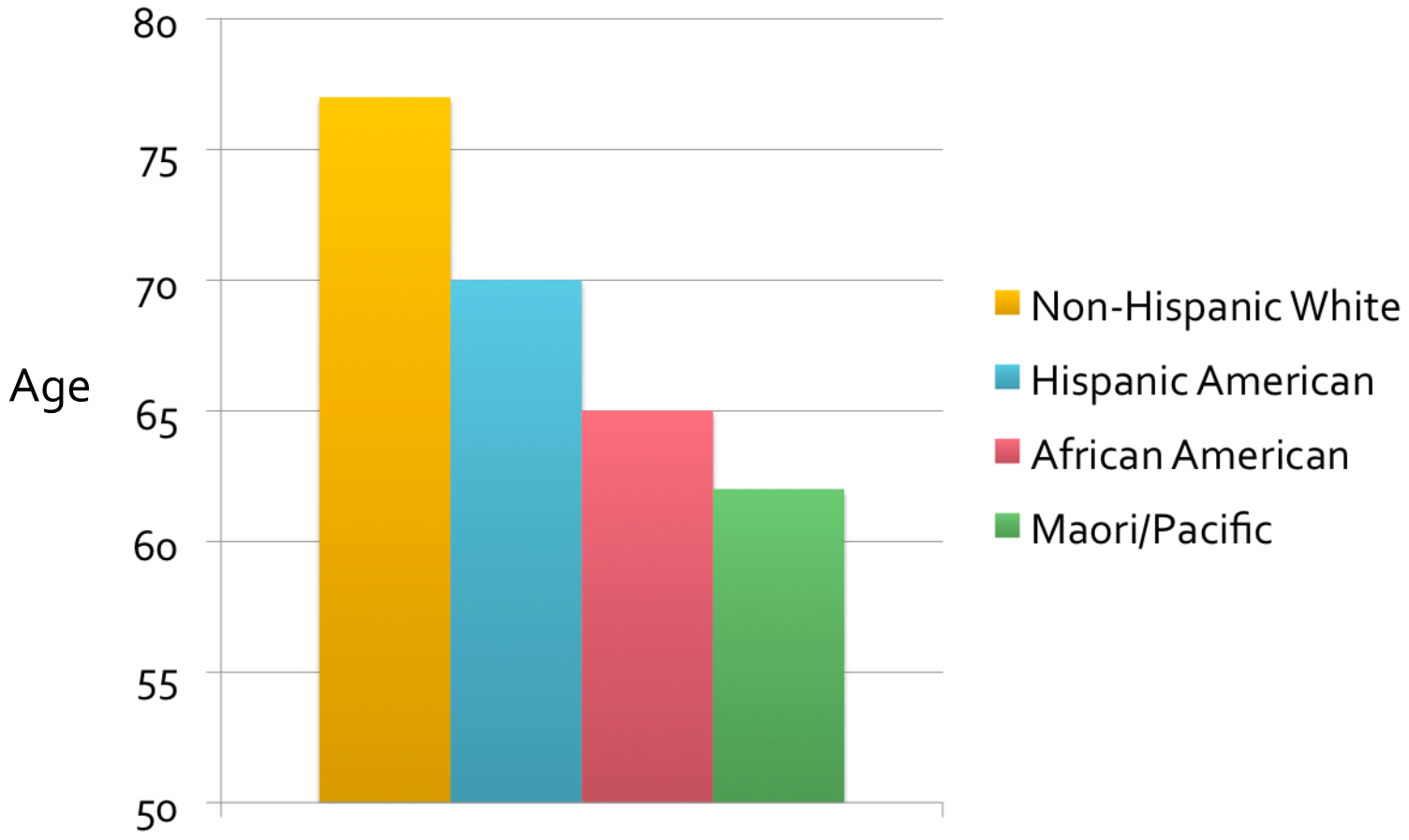
Objectives: To evaluate disparities in stroke risk factors and outcome among the Native Hawaiians and other Pacific Islanders (NHPI) in Hawaii who are hospitalized with intracerebral hemorrhage (ICH).

Methods: We performed a retrospective study on consecutive patients hospitalized for acute ICH at a single tertiary center on Oahu between 2004 and 2010. Clinical data were obtained from the Get With the Guidelines-Stroke database. Multivariable logistic regression was used to assess the predictors for young ICH (age <45).

Results: A total of 562 patients hospitalized for acute ICH (Asian 63%, NHPI 18%, white 16%, other 3%) were studied. The NHPI were younger (mean ages, NHPI 55 ± 16 vs white 66 ± 16 years, $p < 0.0001$), and had higher prevalence of diabetes (NHPI 35% vs white 20%, $p = 0.01$) and history of hypertension (NHPI 77% vs white 64%, $p = 0.04$) compared to white patients. Independent predictors for young ICH were NHPI race (odds ratio [OR] 3.55; 95% confidence interval [CI] 1.33-9.45), being transferred from another hospital (OR 2.03; 95% CI 1.05-3.93), hypertension (OR 0.49; 95% CI 0.27-0.91), previous stroke or TIA (OR 0.21; 95% CI 0.05-0.91), and dyslipidemia (OR 0.15; 95% CI 0.05-0.50).

Conclusions: NHPI with ICH are younger and have higher burden of risk factors compared to white patients. Further studies controlling for socioeconomic modifiers are needed to determine factors contributing to the younger age at presentation in this racial group. *Neurology*® 2012;79:675-680

