Effect of incident stroke on the risk of dementia over a period of 10 years of follow-up in a cohort of Asian American and White older adults in California

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Motivation

- Several studies have shown that poststroke cognitive impairment (PSCI) is frequent, and a large percentage of stroke survivors do no fully recover from PSCI
- Although there are several modifiable risk factors that can reduce both the risk of stroke and dementia, there is a need to understand in more depth the role of the acute vascular event in the predisposition for Alzheimer's disease and related dementias.
- Previous studies looking at the association between stroke - dementia had major limitations (used prevalent stroke, incident stroke as time-fixed, limited information on death as competing event
- Very limited information on the effect for asian-american population

Study population

- **Study sample:**
  - KPNC members who participated on the California Men's Health Study (CMHS) or the Kaiser Permanente Research Program on Genes, Environment and Health Survey (RPGEH) who self-identified as Asian Americans or white.
- **Eligibility criteria:**
  - With no history of stroke at baseline (survey year)
  - With no history of dementia at baseline
  - From 60 to 89 years old at baseline
  - With information on ethnicity
  - With follow-up

Study Design

- **Exposure:** Incident stroke (ischemic stroke, hemorrhagic stroke)
- **Outcome:** Incident dementia diagnosis (Alzheimer's disease, vascular dementia, and non-specific dementia diagnosis)
- **Time zero/Baseline:** Time of survey
- **End of follow-up:** Time of dementia diagnosis, time of death prior to dementia diagnosis (competing event), time end of membership (censoring event) or turning 90 years old.
- **Time-scale:** Years of follow-up

Covariates

Time-fixed covariates

- Nativity status
- Educational attainment
- Health status
- Age at survey
- Sex/gender
- Smoking status

Time-varying covariates

- Systolic blood pressure (median value/year)
- BMI (median value/year)
- Lipids
- Incident diabetes
- Incident hypertension
- Incident myocardial infarction
- Incident congestive heart failure
- Incident cancer

Statistical Analysis

Controlled direct effect

- IPTW for the probability of developing stroke at each time-point based on time-fixed and time-varying covariates.
- IPCW for the probability of end of membership over follow-up (IPCWm).
- IPCW for death over follow-up (IPCWd). This is to satisfy the independent censoring assumption between dementia and death. (*Controlled direct effect*)
- Plug in IPTW x IPCWm x IPCWd in the Kaplan-Meier estimator
- Calculate cumulative incidence of dementia, Risk ratio and Risk difference at 15 years. Bootstrap confidence intervals.

