

Active and passive smoking among pregnant women: a biomarker study in whites, blacks, Hispanics, and 10 other subgroups in California

Martin Kharrazi, Ph.D.
(marty.kharrazi@cdph.ca.gov)

Environmental Health Investigations Branch
California Department of Public Health

“Smoking *Still* Matters”

August 25, 2015

*Webinar in collaboration with Maternal, Child and Adolescent Health Division & the
California Tobacco Control Program, CDPH*



Health risks from second hand smoke exposure during pregnancy

- adverse effects on fetal growth
 - increased risk of low birth weight
- prematurity
 - increased risk of preterm birth
- newborn complications
 - increased risk of respiratory distress syndrome

National Cancer Institute. Health effects of exposure to environmental tobacco smoke: The report of the California Environmental Protection Agency. Smoking and Tobacco Control Monograph no. 10. Bethesda, MD. U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. 99-4645, 1999.

Ashford KB, Hahn E, Hall L, Rayens MK, Noland M, Ferguson JE. The effects of prenatal secondhand smoke exposure on preterm birth and neonatal outcomes, 2010. J Obstet Gynecol Neonatal Nurs. 2010;39:525-35.

Study aims

To objectively measure active smoking and second hand smoke exposure during pregnancy in:

Ten minority groups:

- Asian Indian
- Cambodian
- Chinese
- Filipino
- Japanese
- Laotian
- Korean
- Native American
- Samoan
- Vietnamese

Three major subgroups:

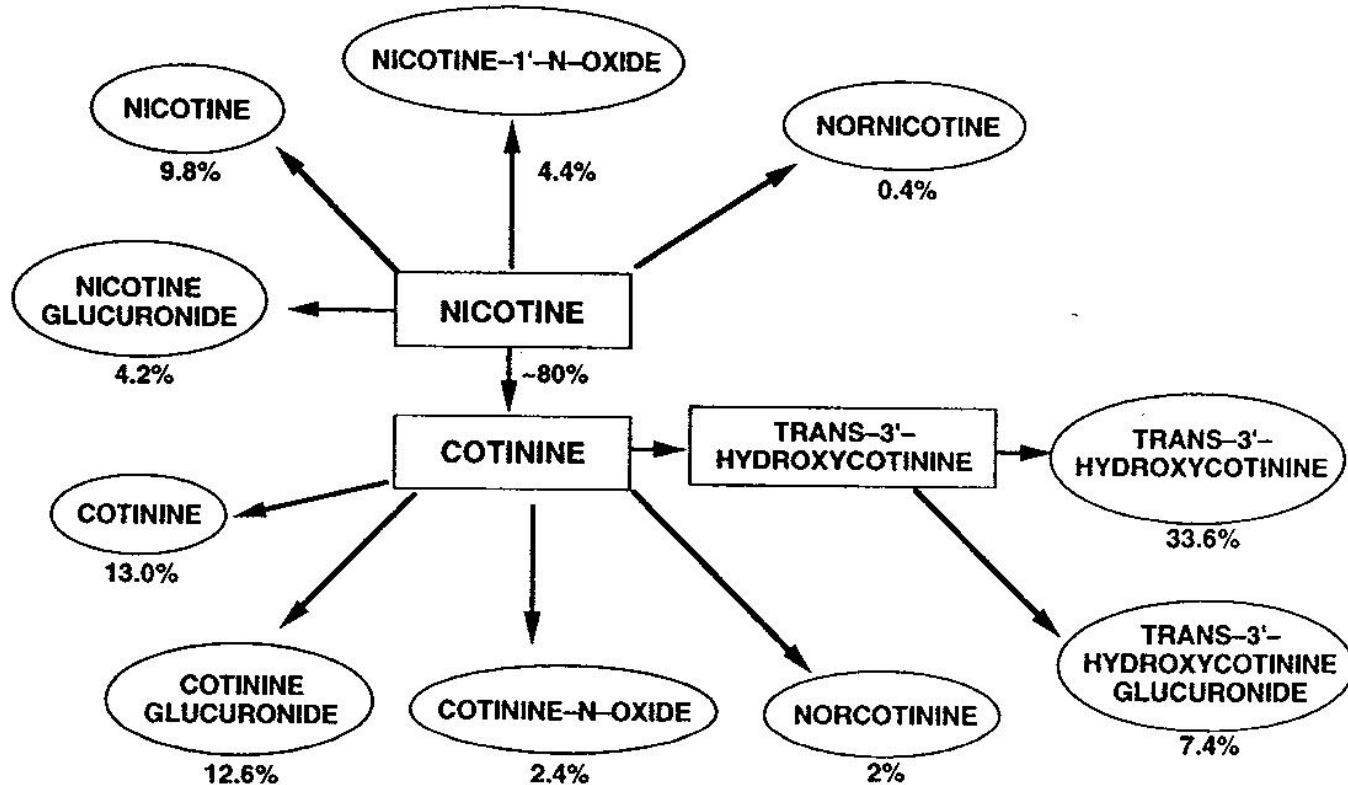
- Hispanics
- Whites
- Blacks

Study design and population

- Cross-sectional design
- Derived from 180,000+ pregnant women in California's Prenatal Screening Program
- November 1999 to December 2002
- Imperial, Orange, San Diego Counties
- Maternal serum specimens collected at 15-19 weeks gestation
- Banked by Project Baby's Breath
- Randomly selected 300 or more pregnancies for each race-ethnicity group
 - Except Native Americans (N=245) and Samoans (N=184) for which all available banked specimens were selected



Nicotine exposure: metabolic pathway



Circled compounds indicate excretion in urine and associated numbers indicate percent of systemic dose of nicotine

