Breast Cancer Disparities: Factors that Contribute to Causation

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Breast cancer disparities: current evidence

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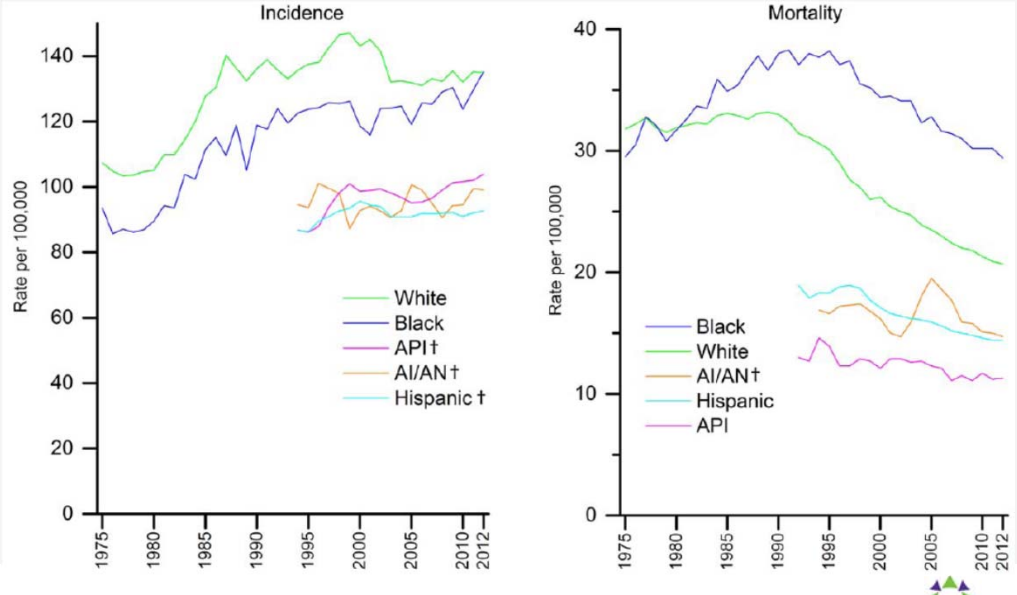
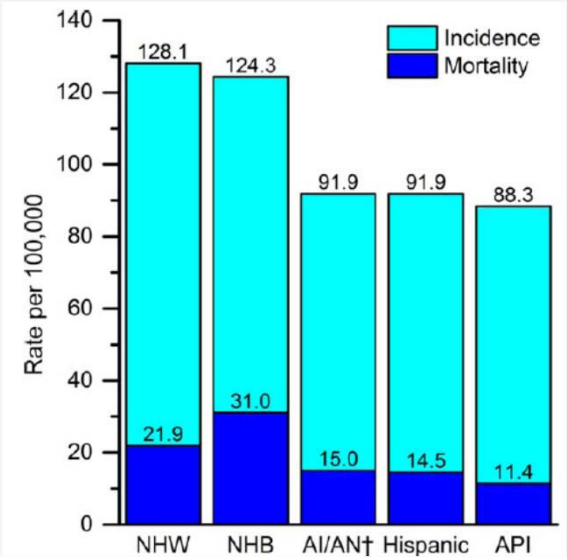
Breast cancer incidence and mortality trends by race/ethnicity, US, 1975-2012