Statistical Analysis

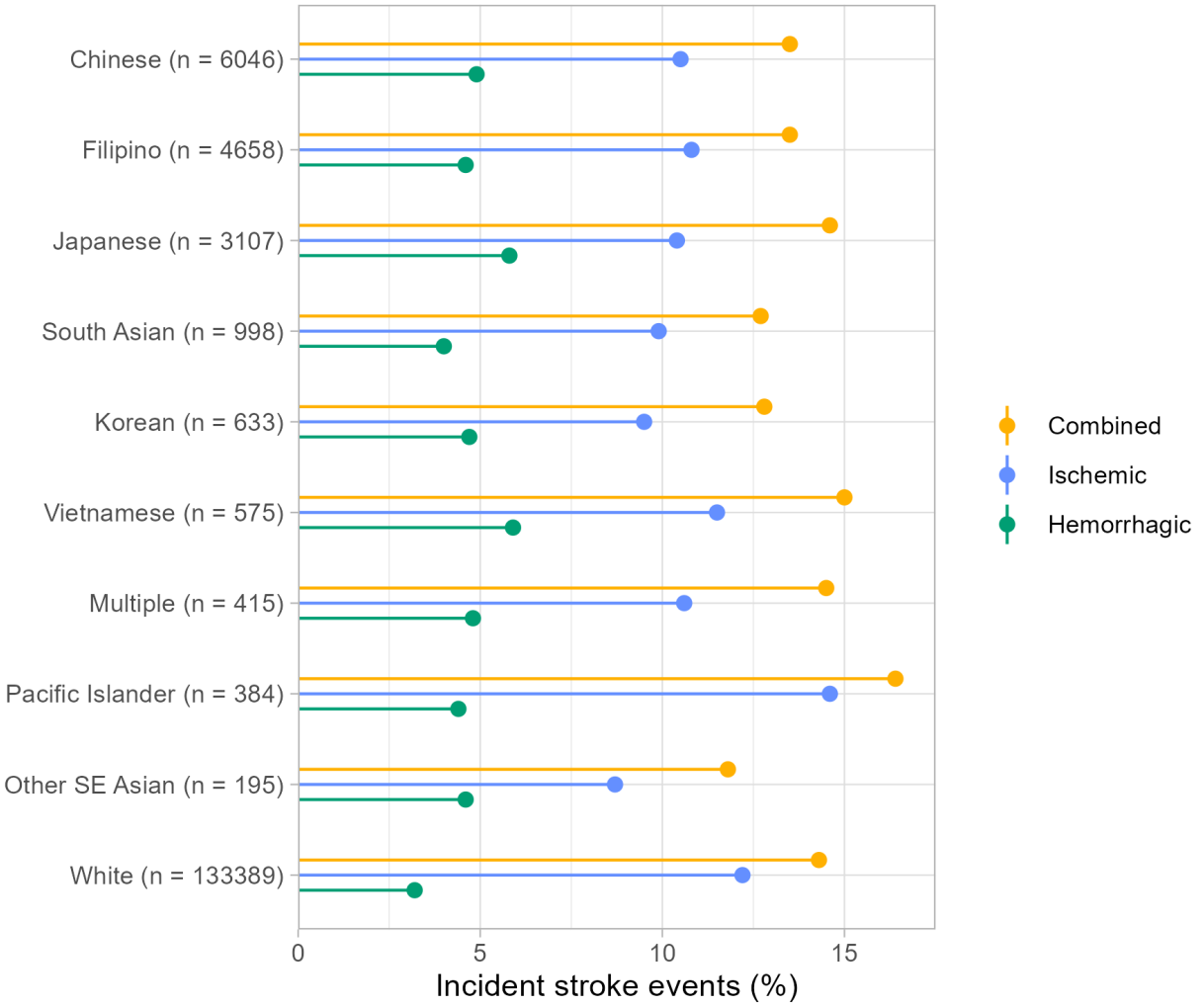
Total effect

- Plug in IPTW x IPCWm in the Aalen-Johannsen estimator
- Calculate cumulative incidence of dementia, Risk ratio and Risk difference at 15 years. Bootstrap confidence intervals.