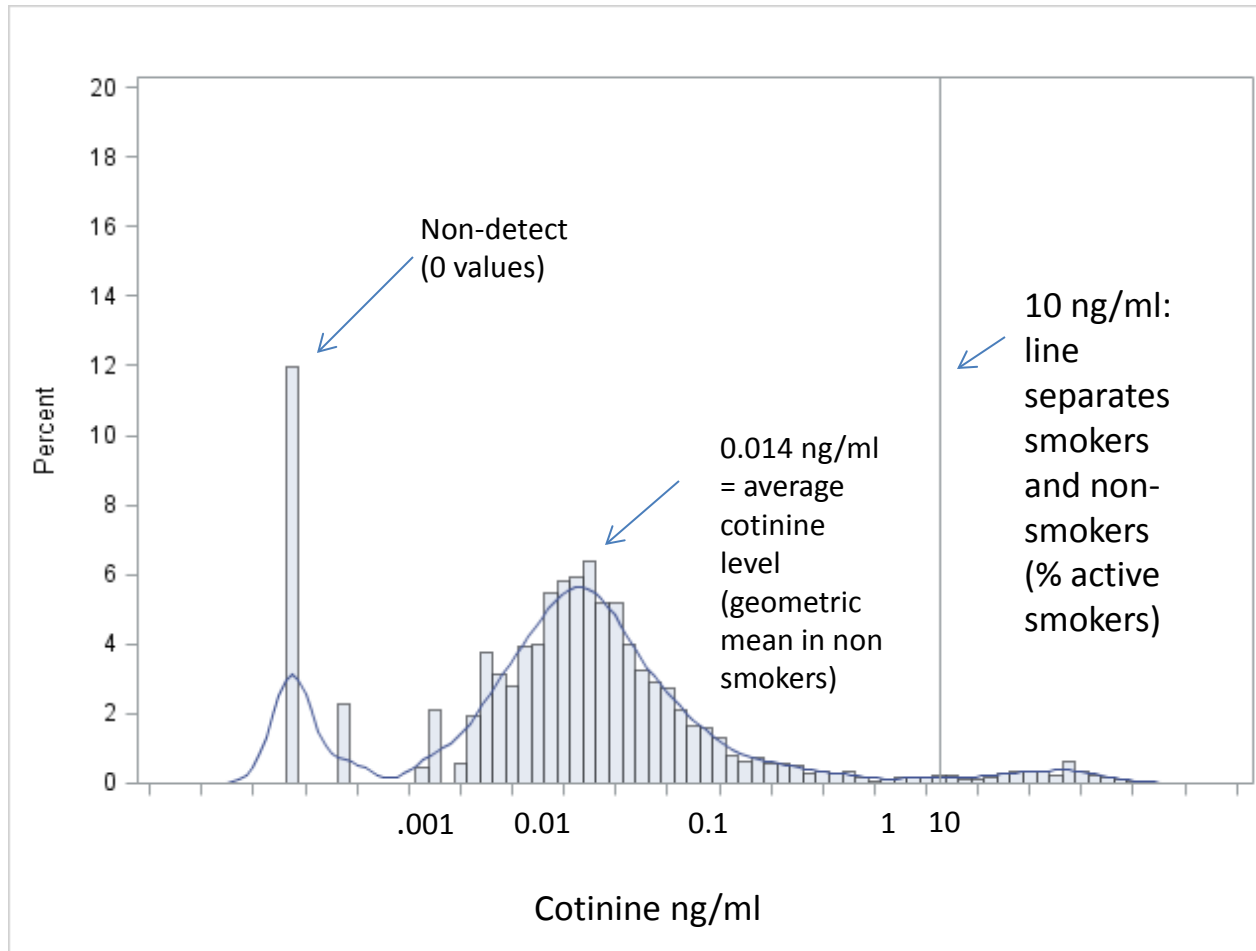
Cotinine lab testing

(measurable biomarker of tobacco exposure)

- Highly sensitive method: isotope dilution high performance liquid chromatographic-atmospheric pressure chemical ionization tandem mass spectrometry
- Sensitive assay
 - Quantitation level: 0.018-0.025 ng/mL
 - Used values to 0.001 ng/mL
- Reflects exposure of last several days



Tobacco exposure in total study population, as measured by cotinine levels in ng/mL*