ICH Disparities - 2010



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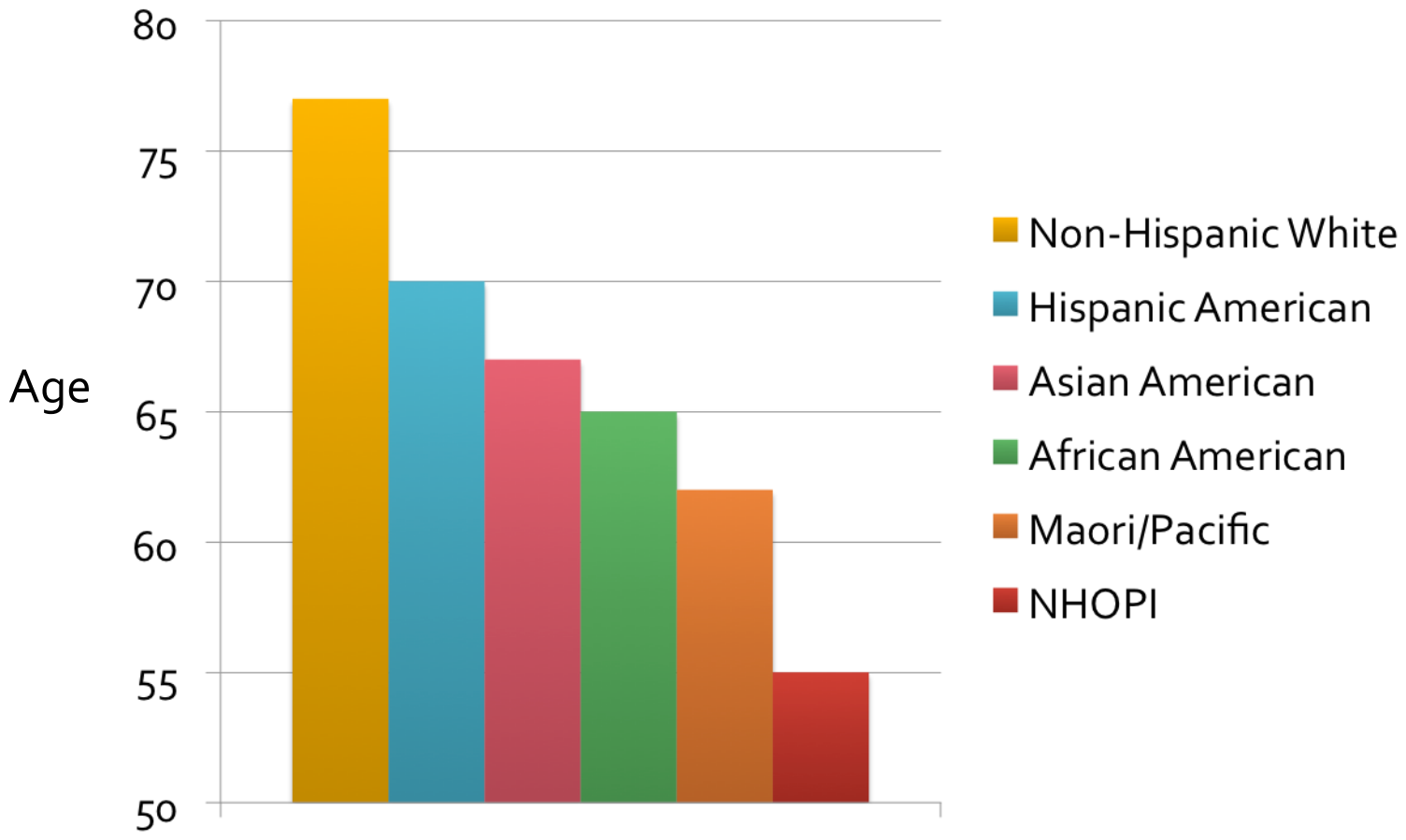
ICH Disparities - 2011



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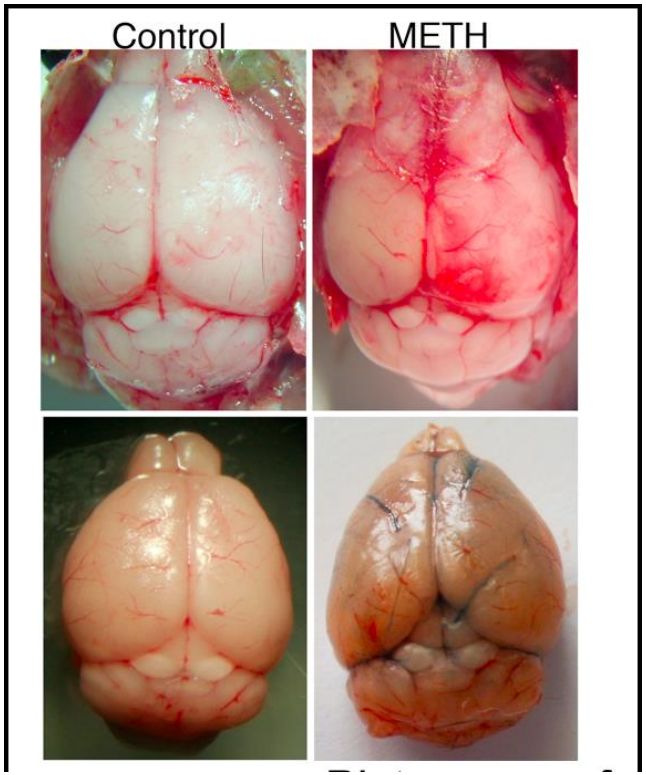
Feigin et al. Lancet Neuro. 2006

Questions

- What is driving this age disparity?
- How much of this is due to methamphetamine abuse among young NHOPI?
- How much of this is due to lack of blood pressure control?

Methamphetamine and ICH

Daily injection of methamphetamine in mice.



Mechanism:

- Damage to arteries
- High blood pressure
- Inflammation
- Neurotoxic

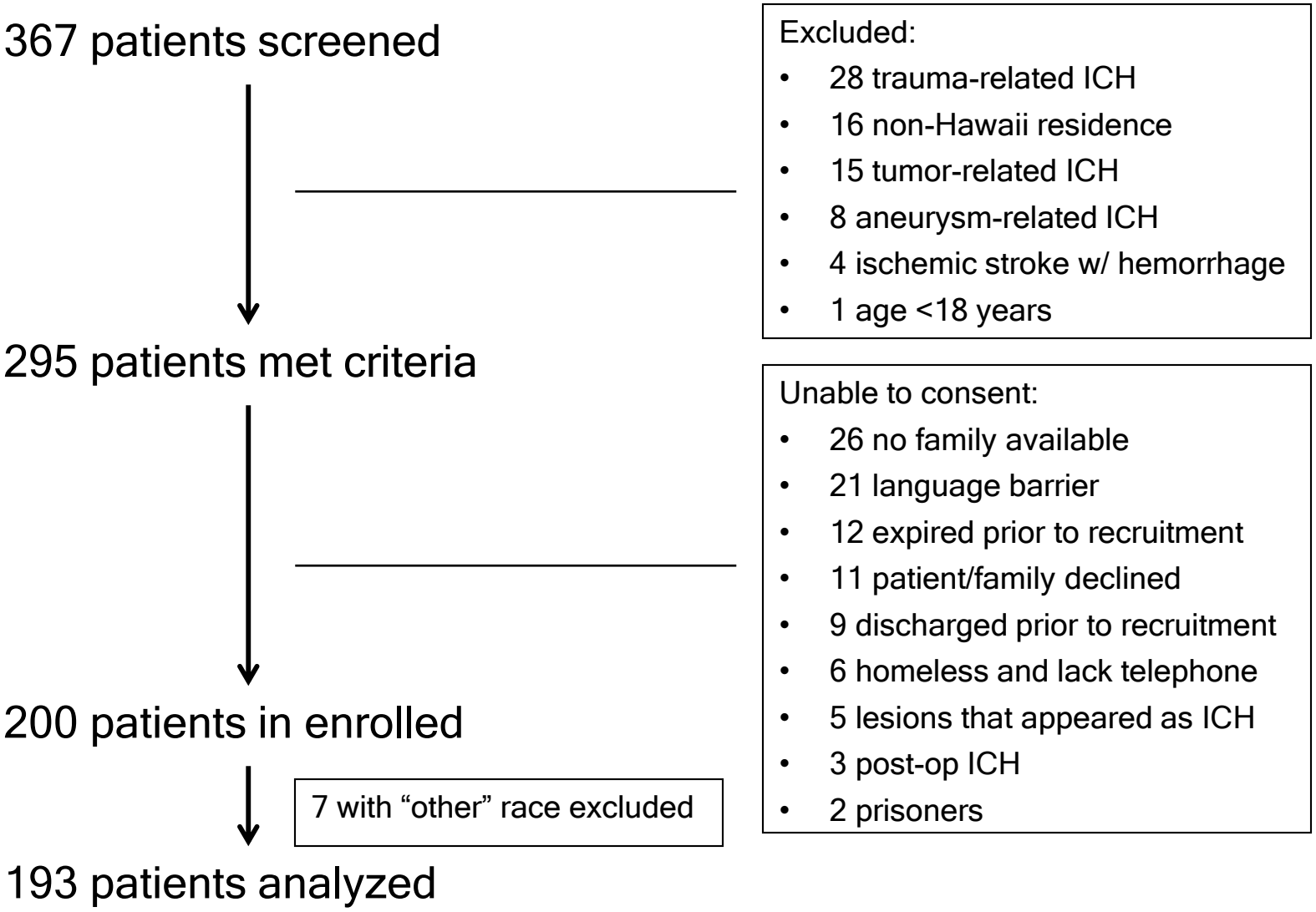
Courtesy of James Haorah, Ph.D., Associate Professor, Laboratory of Neurovascular Oxidative Injury, Department of Pharmacology and Experimental Neuroscience, University of Nebraska Medical Center, Omaha, NE.