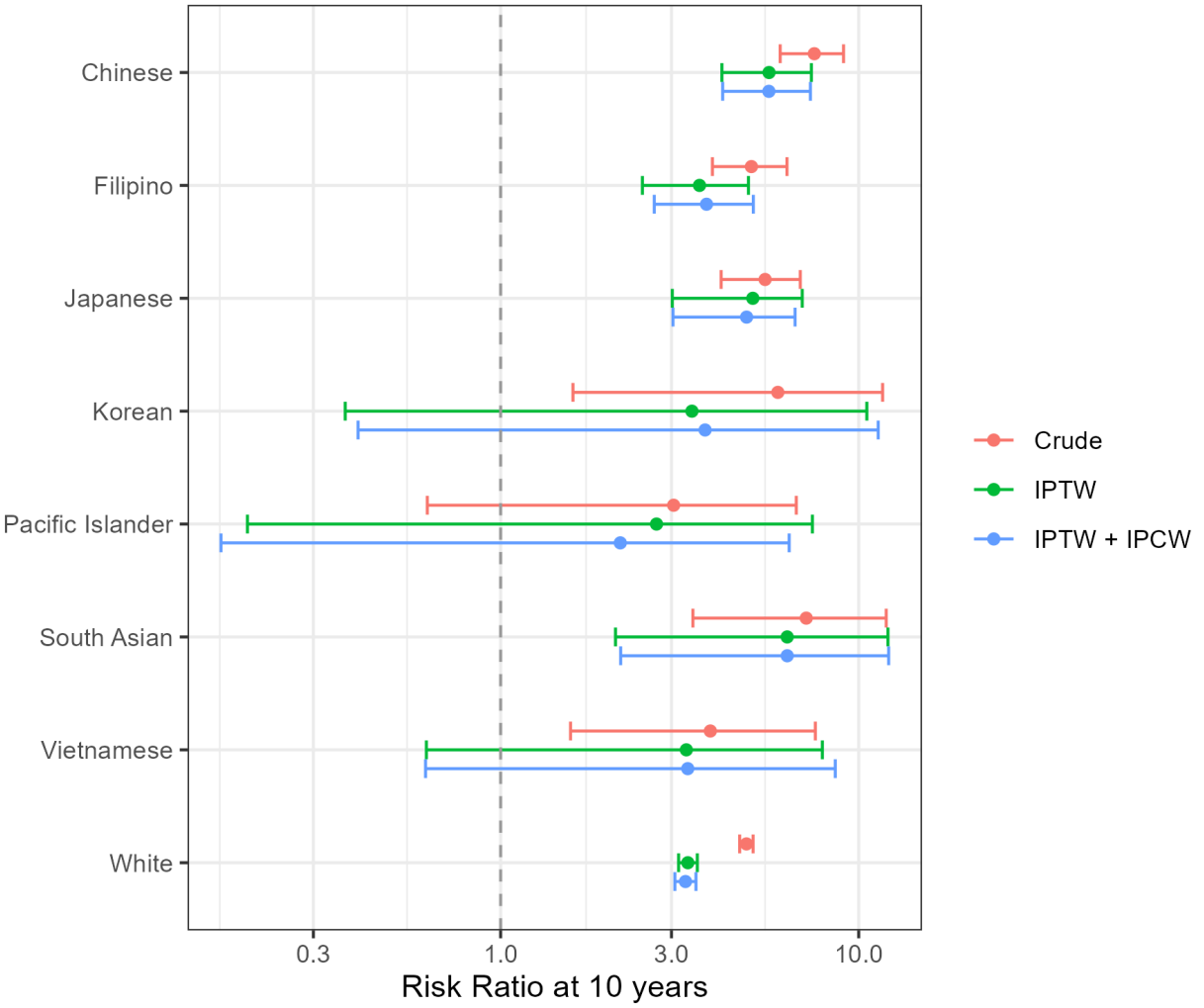
Covariates used for the models

- IPTW:
  - FU yr (bspline), baseline age (bspline)
  - Baseline covariates: gender, nativity, education, general health, smoking status, prevalent acute myocardial infarction
  - Time-varying covariates: diabetes, hypertension, incidence acute myocardial infarction, congestive heart failure, peripheral vascular disease, BMI, SBP
- IPCWd: Death weights.
  - Same variables as IPTW and t-v stroke indicator
- IPCWm: End of membership weights
  - Survey age, education, and general health