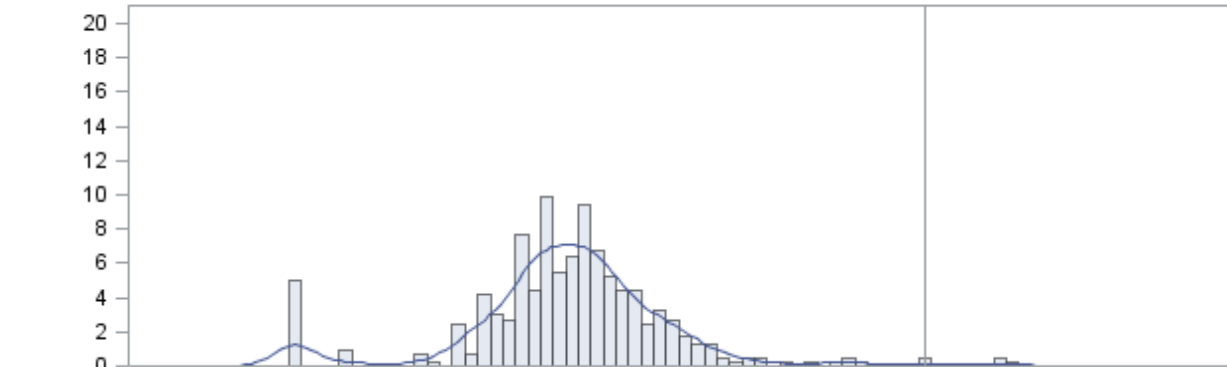


* Data are log transformed

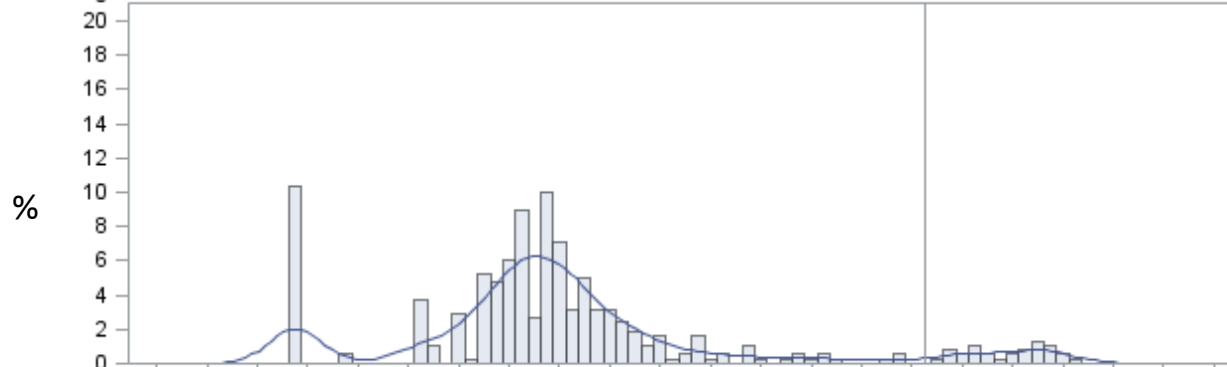
PRELIMINARY DATA

Cotinine distribution in three subgroups

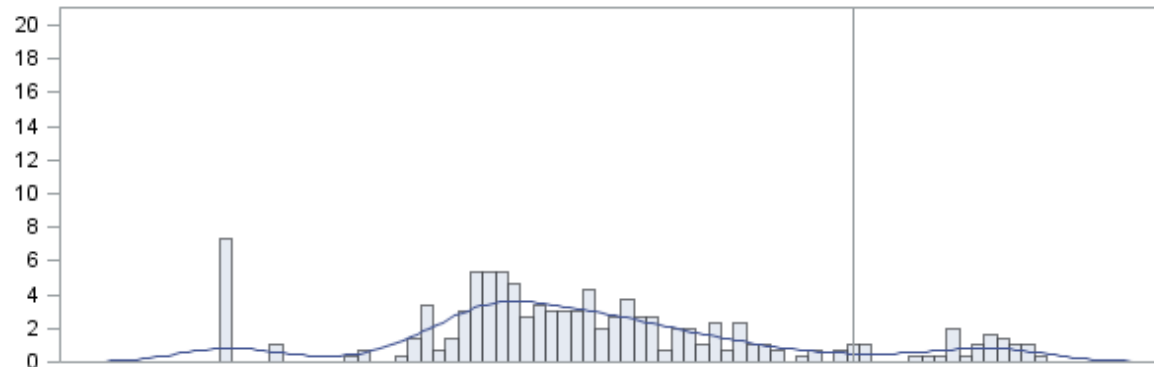
Hispanics



Whites



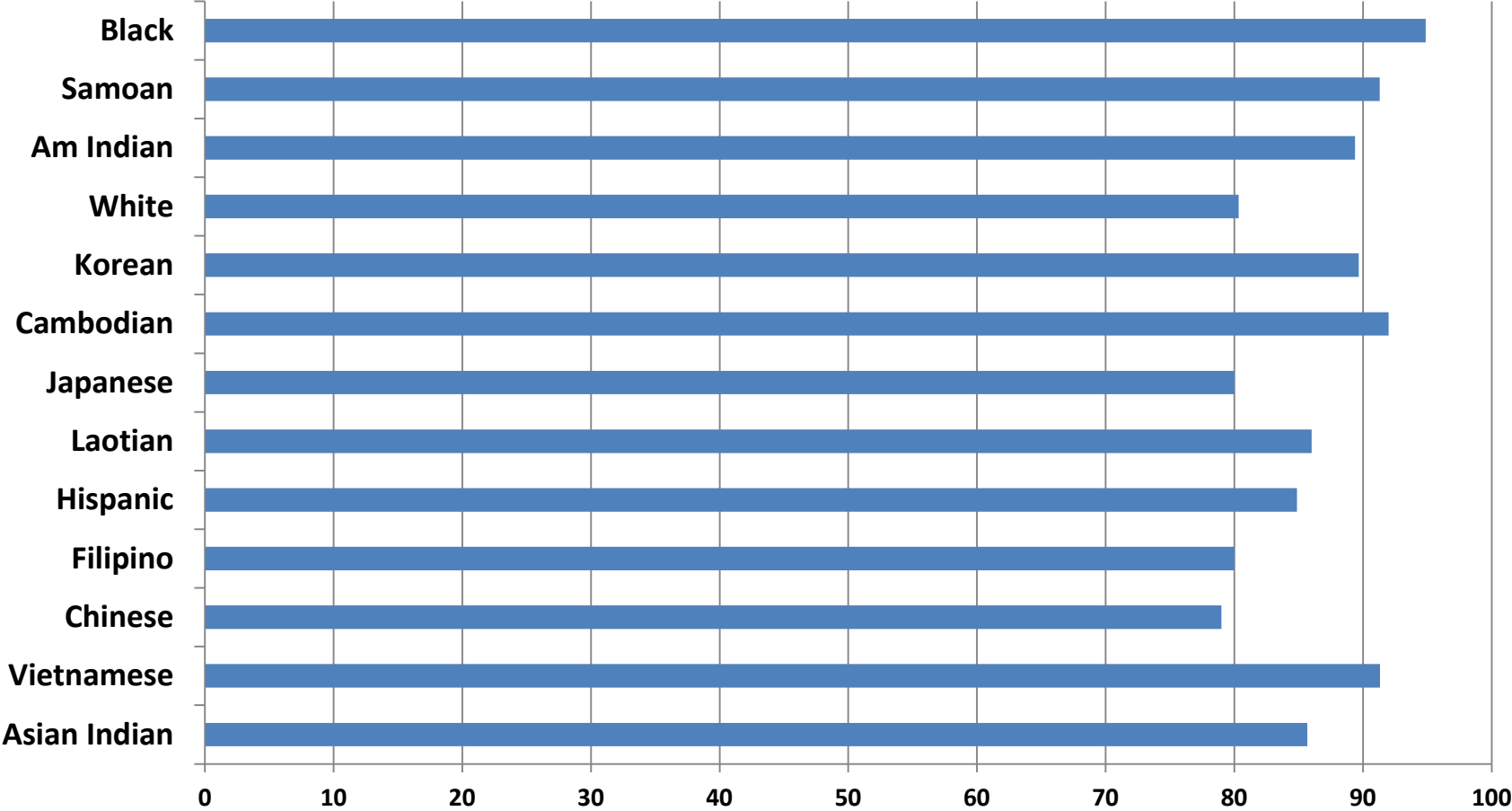
Blacks



Log Cotinine

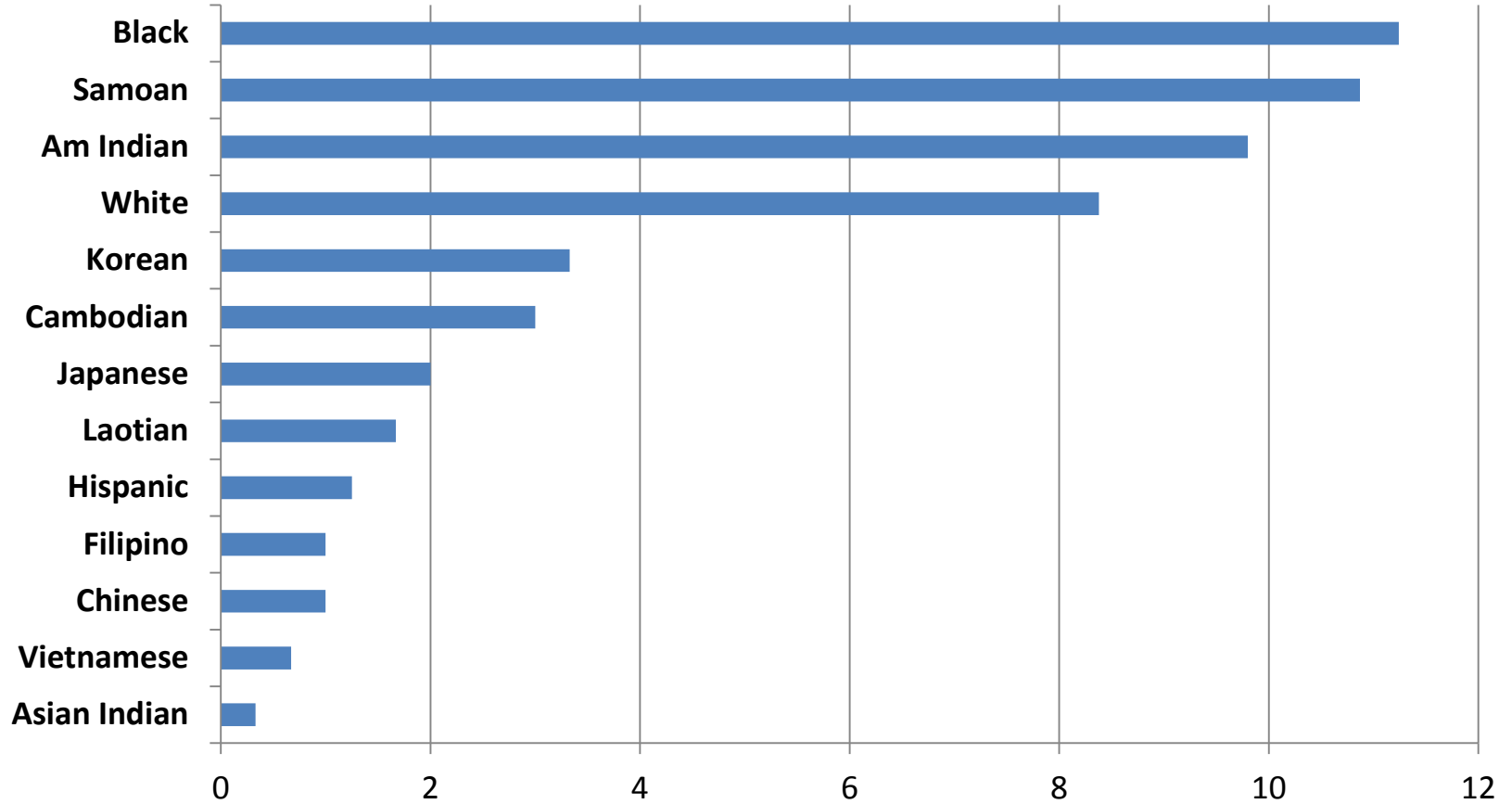
PRELIMINARY DATA