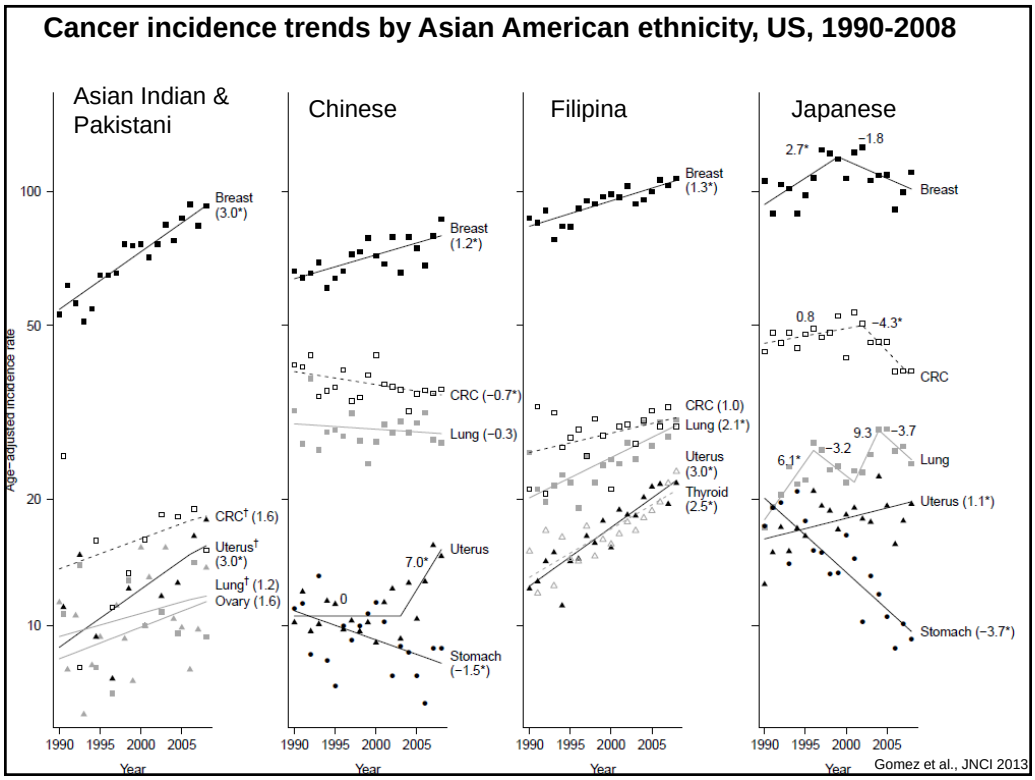


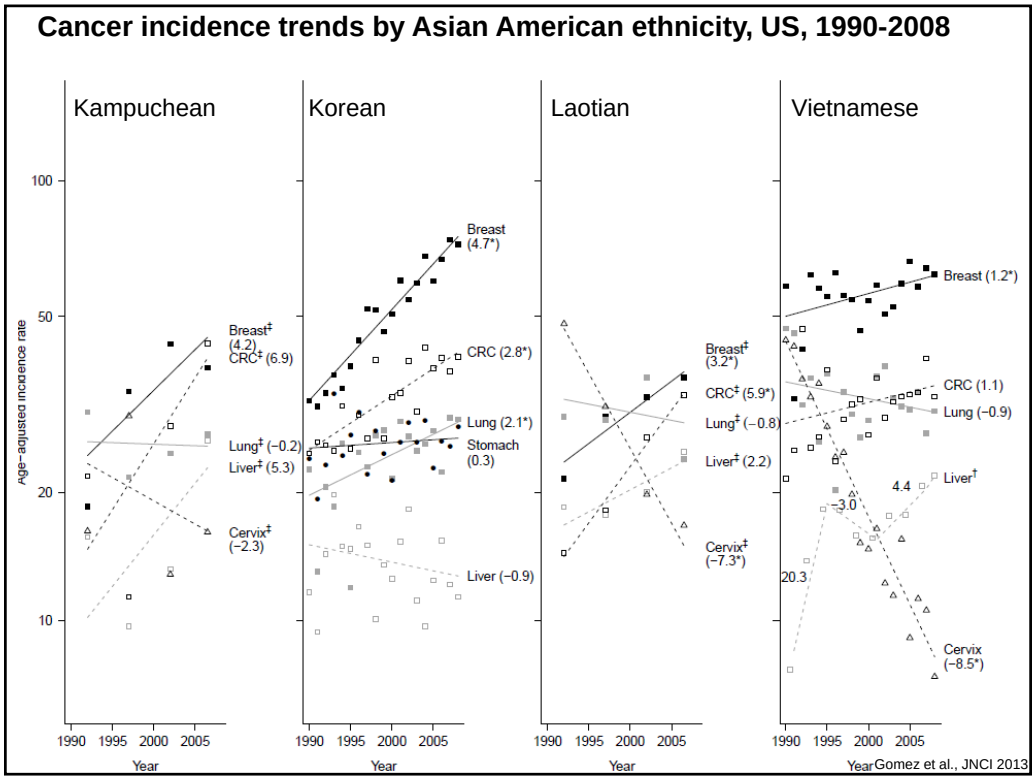
From DeSantis et al. Ca J Clin 2016

Breast cancer incidence and mortality rates by race/ethnicity, US, 2008-2012

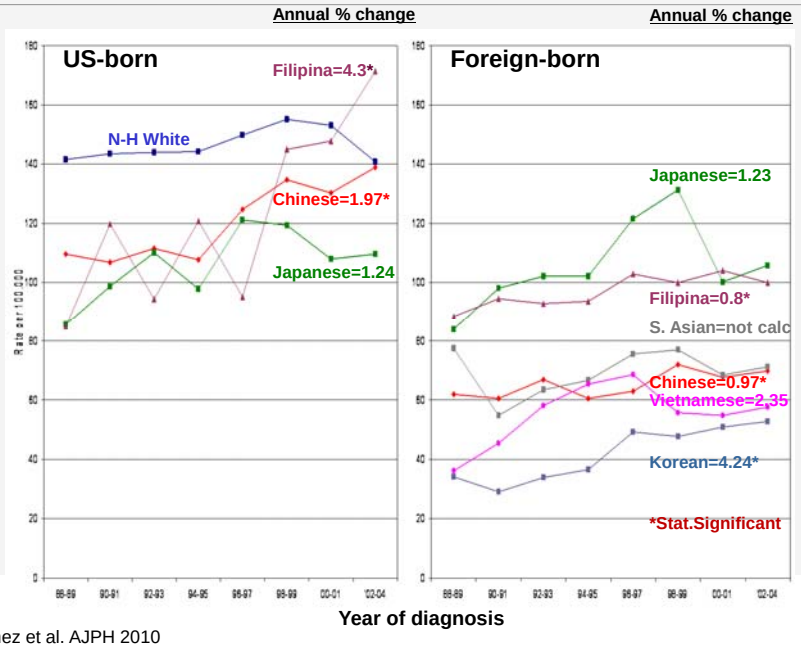


From DeSantis et al. Ca J Clin 2016


Cancer incidence trends by Asian American ethnicity, US, 1990-2008
Asian Indian & Pakistani
Chinese
Filipina
Japanese
Age-adjusted incidence rate
100
50
20
10
Breast (3.0*)
CRC† (1.6)
Uterus† (3.0*)
Lung† (1.2)
Ovary (1.6)
Breast (1.2*)
CRC (−0.7*)
Lung (−0.3)
Uterus
7.0*
0
Stomach (−1.5*)
Breast (1.3*)
CRC (1.0)
Lung (2.1*)
Uterus (3.0*)
Thyroid (2.5*)
2.7*