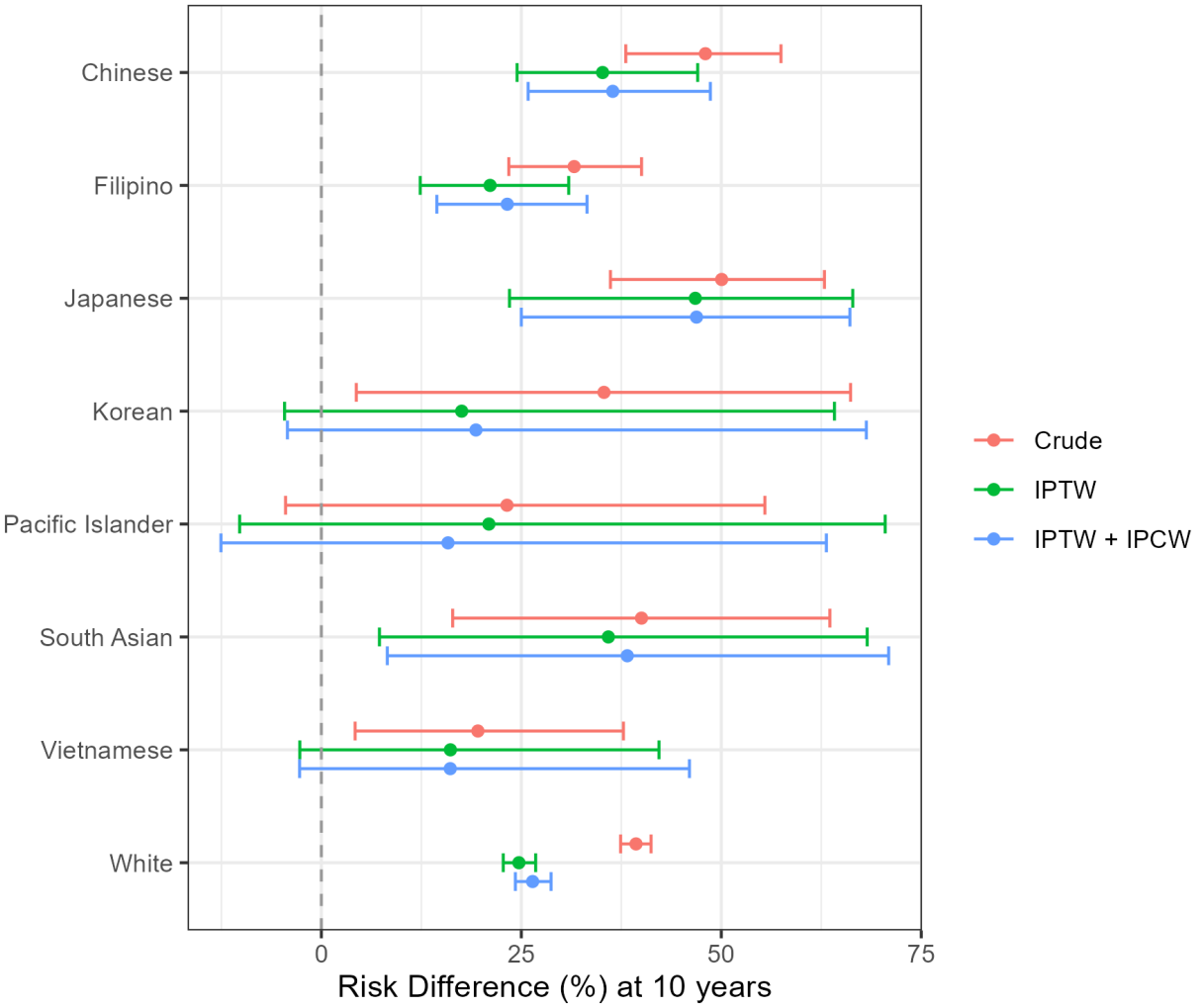
Results


Chinese (n = 6046)
Filipino (n = 4658)
Japanese (n = 3107)
South Asian (n = 998)
Korean (n = 633)
Vietnamese (n = 575)
Multiple (n = 415)
Pacific Islander (n = 384)
Other SE Asian (n = 195)
White (n = 133389)
0
5
10
15
Incident stroke events (%)
Combined
Ischemic
Hemorrhagic