Center Research Study

Aim 1: To determine the prevalence of methamphetamine-related ICH (Meth-ICH) for each racial group.

The primary hypothesis: NHOPI with ICH would have significantly higher prevalence of Meth-ICH than whites or Asians.

Patient Enrollment (7/11 – 1/14)



Results (N = 193)

Enrolled Patients

- 23% NHOPI
- 59% Asians
- 16% Non-Hispanic whites

Results

	NHOPI	Whites	Asians
N	45	30	118
Age (yrs)	**54 ± 15**	**68 ± 15***	**65 ± 16***
Female, *n* (%)	14 (31)	10 (33)	54 (46)
Married, *n* (%)	24 (53)	17 (57)	65 (55)
No Insurance, *n* (%)	8(18)	1 (3)	12 (10)
Household income <$15,000, *n* (%)	**18 (40)**	**5 (17)***	**20 (17)***
Regular visit to Primary Care Physician, *n* (%)	**17 (42)**	**21 (72)***	**73 (67)***
Hypertension	**37 (82)**	**18 (60)***	**95 (81)***
Diabetes Mellitus	**19 (42)**	**5 (17)***	**27 (23)***
Hypercholesterolemia	19 (42)	15 (50)	55 (47)
Coronary artery disease	4 (9)	6 (20)	12 (10)
Atrial Fibrillation	7 (16)	8 (27)	19 (16)

Results

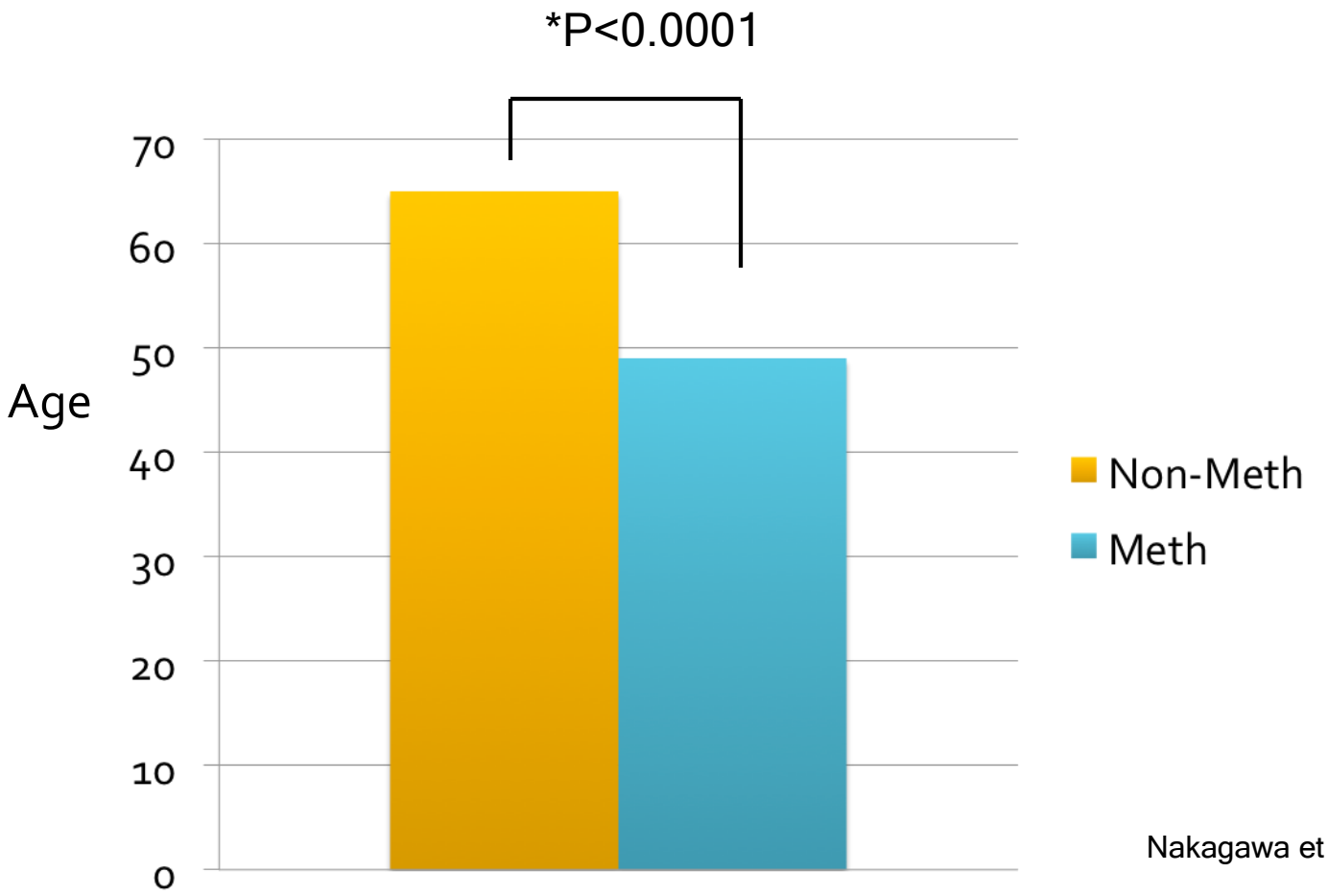
	NHOPI	Whites	Asians
Meth - associated ICH	**24%**	**0%***	**12%***