−1.8
Breast
0.8
−4.3*
CRC
9.3
−3.7
−3.2
6.1*
Lung
Uterus (1.1*)
Stomach (−3.7*)
1990 1995 2000 2005
Year
Gomez et al., JNCI 2013

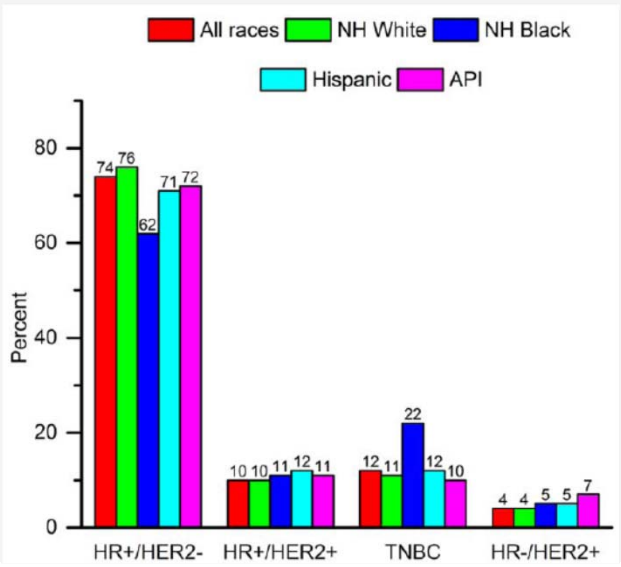

Cancer incidence trends by Asian American ethnicity, US, 1990-2008
Kampuchean
Korean
Laotian
Vietnamese
Age-adjusted incidence rate
100
50
20
10
Breast‡ (4.2)
CRC‡ (6.9)
Lung‡ (−0.2)
Liver‡ (5.3)
Cervix‡ (−2.3)
Breast (4.7*)
CRC (2.8*)
Lung (2.1*)
Stomach (0.3)
Liver (−0.9)
Breast‡ (3.2*)
CRC‡ (5.9*)
Lung‡ (−0.8)
Liver‡ (2.2)
Cervix‡ (−7.3*)
Breast (1.2*)
CRC (1.1)
Lung (−0.9)
4.4
Liver†
−3.0
20.3
Cervix (−8.5*)
1990 1995 2000 2005
Year
Gomez et al., JNCI 2013