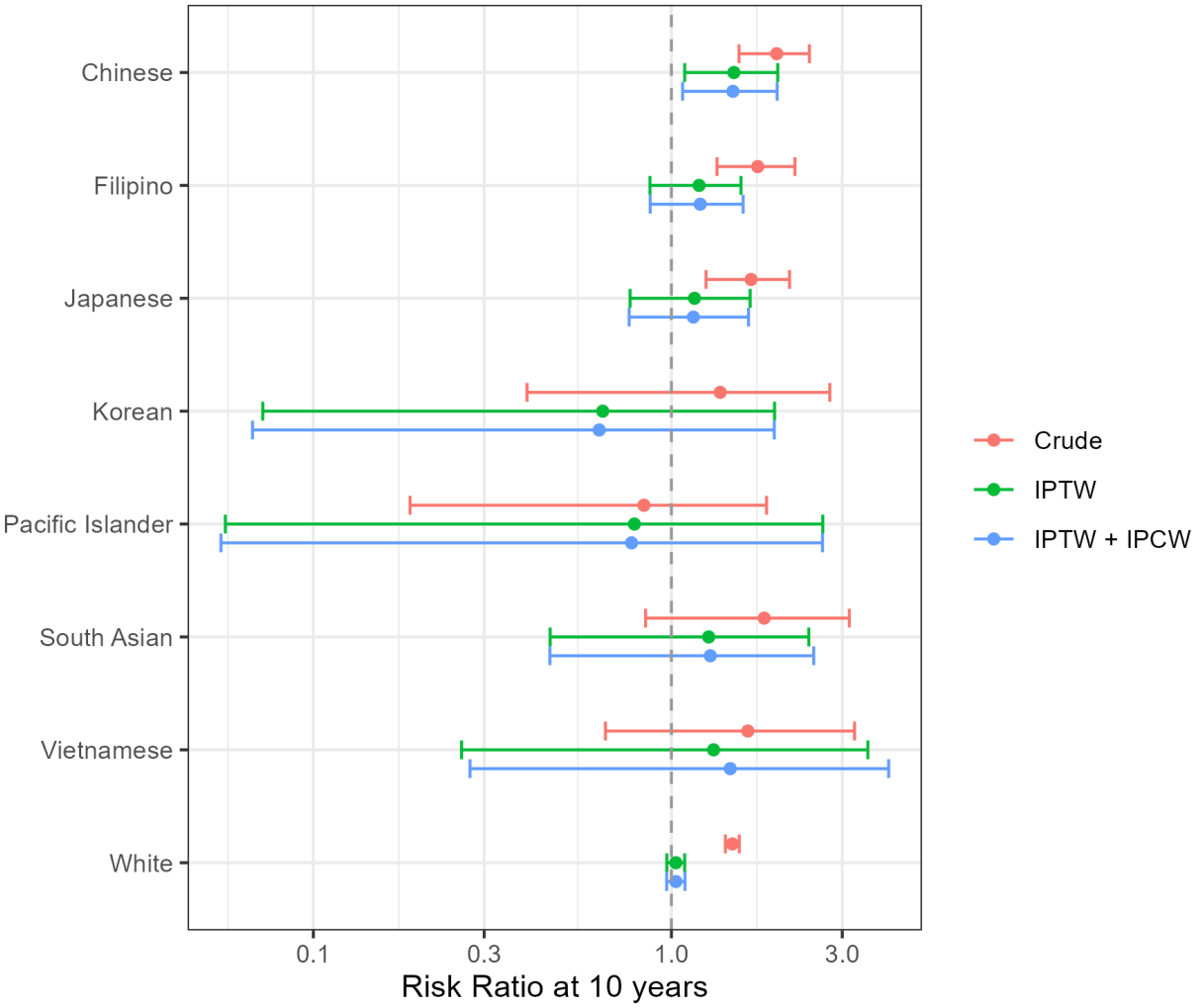
Direct effect of stroke in the risk of dementia