Nakagawa et al. Neurology. 2015

*P < 0.05

Meth vs. non-Meth ICH

- Age difference: 16 years



Nakagawa et al. Neurology. 2015

Conclusion

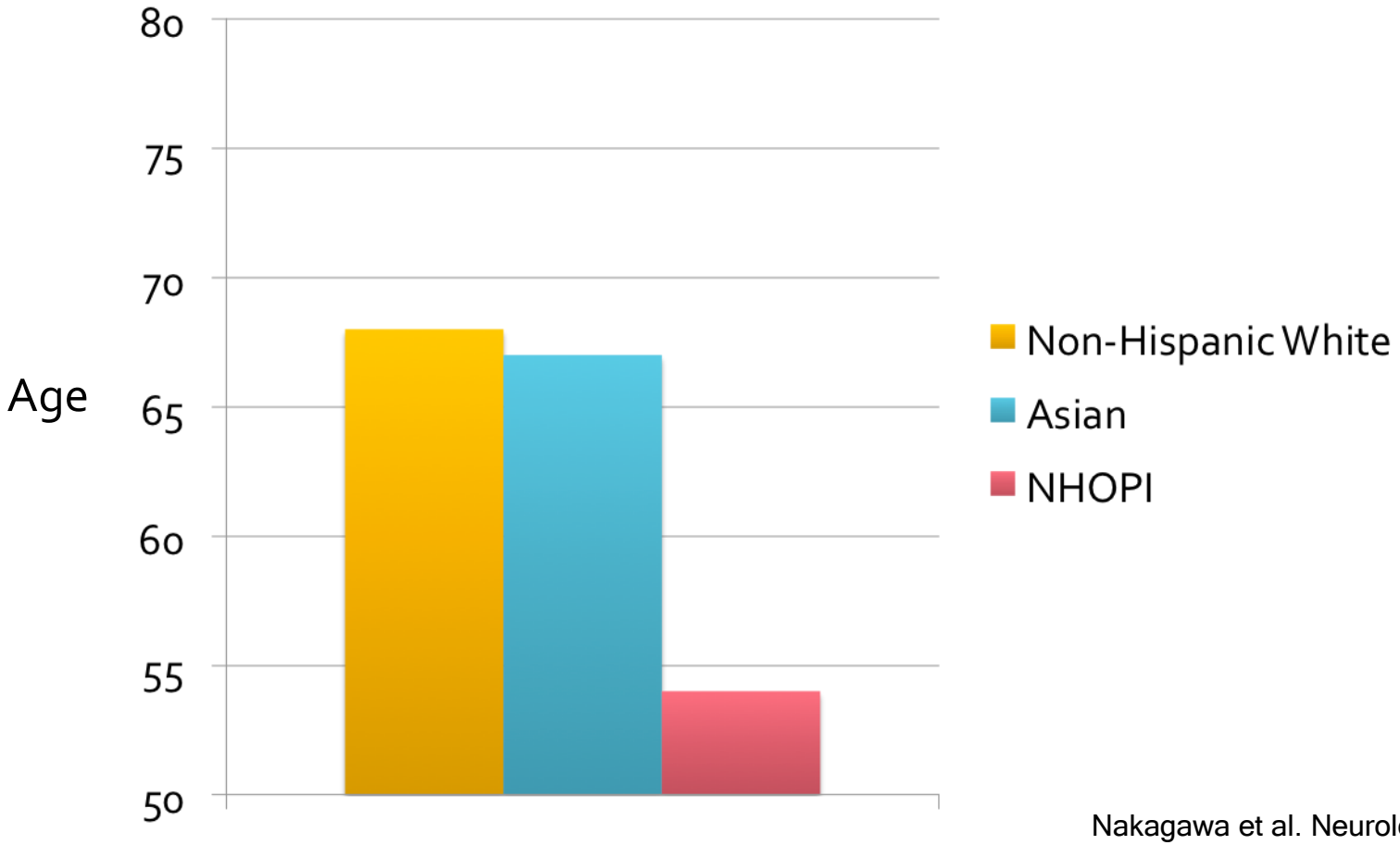
Conclusion #1:

Native Hawaiians and other Pacific Islanders have higher prevalence of Meth-ICH compared to whites and Asians.

Meth-ICH patients are significantly younger than non-Meth ICH patients.

Non-Meth ICH

- Only Non-Meth ICH (Excluded 25 Meth-ICH patients)



Nakagawa et al. Neurology. 2015

Conclusion

Conclusion #2:

Even after excluding the Meth-ICH group, NHOPI still had younger age, suggesting that observed health disparities are not entirely driven by the methamphetamine abuse in the community.

2015

Racial disparities in methamphetamine-associated intracerebral hemorrhage

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ABSTRACT

Objective: To assess racial disparities in the prevalence of methamphetamine-associated intracerebral hemorrhage (Meth-ICH) among Native Hawaiians and other Pacific Islanders (NHOPI).

Methods: Prospectively collected data from an ongoing, multiethnic, single-center cohort study were analyzed. The inclusion criteria for the cohort study required that patients be adult (age 18 years or older) residents of Hawaii with nontraumatic spontaneous intracerebral hemorrhage (ICH). Patients of race other than white, Asian, or NHOPI were excluded. Determination of Meth-ICH was made prospectively by positive urine toxicology result and lack of other clinically suspected ICH etiology. Prevalence of Meth-ICH among NHOPI was compared with that of white and Asian patients.

Results: A total of 193 patients (white 16%, Asian 61%, NHOPI 23%) were analyzed. NHOPI were younger than white (54 ± 15 vs 68 ± 15 years, respectively, $p = 0.0001$) and Asian (vs 65 ± 16 years, $p = 0.0001$) patients. Overall, 25 (13%) Meth-ICHs (mean age: 49 ± 6 years, range: 33–56 years) were identified. NHOPI had higher prevalence of Meth-ICH compared with white (24% vs 0%, respectively, $p = 0.003$) and Asian (vs 12%, $p = 0.046$) patients. The observed age differences between the racial groups persisted even after excluding the Meth-ICH group ($p < 0.01$ for all comparison).

Conclusions: NHOPI have higher prevalence of Meth-ICH compared with white and Asian patients. However, the age disparity is not entirely driven by methamphetamine abuse. *Neurology®* 2015;84:995–1001

Questions / Next Step

Is there any difference in outcome after stroke?

Specific Aim 2: To determine the difference in 3-month disability level between NHOPI and whites.