Breast cancer incidence trends by immigrant status, California, 1990-2004



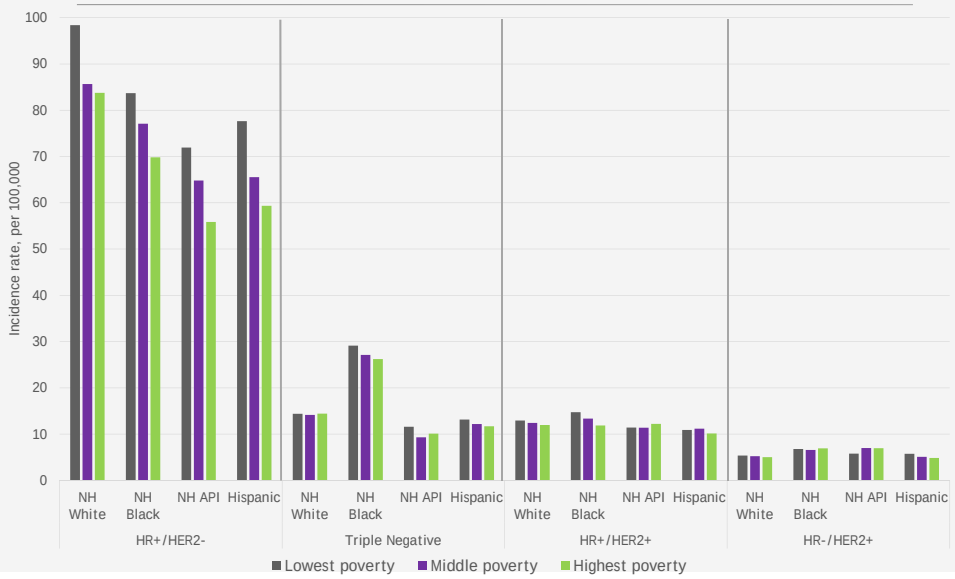
From Gomez et al. AJPH 2010

Distribution of breast cancer subtypes by race/ethnicity, US, 2008-2012



From DeSantis et al. Ca J Clin 2016

Subtype incidence rates by race/ethnicity & SES



From Kohler et al. JNCI 2015

Breast cancer disparities persist: Identifying the drivers

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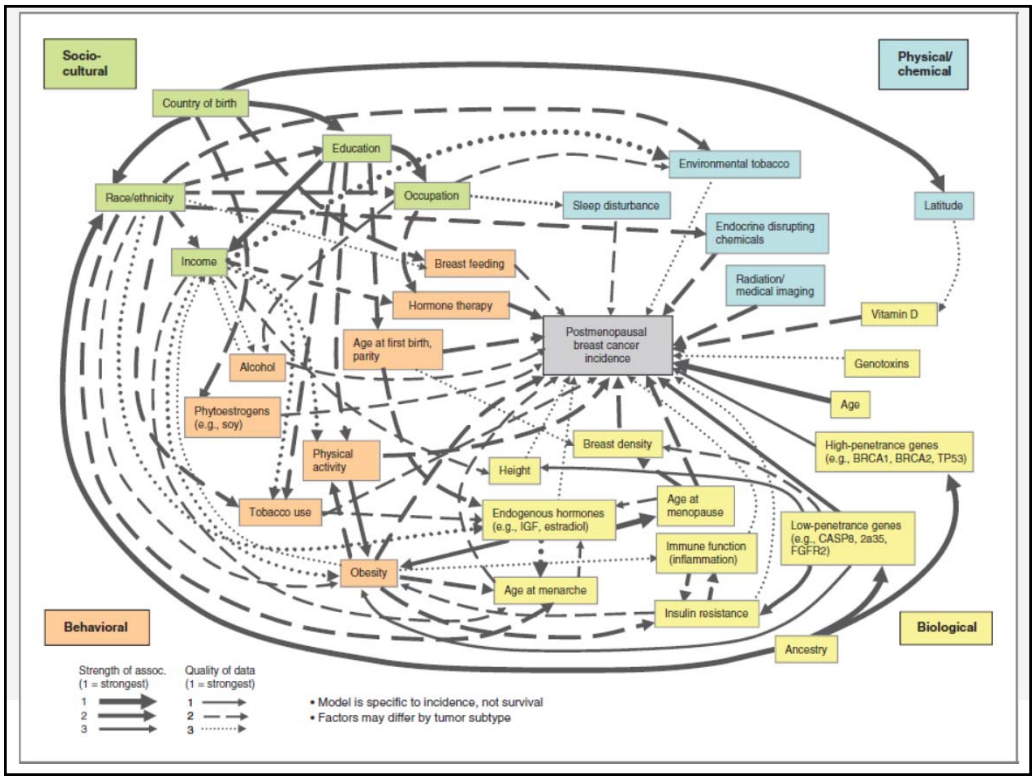
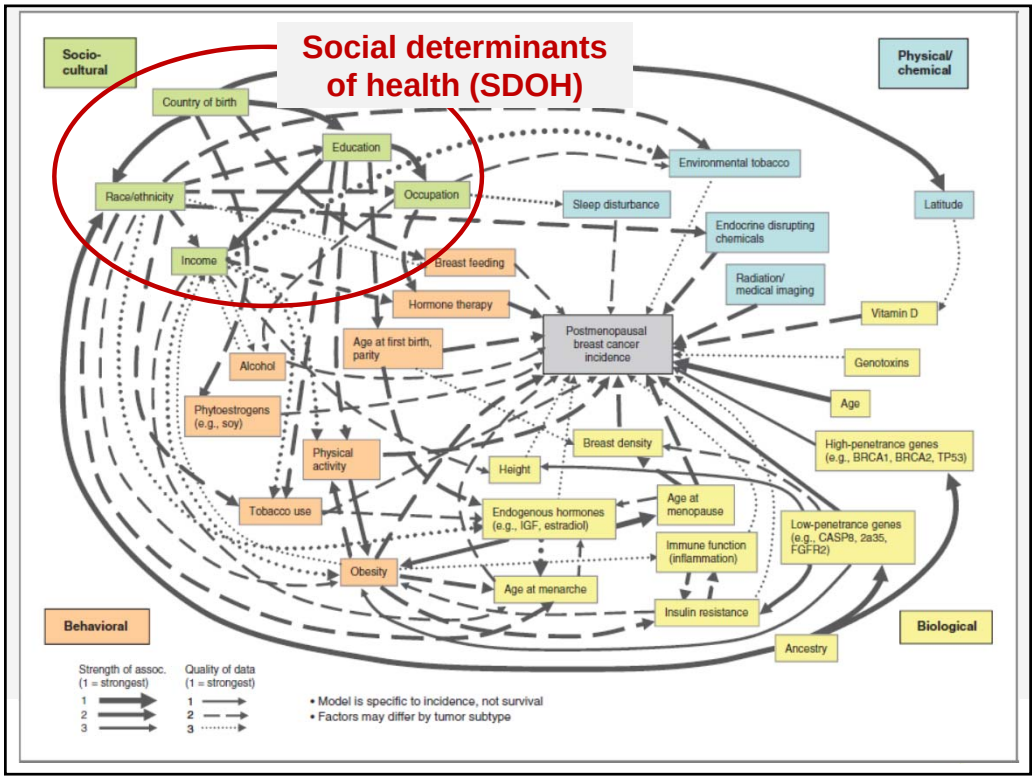

Socio-cultural
Physical/ chemical
Country of birth
Education
Environmental tobacco
Race/ethnicity
Occupation
Sleep disturbance
Latitude
Endocrine disrupting chemicals
Income
Breast feeding
Radiation/ medical imaging
Hormone therapy
Vitamin D
Postmenopausal breast cancer incidence
Age at first birth, parity
Alcohol
Genotoxins
Phytoestrogens (e.g., soy)
Age
Breast density
High-penetrance genes (e.g., BRCA1, BRCA2, TP53)
Physical activity
Height
Age at menopause
Tobacco use
Endogenous hormones (e.g., IGF, estradiol)
Low-penetrance genes (e.g., CASP8, 2a35, FGFR2)
Immune function (inflammation)
Obesity
Age at menarche
Insulin resistance
Behavioral
Biological
Ancestry
Strength of assoc. (1 = strongest)
Quality of data (1 = strongest)
• Model is specific to incidence, not survival
• Factors may differ by tumor subtype