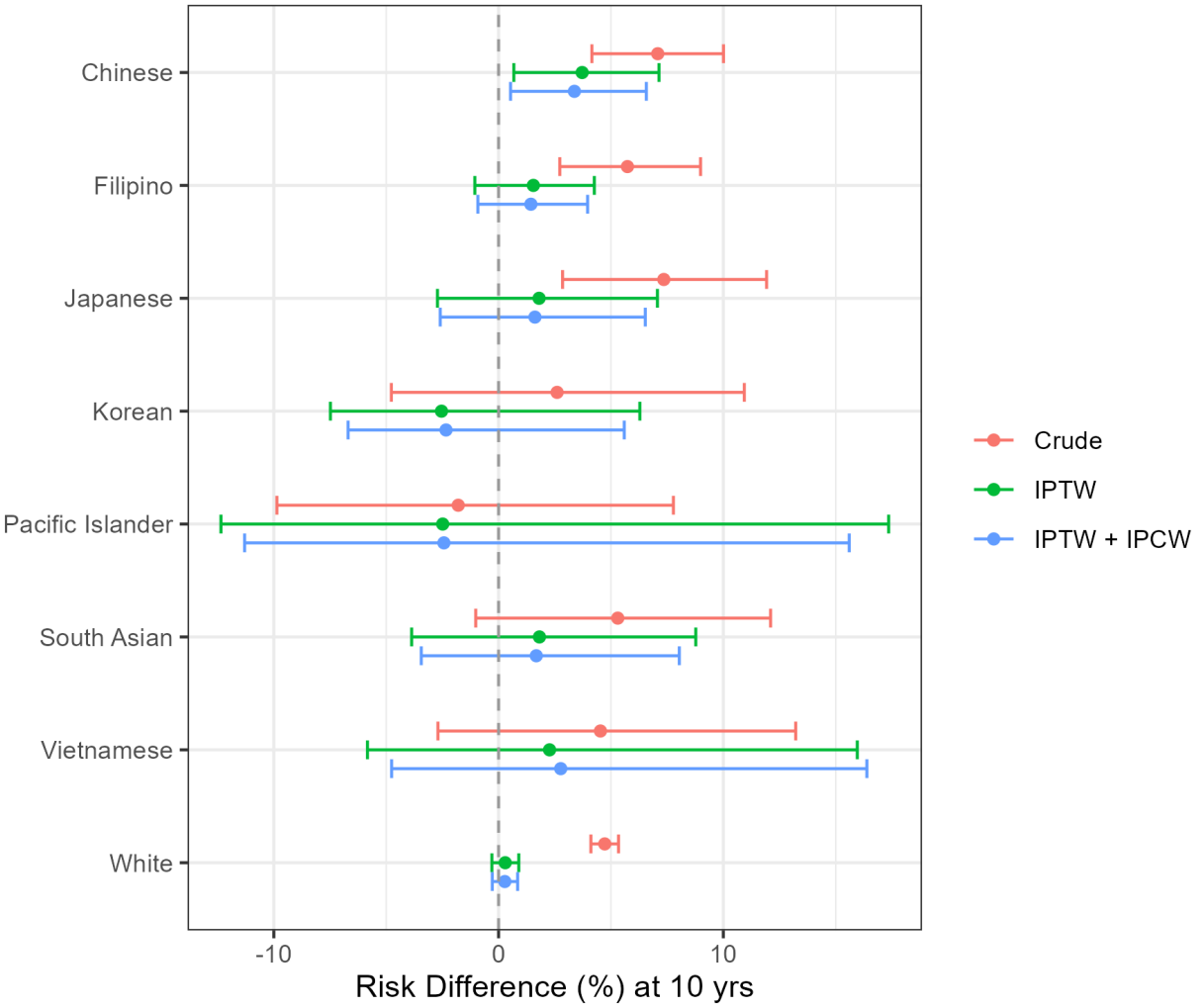
Direct effect of stroke in the risk of dementia



Total effect of stroke in the risk of dementia



Total effect of stroke in the risk of dementia



Take-aways

- The incidence of stroke large across all Asian-American ethnicities and in the White population.
- There is a large effect of stroke in the risk of dementia if we treat death as a censoring event (*as if we could have prevented it*).
- There are several factors that could explain the heterogeneity of the effects across subgroups.

Discussion points

- Because we use use discrete time in the analysis, this results in rounding and we loose events. Suggestions for sensitivity analysis?
- How can we prevent the potential reverse causation of those who have a dementia diagnosis very close to the stroke event?
- Smaller time-frame to look at stroke? What would be a reasonable time-frame with the trade off of loosing outcomes?

Thank you, Gracias!

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QUESTIONS?