Modified Rankin Scale

0 No symptoms at all

1 No significant disability despite symptoms; able to carry out all usual duties and activities

2 Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance

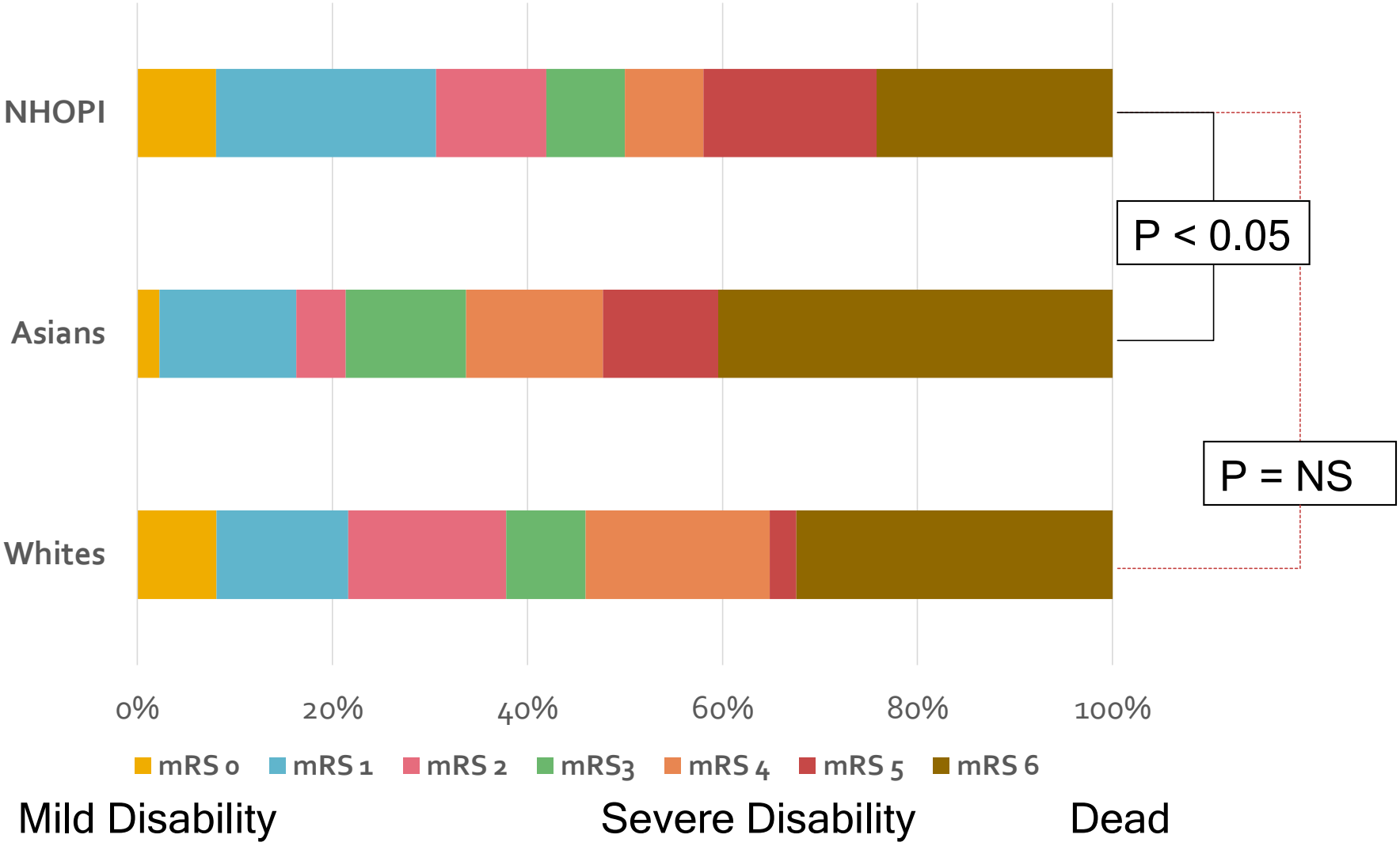
3 Moderate disability; requiring some help, but able to walk without assistance