Percent of pregnant women with any detectable cotinine exposure, by race



PRELIMINARY DATA

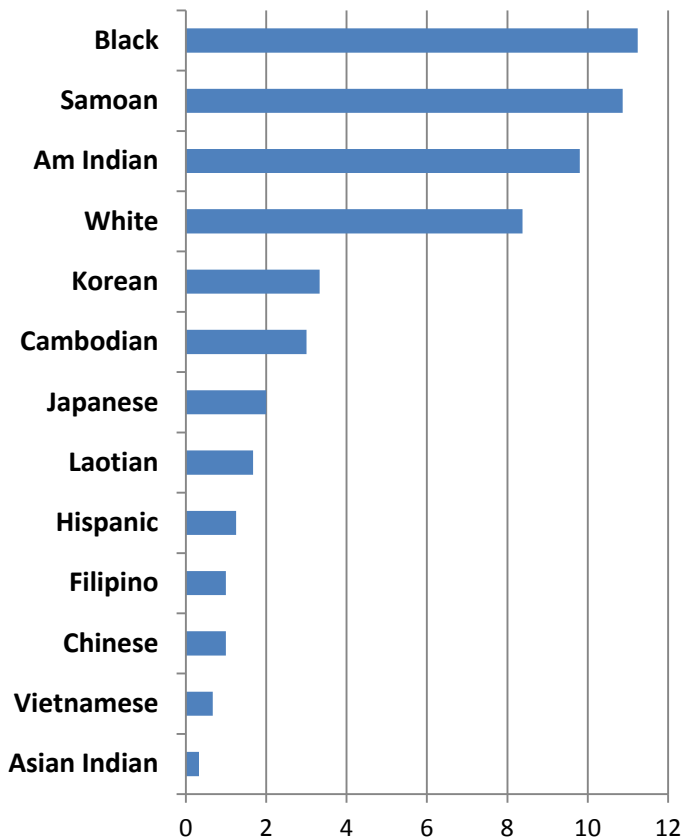
Percent active smokers by race



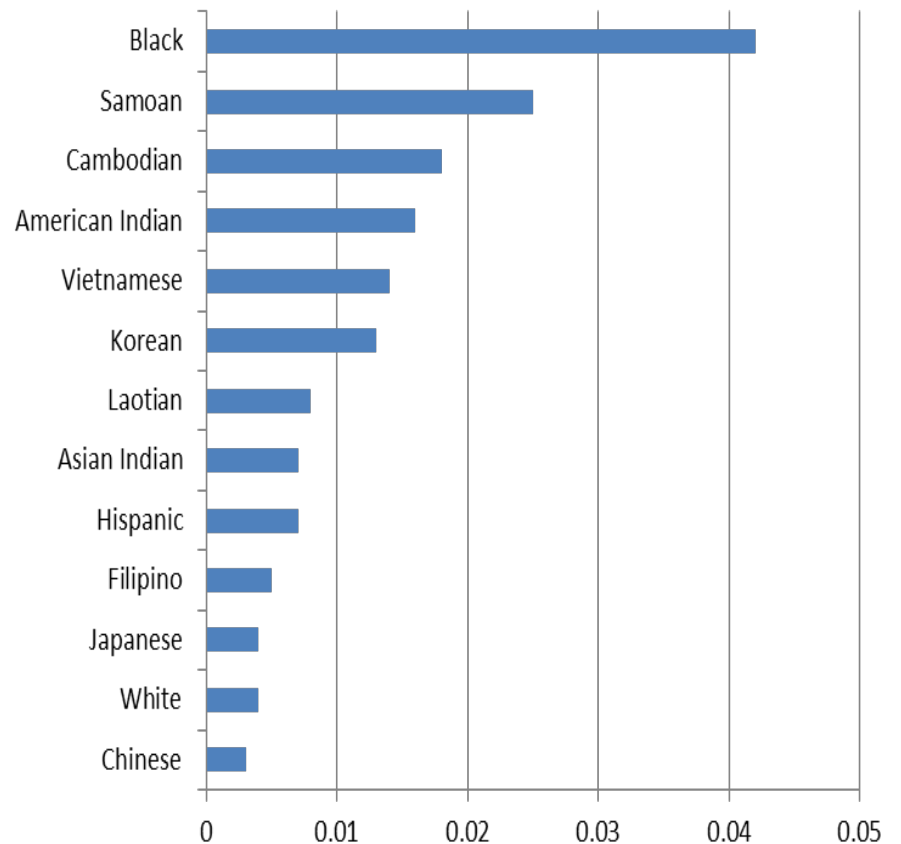
PRELIMINARY DATA

Percent active smokers and cotinine levels in non-smokers

Percent active smokers



Cotinine levels* among non-smokers

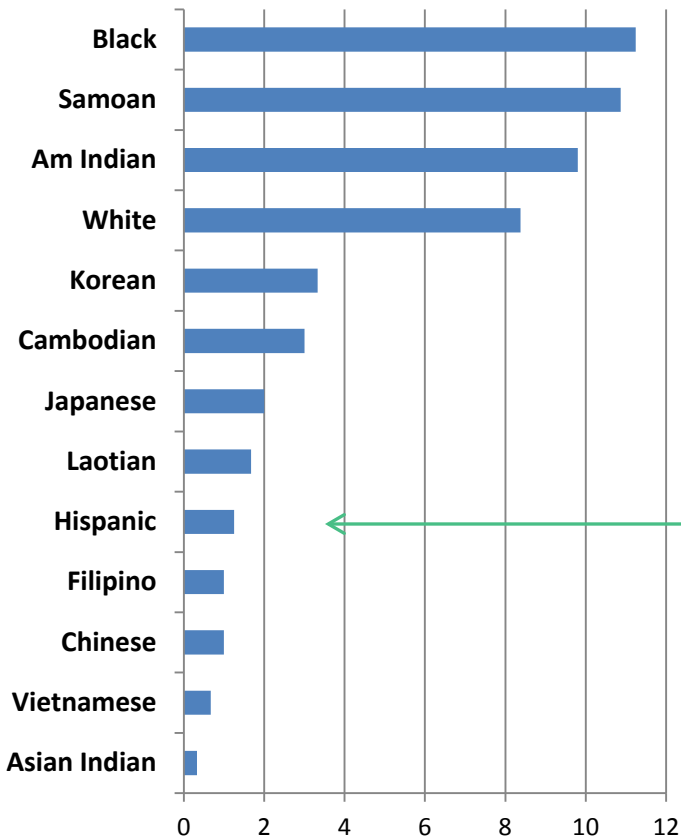