Social determinants of health (SDOH)
Socio-cultural
Physical/ chemical
Country of birth
Education
Environmental tobacco
Race/ethnicity
Occupation
Sleep disturbance
Latitude
Endocrine disrupting chemicals
Income
Breast feeding
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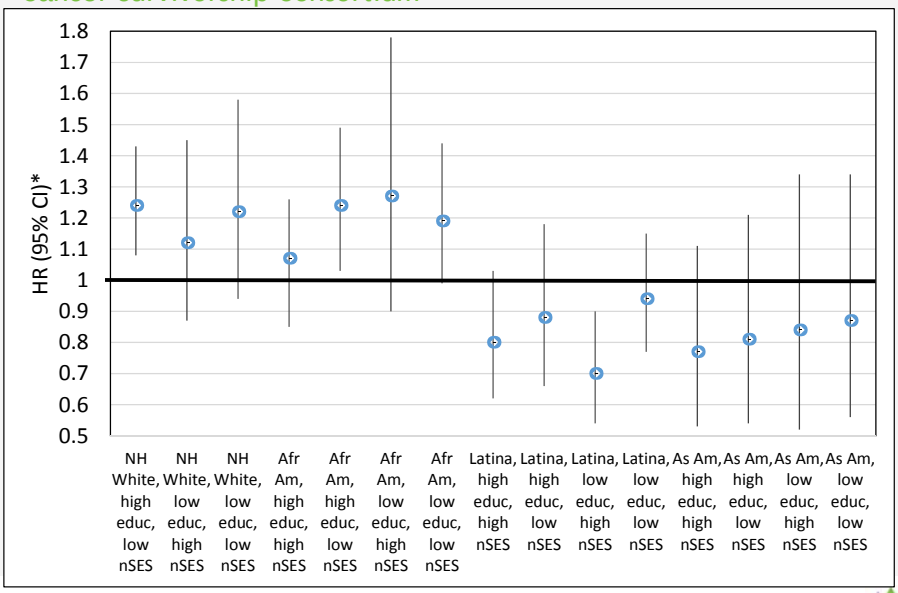
Unequal burden of breast cancer – role of social determinants of health?

- SDOH and their impacts on breast cancer burden may encompass or be shaped other social statuses:
  - discrimination, sexuality, contextual factors (neighborhood, family, social networks), language, immigration status, etc.
- Important also to consider **"intersectional"** effects of SDOH factors – interactive impacts of multiple social statuses

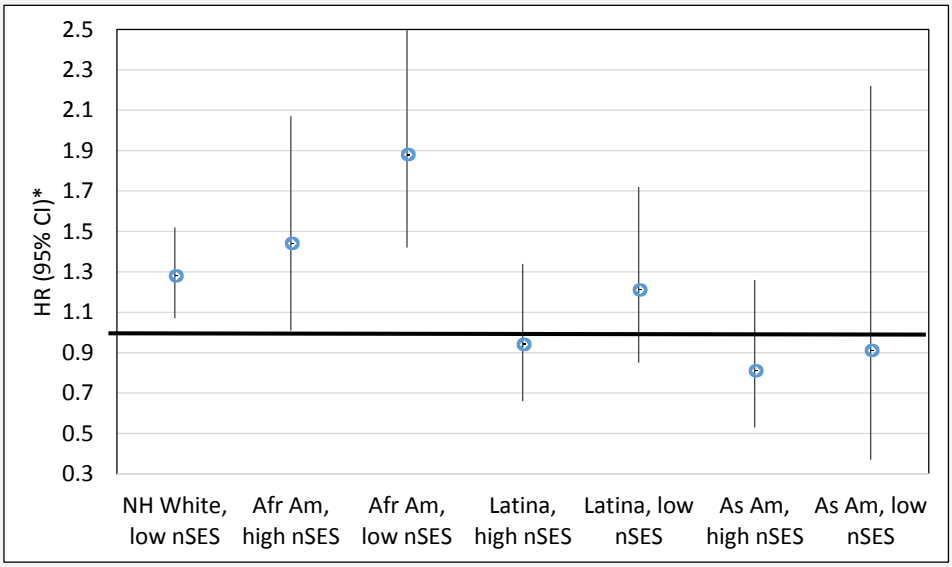
Intersectional effects of race/ethnicity, education, and neighborhood SES on overall mortality among breast cancer patients, California Breast Cancer Survivorship Consortium



From Shariff-Marco et al. J Comm Health 2015;
Funded by CBCRP 16ZB-8002

*relative to NH White, high educ, high nSES;
adjusted for study, age, year, region, stage, tumor characteristics, treatment, comorbidities, hospital factors

Intersectional effects of race/ethnicity and neighborhood SES on overall mortality among breast cancer patients in an insured population