4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance

5 Severe disability; bedridden, incontinent and requiring constant nursing care and attention

6 Dead

3-month outcome

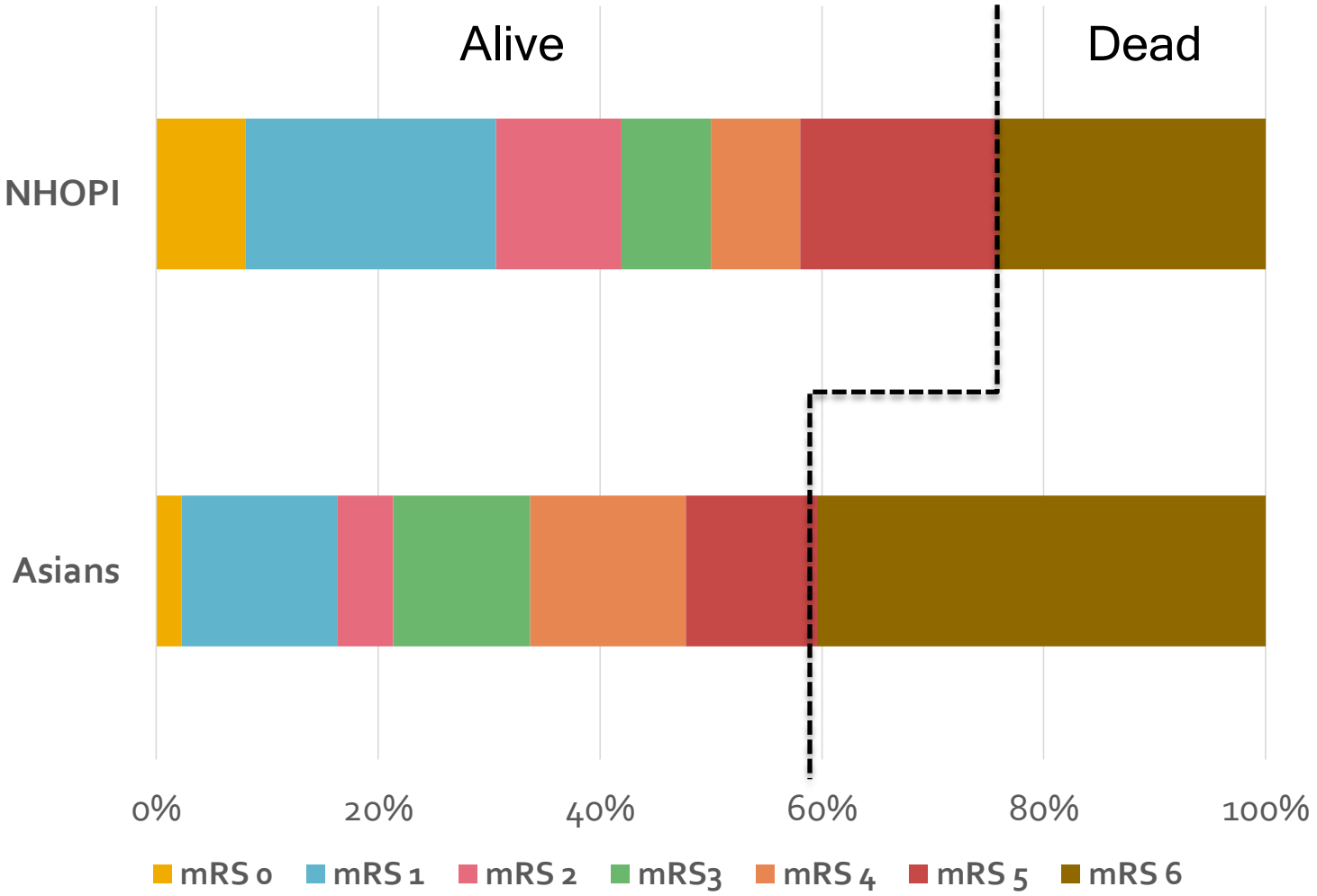


Observation

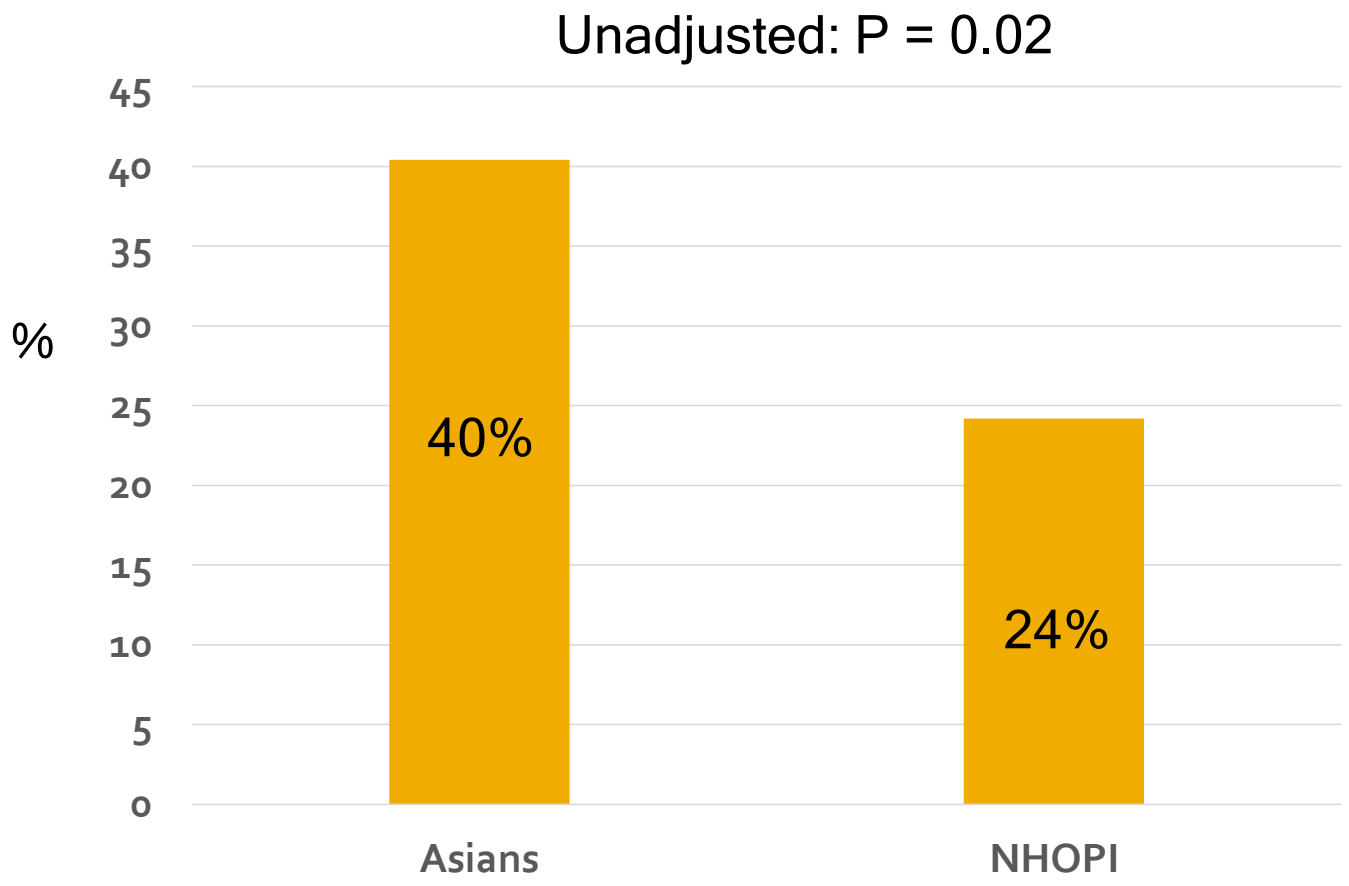
3-month neurological outcome:

- No difference between NHOPI and whites.
- Possible difference between NHOPI and Asians.

3-month mortality



3-month mortality



Age-adjusted: P = NS (Asians 65 years vs. NHOPI 52 years)