PRELIMINARY DATA

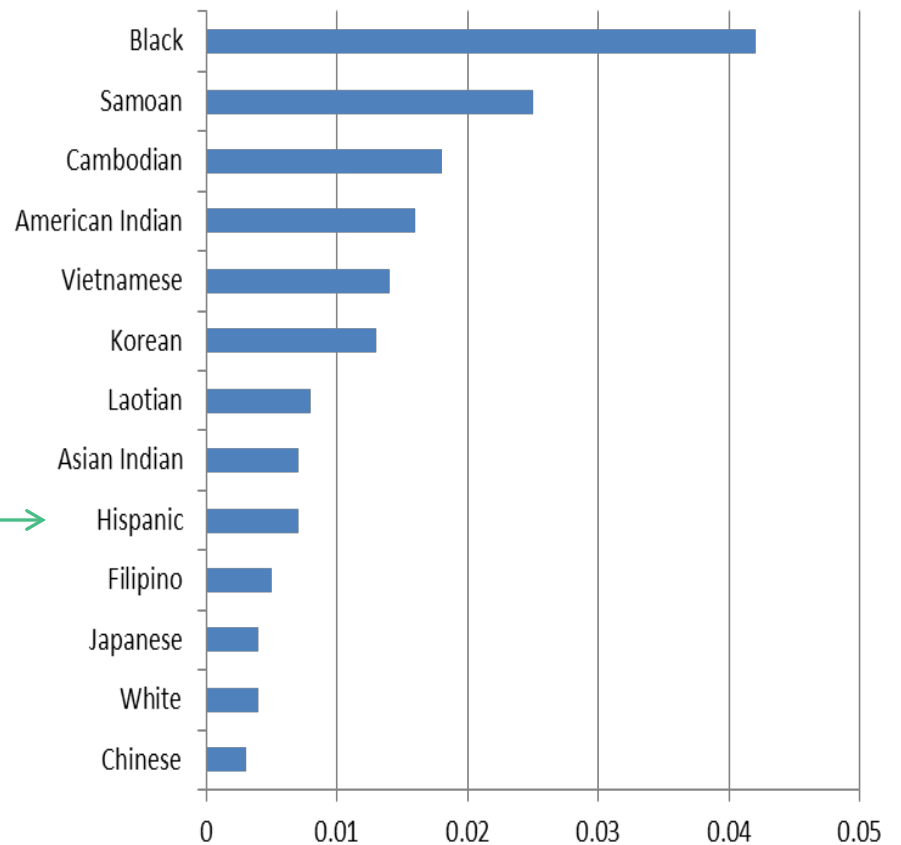
*Cotinine ng/ml, geometric mean of group

Percent active smokers and cotinine levels in non-smokers

Percent active smokers



Cotinine levels* among non-smokers

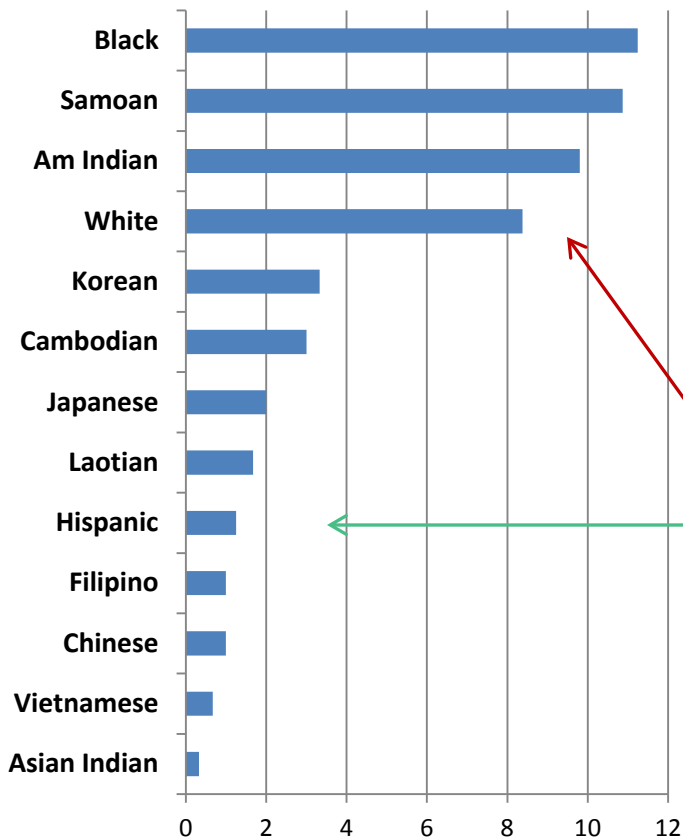


PRELIMINARY DATA

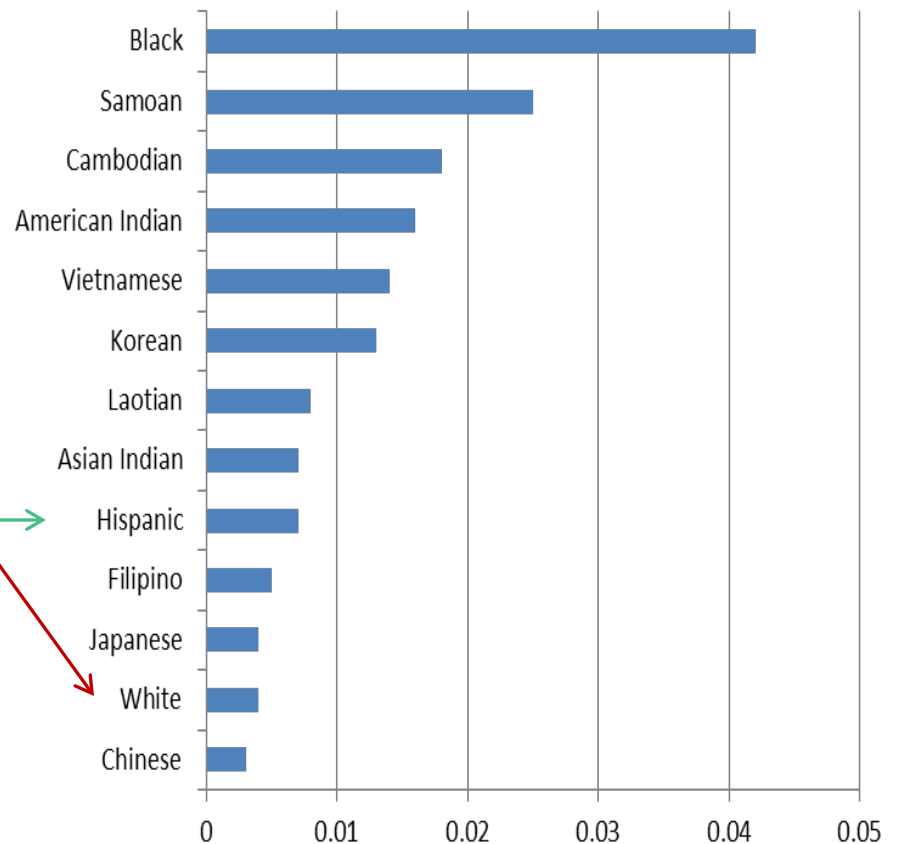
*Cotinine ng/ml, geometric mean of group