From Keegan et al, AJPH 2015

*relative to NH White, high nSES; adjusted for study, age, year, region, stage, tumor characteristics, subtype, treatment, comorbidities

Immigrant experience and breast cancer risk among AA & NHPIs*

Motivation

- Earlier generation of studies (Ziegler et al., Wu et al., 1980's) showed variability in risk across generations, length of residence not due to established reproductive risk factors.
- However, prior studies not able to consider new knowledge
  - Risk factors – hormone therapy, physical activity, alcohol
  - Breast cancer subtypes
  - Early-life exposures, lifecourse approach
- Studies among migrants have been centerpiece evidence for novel insights regarding risk factors, especially non-genetic factors
- No studies of breast cancer risk among AAs & NHPIs since these early studies

*AA & NHPI = Asian American & Native Hawaiian, Pacific Islander

Immigrant experience and breast cancer risk among AAs & NHPIs

The Asian CHI (Community Health Initiative) study

Funded by: CBCRP 17UB-8602

Asian CHI study investigators

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Asian Americans for Community Involvement (AACI)
Pancho Chang
Kai Ying Fung

Asian Pacific Islander American Health Forum (APIAHF)
Winston Tseng
Roxanna Bautista
Trish Quema

Asian CHI study objectives

1. Document the extent to which novel and established risk factors among AAs & NHPIs vary across the life-course and across multilevel contexts
2. Explore novel hypotheses relating to the impact of immigrant exposures across the life-course on breast cancer risk
3. Compile pilot data on effective strategies for recruiting AAs & NHPIs for future population-based studies

Asian CHI study specific aims

1. Determine, among controls,
   a. the associations between perceived stress and the immigration experience and discrimination, and how these associations are modified by generational status, timing of immigration, and coping styles;
   b. how other relevant breast cancer exposures, including age-specific markers of infectious disease exposures, physical activity and body size, and dietary intake and behaviors, vary with generational status and timing of immigration.
2. Among controls, determine the extent to which the factors in Aims 1 vary according to family, social network, and neighborhood characteristics and relationships.
2. Among cases and controls, identify the associations between the factors in Aim 1 and breast cancer risk among AAs & NHPIs.

Asian CHI study survey constructs

- Sociodemographic, employment* & occupation*
- Immigration, language, reasons for immigration, social standing pre/post immigration*
- Health insurance, medical home
- Dietary acculturation*
- Body size*, physical activity*
- Social networks
- Discrimination – major & everyday
- General stress, active coping, immigrant stress
- Early life infectious exposures*
- Reproductive history, exogenous hormone use
- Screening, family & self history of breast diseases
- Sleep patterns
- Alcohol, smoking
- Perceived neighborhood – safety, aesthetics, collective efficacy

* asked for different periods in life, and pre-/post-immigration

Asian CHI study design

Breast cancer cases

- Recruited for the Equality in Breast Cancer Care ("EBCC") survivorship study (DOD BCRP), N~200
- All Asian American, Native Hawaiian, Pacific Islander groups
- Diagnosed with breast cancer 2006-2009, ages 20-80
- San Francisco, Contra Costa, San Mateo, Alameda, Santa Clara counties
- English, Cantonese, Mandarin, Tagalog
- Telephone and self-administered survey

Asian CHI study design

Population-based controls

- Marketing directories
  - Obtain listings of presumed Asian households (based on surnames)
- Army of Women
- Asian-serving community health centers
  - Asian Health Services (Alameda County)
  - Asian Americans for Community Involvement (San Jose)
- Community-based organizations & media outreach, via Asian Pacific Islander American Health Forum (APIAHF)
- On-line methods
  - Listservs, Craigslist, Facebook, etc.
- Target N's based on expected distributions of SES and acculturation among general population
- Carefully track response rates, efficiency, generalizability
  - (compare to CHIS data)

Asian CHI study design

- 139 cases, 488 controls
- Matched on ethnicity (Chinese, Filipina, other), age group
- Controls representative of underlying population (as estimated by CHIS data)

Results: individual and neighborhood stressors

Stressors	Odds ratio* breast cancer risk		
	OR	SE	p
Individual Stressors			
Overall stress	0.882	0.134	0.405
Lifetime discrimination	0.970	0.041	0.636
Day to day discrimination	0.726	0.155	0.135
Acculturative stress (foreign-born)	0.897	0.252	0.698
Neighborhood Stressors			
Neighborhood safety	1.207	0.162	0.162
Neighborhood problems	0.932	0.040	0.104
Collective efficacy	1.050	0.148	0.748