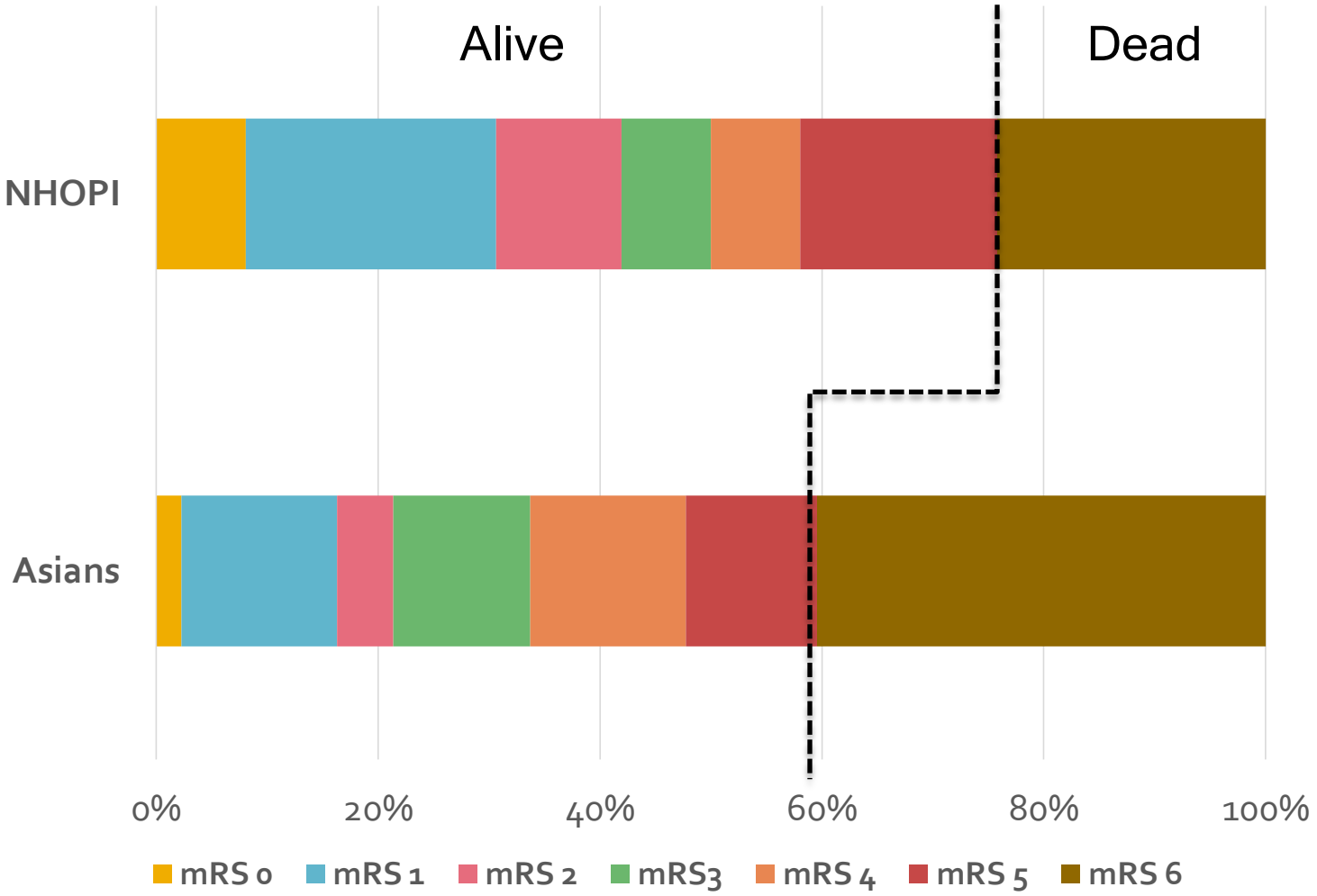
Observation

- NHOPI have lower 3-month mortality compared to Asians.
- However, this was driven by their younger age.
- Most likely higher number of elderly Asians expired due to cessation of aggressive care (i.e., comfort care/hospice)

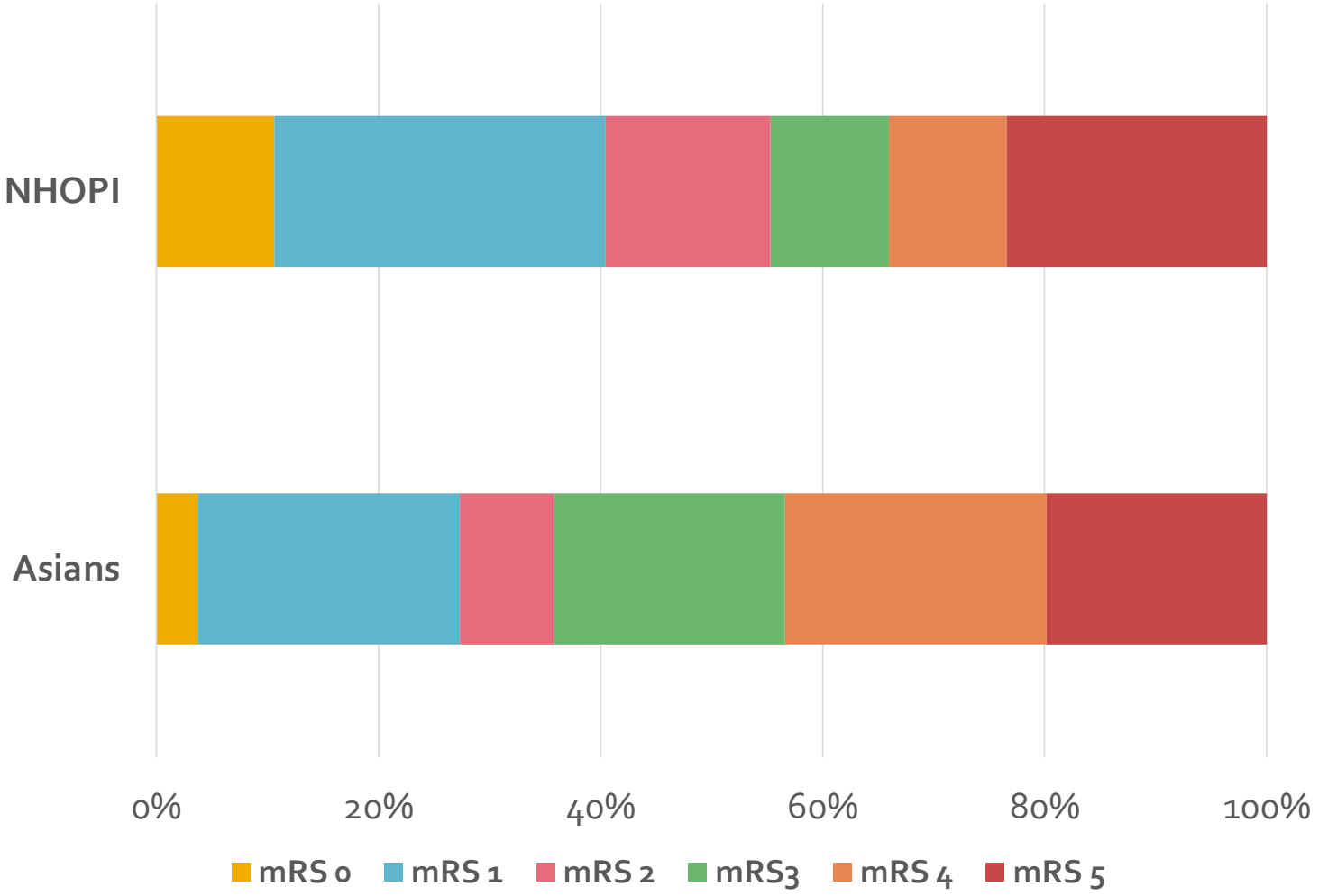
Question

- Among the survivors, is there any difference in the disability severity between NHOPI and Asians?