Percent active smokers and cotinine levels in non-smokers

Percent active smokers



Cotinine levels* among non-smokers

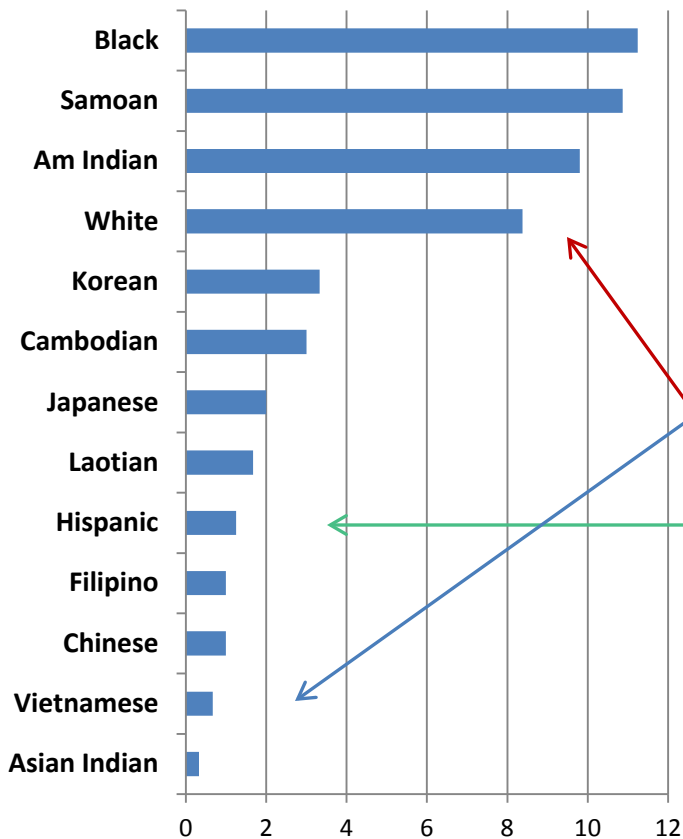


PRELIMINARY DATA

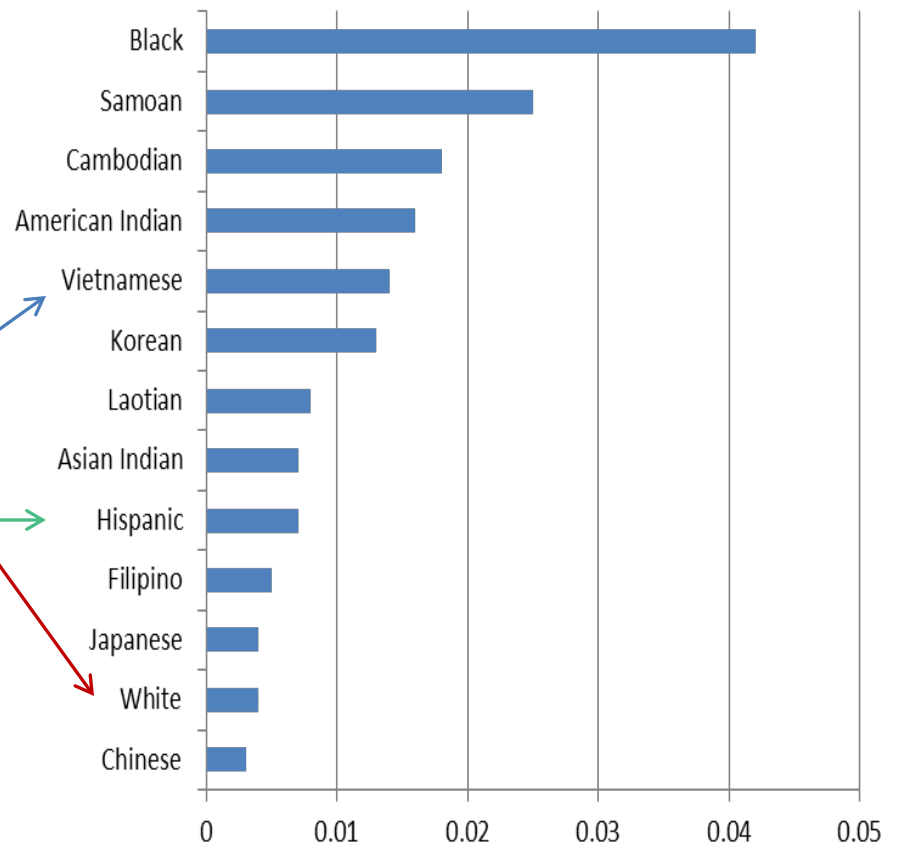
*Cotinine ng/ml, geometric mean of group