* unadjusted

Results: early-life exposures

	N cases/ N controls	Odds Ratio[a]	95% CI
Early life infectious exposures[b]			
1 SD	139/474	0.93	(0.87, 1.00)
Quartile 1 (low exposure)	41/79	1.00	
Quartile 2	27/97	0.58	(0.32, 1.05)
Quartile 3	36/144	0.51	(0.29, 0.89)
Quartile 4 (high exposure)	35/154	0.46	(0.26, 0.80)

[a]Models adjusted for matching variables (age-group, race/ethnicity (Chinese, Filipino, Other) & immigration status

[b]Early life exposures based on 0 to 19 scale for response to (siblings, attend preschool, kinder garden, live in dorm before age 18 , lived in farm/rural age, share room age, lived by stables, help raise animals, animal feces exposure). 1 SD = 3 unit change.

unadjusted

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Body mass index (kg/m^2) age 18 years			
Per 5 kg/m^2	126/445	0.87	(0.79, 0.95)

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Body mass index (kg/m^2) age 18 years			
Per 5 kg/m^2	126/445	0.87	(0.79, 0.95)
Physical activity level, age 18, MET hrs/wk/yr[c]			
Quartile 1	29/116	1.00	
Quartile 2	46/107	1.78	(1.02, 3.11)
Quartile 3	27/111	1.12	(0.60, 2.09)
Quartile 4	24/111	1.11	(0.59, 2.10)

[a]Models adjusted for matching variables (age-group, race/ethnicity (Chinese, Filipino, Other) & immigration status

[c]Hours per week per year for moderate (MET = 3) or strenuous (MET = 6) activities.

Future research to address breast cancer disparities: Towards improved measurement of social determinants of health

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Measuring SDOH

- Ensuring that social determinants are being measured
- Consistency across studies, data sources
- Relevance to population
- Granularity
- Intersectional effects

"Stars" Study

"Stars" = Standardizing survey questions for breast cancer research

Overall objective: To develop recommendations for researchers in gathering demographic information when conducting research on breast cancer in California

- So that survey items are culturally and linguistically appropriate
- To optimize ability to pool data across studies

Funded by CBCRP 15QB-8102

Study Team

Principal Investigator: Scarlett Lin Gomez

Co-Investigators: Nancy Krieger (Harvard), Gem Le

Program Manager: Laura Allen

Study Coordinators: Helen Chen, Pagan Morris

Epidemiologist: Daphne Lichtensztajn

Interviewers: Zinnia Loya, Kathie Lau, Mei-Chin Kuo, Alene Pham, Lavetta Cross, Regina Dela Cruz

Contributors: Susan Hurley, Laura McClure

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Cancer Detection Program; California Health Collaborative
Dolores Moorehead
Women's Cancer Resource Center
Carmen Ortiz
Circulo de Vida Cancer Support and Resource Center

Core & Expanded Questions

Core questions

- Minimal set of sociodemographic questions that should to be included in ALL breast cancer studies regardless of hypotheses being addressed
- Gives a sense of who is being studied
- Questions should be brief

Core & Expanded Questions

Expanded questions

- For research in which the domain is a major exposure or outcome of interest
- Researcher is interested in a more nuanced or detailed examination of domain aspects
- Questions will be more extensive, used in combination with core

→ Aim to have as much granularity as possible

→ Roll up to be compatible with administrative standards (ethnicity & race)

Core & Expanded Constructs

Race & ethnicity
- Detailed ancestry

SES – education, income, occupation, employment
- Wealth, financial hardship, health insurance, neighborhood, residential history, social & built environment

Immigration – nationality, immigrant status
- Reasons for immigration, time lived in US, citizenship, generational level

Language
- Interpreter needs, literacy, numeracy

Disability Status – health status, activity-limited days, physical health, emotional health

Sexuality and gender
- Biological sex at birth, marital status/co-habitation

Languages

- English
- Spanish
- Chinese (tested in Mandarin & Cantonese)
- Tagalog
- Vietnamese

What's in the toolkit

Available at: www.cpic.org/stars

- Study summary
- Self-administered survey (in 5 languages)
- Interviewer-administered survey (in 5 languages)
- Question x question specifications for field administration
- Source documentation: documentation of original source of survey items and rationale for modifications
- Test-retest results
- *Some survey items had low test-retest reliability, use with discretion!*

Thank you!

Questions?

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