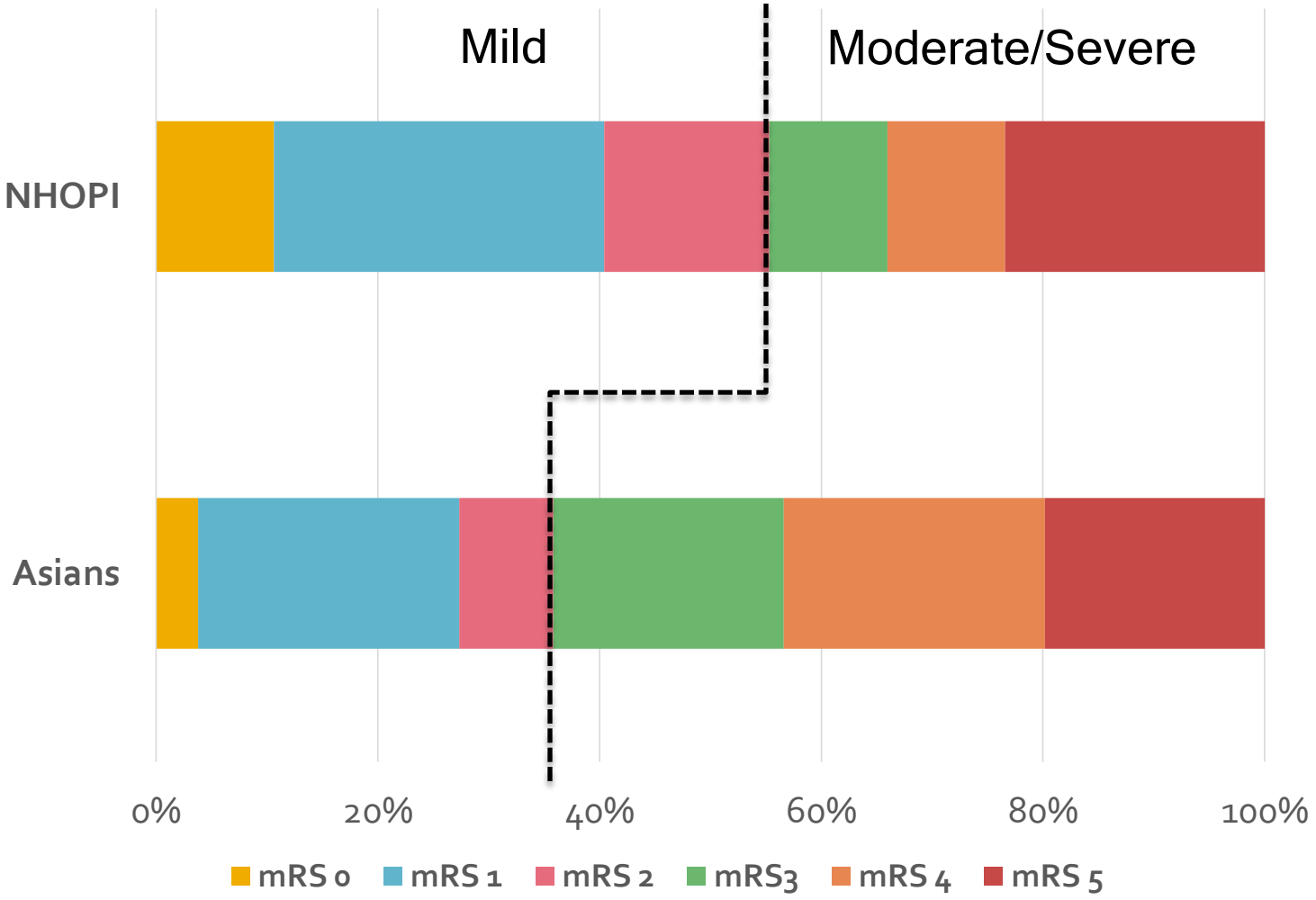
Survivors


Alive
Dead
NHOPI
Asians
0%
20%
40%
60%
80%
100%
mRS 0
mRS 1
mRS 2
mRS3
mRS 4
mRS 5
mRS 6

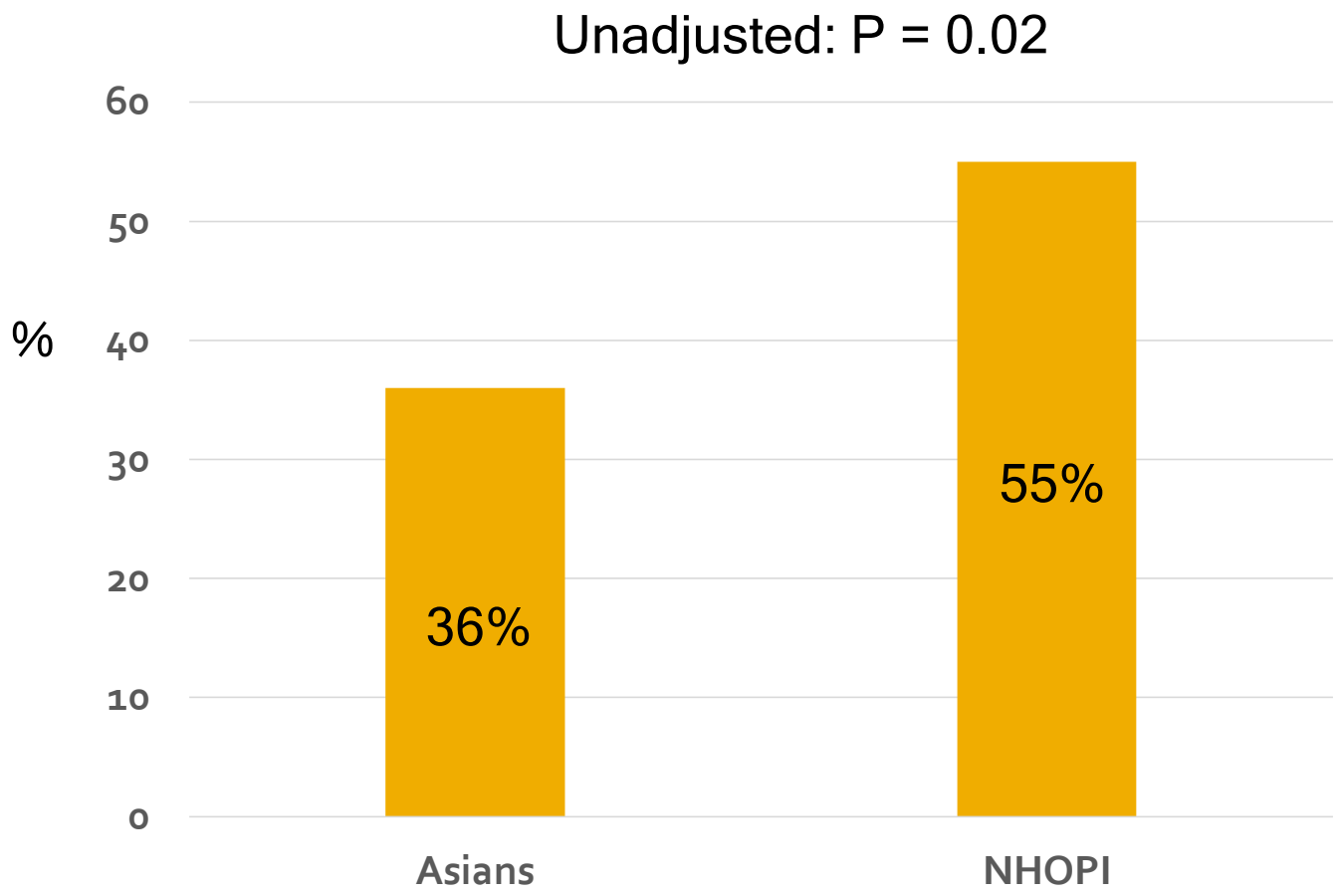
3-month disability of survivors



3-month disability of survivors



3-month mRS ≤2 (mild disability)



Age-adjusted: P = NS (Asians 65 years vs. NHOPI 52 years)

Conclusion of Aim 2

- NHOPI have lower 3-month mortality compared to Asians.
- Among the survivors, NHOPI have milder neurological disability compared to Asians.
- However, these findings were driven by their young age.
- There is no significant age-adjusted racial difference in outcome after intracerebral hemorrhage.

Acknowledgment

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