Percent active smokers and cotinine levels in non-smokers

Percent active smokers



Cotinine levels* among non-smokers

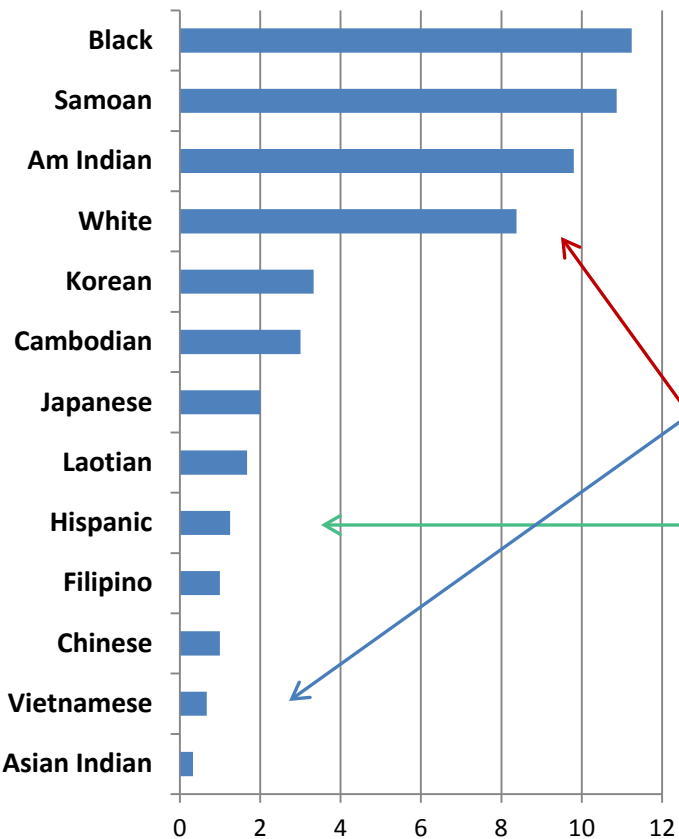


PRELIMINARY DATA

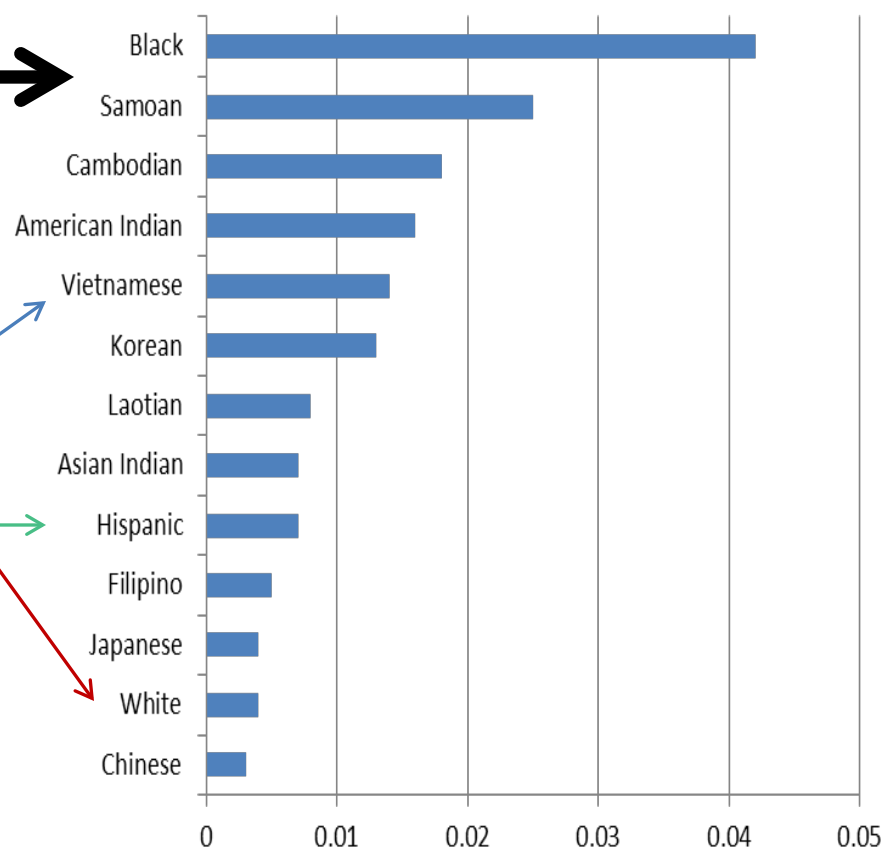
*Cotinine ng/ml, geometric mean of group

Percent active smokers and cotinine levels in non-smokers

Percent active smokers



Cotinine levels* among non-smokers



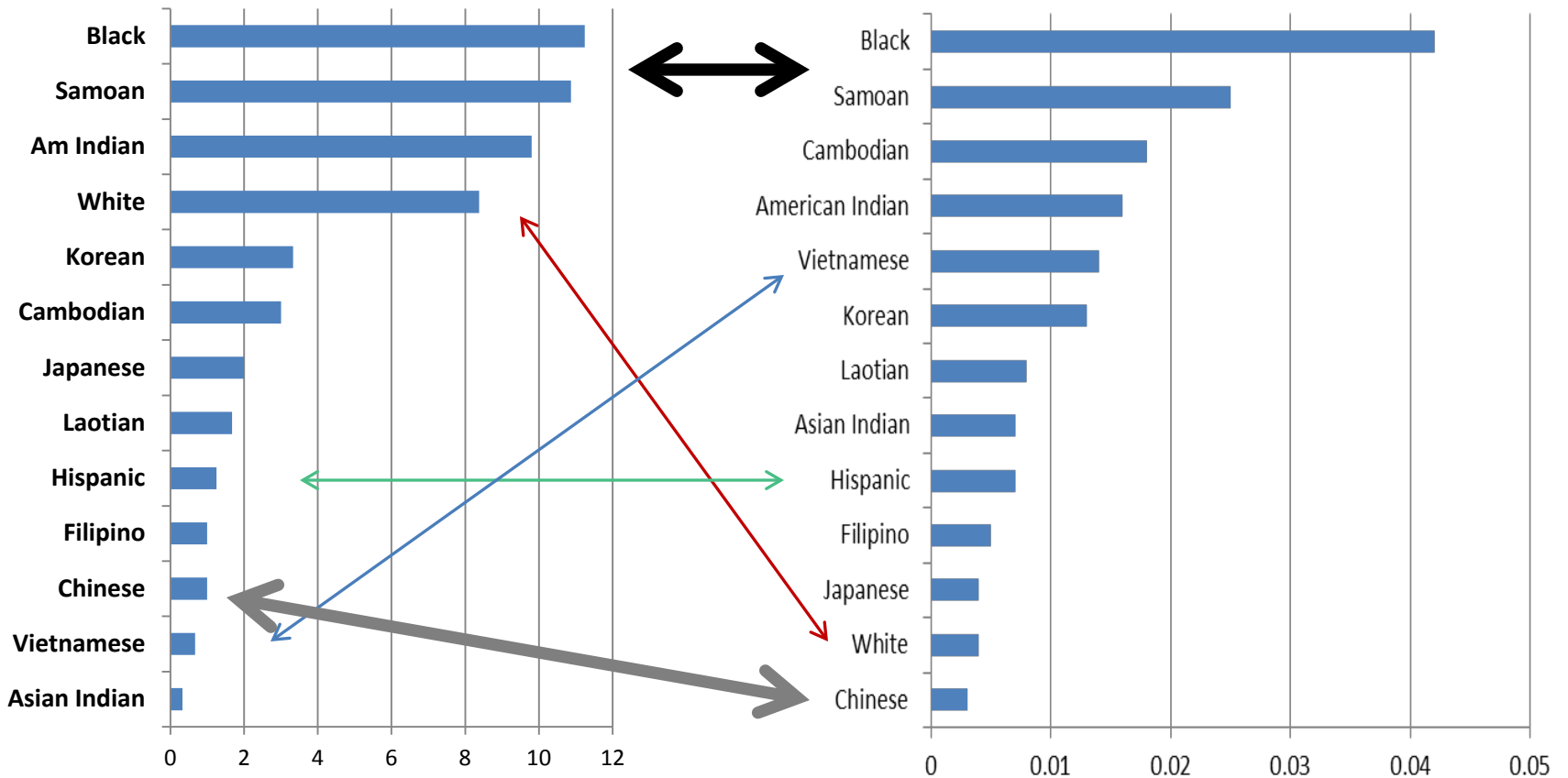
PRELIMINARY DATA

*Cotinine ng/ml, geometric mean of group

Percent active smokers and cotinine levels in non-smokers

Percent active smokers

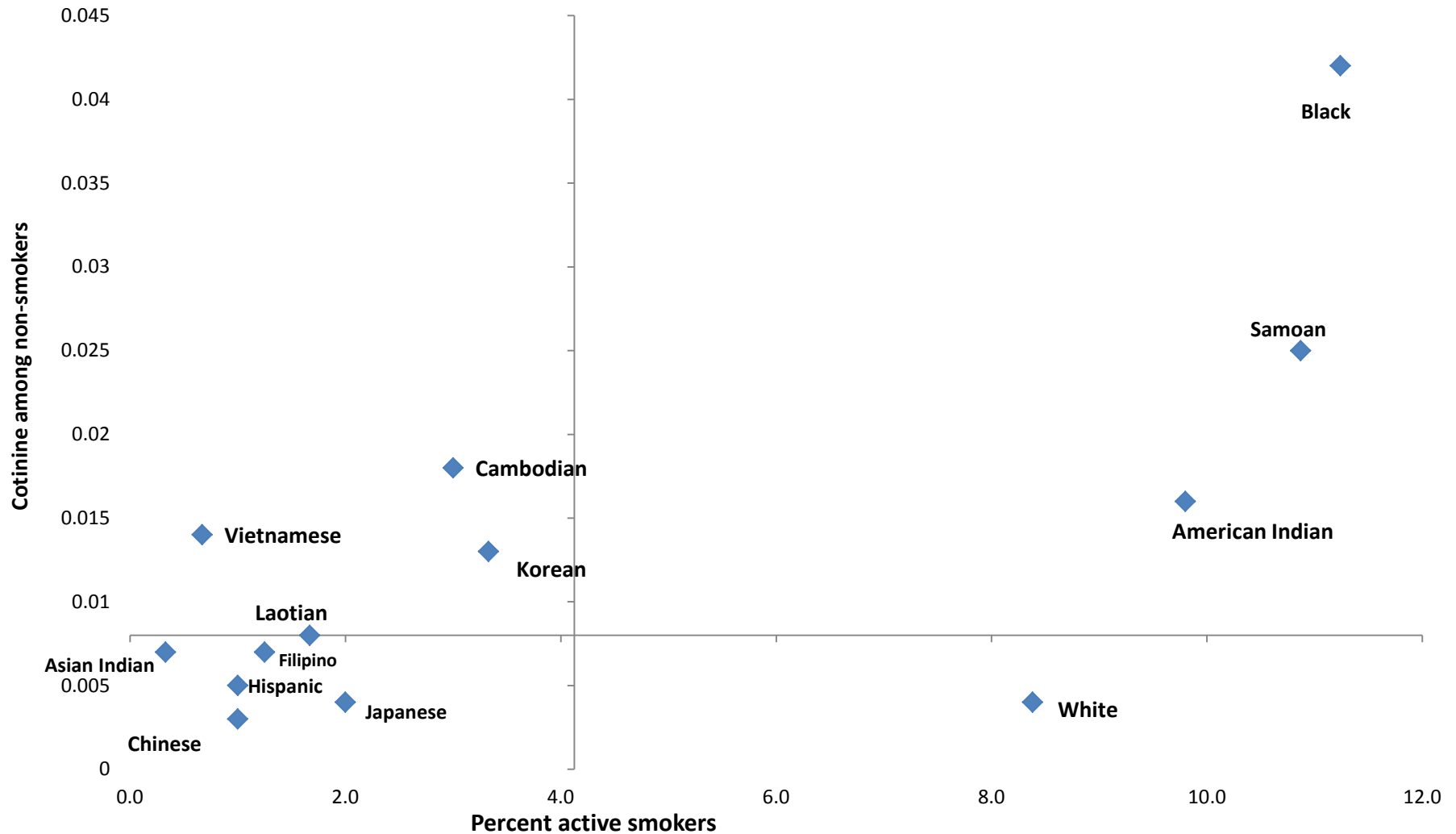
Cotinine levels* among non-smokers



PRELIMINARY DATA

*Cotinine ng/ml, geometric mean of group

Percent active smokers by cotinine levels* in nonsmokers



* Cotinine is log-transformed.

PRELIMINARY DATA

Results summary

Tobacco exposure:

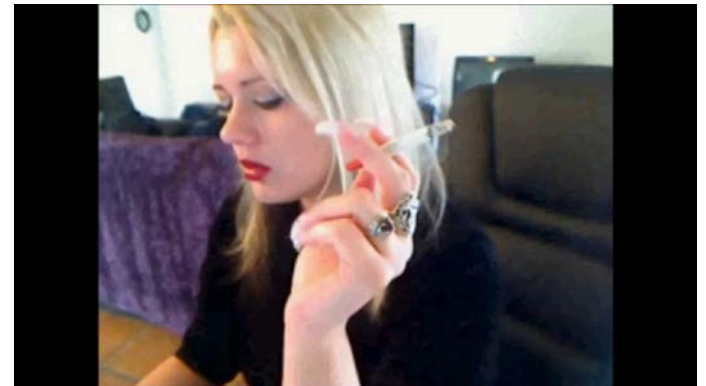
- 79%-95% of women had some type of tobacco exposure during pregnancy
- Active smoking:
0.3%-11% of pregnant women smoked during pregnancy



PRELIMINARY DATA

Results summary – Active smoking

- Highest levels (8-12%):
 - Native Americans, Samoans
 - similar to blacks and whites
- Lowest levels: (< 2%):
 - Asian Indians, Vietnamese, Chinese, Filipinos, Laotians
 - similar to Hispanics
- Whites had high levels of active smoking but low levels of passive smoking



Results summary – Passive smoking

- Highest average exposures:
 - Samoans, Native Americans
 - Similar to Blacks
- Lowest average exposures:
 - Chinese, Japanese, Filipinos, Asian Indians, Laotians
 - Similar to whites and Hispanics
- Some groups had low active smoking but relatively high passive smoking
 - Vietnamese, Cambodians, Koreans



Conclusions & Policy Implications

- Tobacco exposure in pregnancy varies substantially across race/ethnicity groups
- Rates of active smoking may not reflect the patterns of second hand smoke exposure
- Education and other efforts are still needed to bring down active smoking rates in some subgroups
- There are subgroups with low levels of smoking that are still getting exposed to second hand smoke needing attention

Authors and Funder

Martin Kharrazi,¹ Juan Yang,¹ Michelle Pearl,²
Sumi Hoshiko,¹ Kenneth M Aldous,³ John T Bernert,⁴
Gerald N DeLorenze⁵

¹Environmental Health Investigations Branch, CDPH, Richmond, CA

²Sequoia Foundation, La Jolla, CA

³New York State Department of Health, Albany, NY

⁴Centers for Disease Control and Prevention, Atlanta, GA

⁵Kaiser Permanente, Oakland, CA

This study was funded by the California Tobacco-Related Disease Research Program (#13RT-0168) to Sequoia Foundation

