



Stress and Health: Data from the Black Women's Health Study

Yvette C Cozier, D.Sc., M.P.H.

Slone Epidemiology Center at Boston University

Associate Professor of Epidemiology

Associate Dean of Diversity, Equity, Inclusion & Justice

Boston University School of Public Health

Land Acknowledgment

- 
- Agawam
 - Cowasuck
 - Massachusetts
 - Mohican
 - Narraganset
 - Nashaway
 - Naumkeag
 - Nauset
 - Ninnimissinuok
 - Nipmuc
 - Paomet
 - Patuxet
 - Pennacook
 - Potomtuc
 - Ponkapoag
 - Succonnet
 - Wampanoag

I acknowledge that the land upon which I present this afternoon is the original homelands of numerous tribal nations including the Wampanoag, Nipmuc, and Massachusetts.

Research Team

*Slone Epidemiology Center
at Boston University*

**Lynn Rosenberg, Sc.D.
Julie Palmer, Sc.D.**

Yvette Cozier, D.Sc.
Patricia Coogan, D.Sc.
Kimberly Bertrand, Sc.D.
Jessica Petrick, Ph.D.
Gary Zirpoli, Ph.D.
Shanshan Sheehy, Sc.D.

*Georgetown University Lombardi
Cancer Center*

Lucile Adams-Campbell, Ph.D.

Chiranjeev Dash, MBBS, MPH, PhD
Traci Bethea, Ph.D.



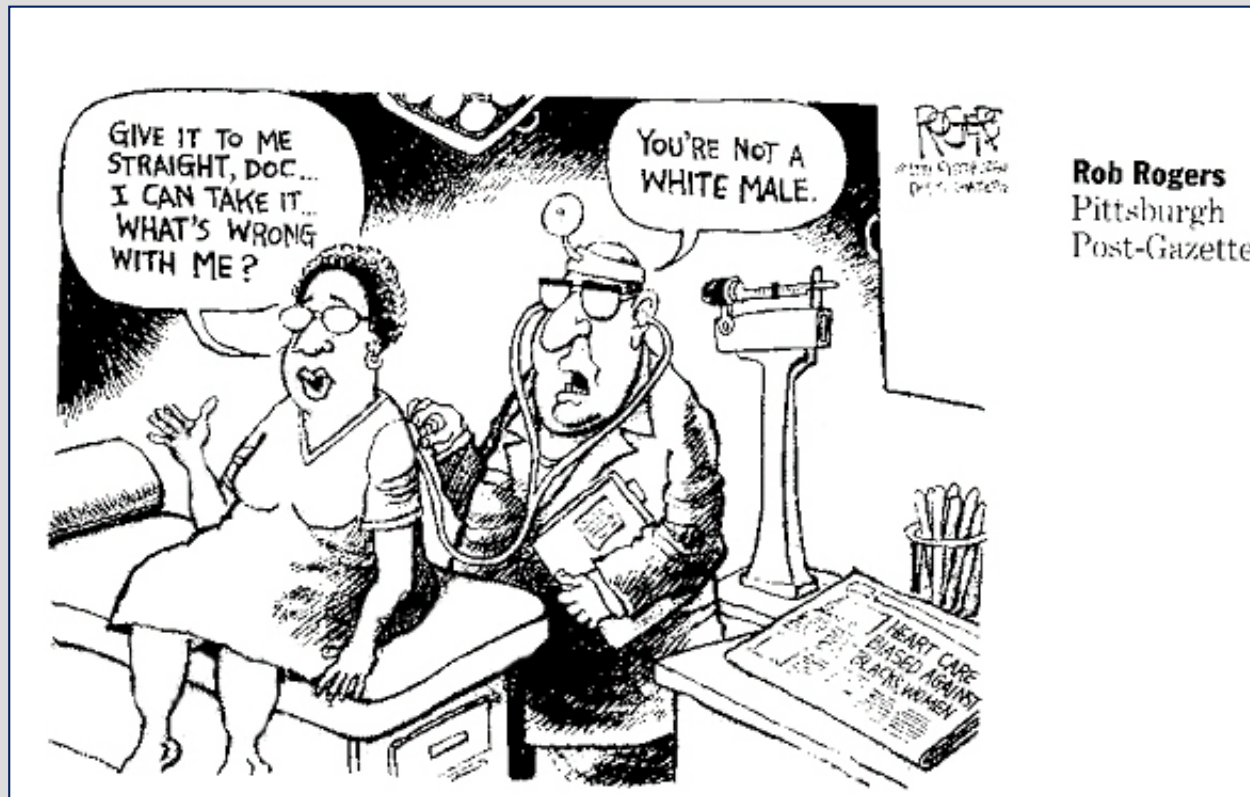
Funding Sources

- National Institutes of Health
 - NCI (UM1, R01)
 - NIEHS
 - NIDDK
 - NIDCR
 - NIAID
 - NIAMS
 - NHLBI
- The Patient-Centered Outcomes Research Institute (PCORI)
- Centers for Disease Control (CDC)
- Komen Foundation
- Hood Foundation
- Aetna Foundation
- American Heart Association (AHA)
- John Templeton Foundation
- Michael J Fox Foundation

Presentation Outline

1. Historical perspective
1. Overview of the Black Women's Health Study
2. Measures of Stress and Health Outcomes
 - a. Interpersonal racism
 - i. Coping with Stress
 - b. Institutional racism
3. Coping with Stress II: religiosity/spirituality
4. Future Directions

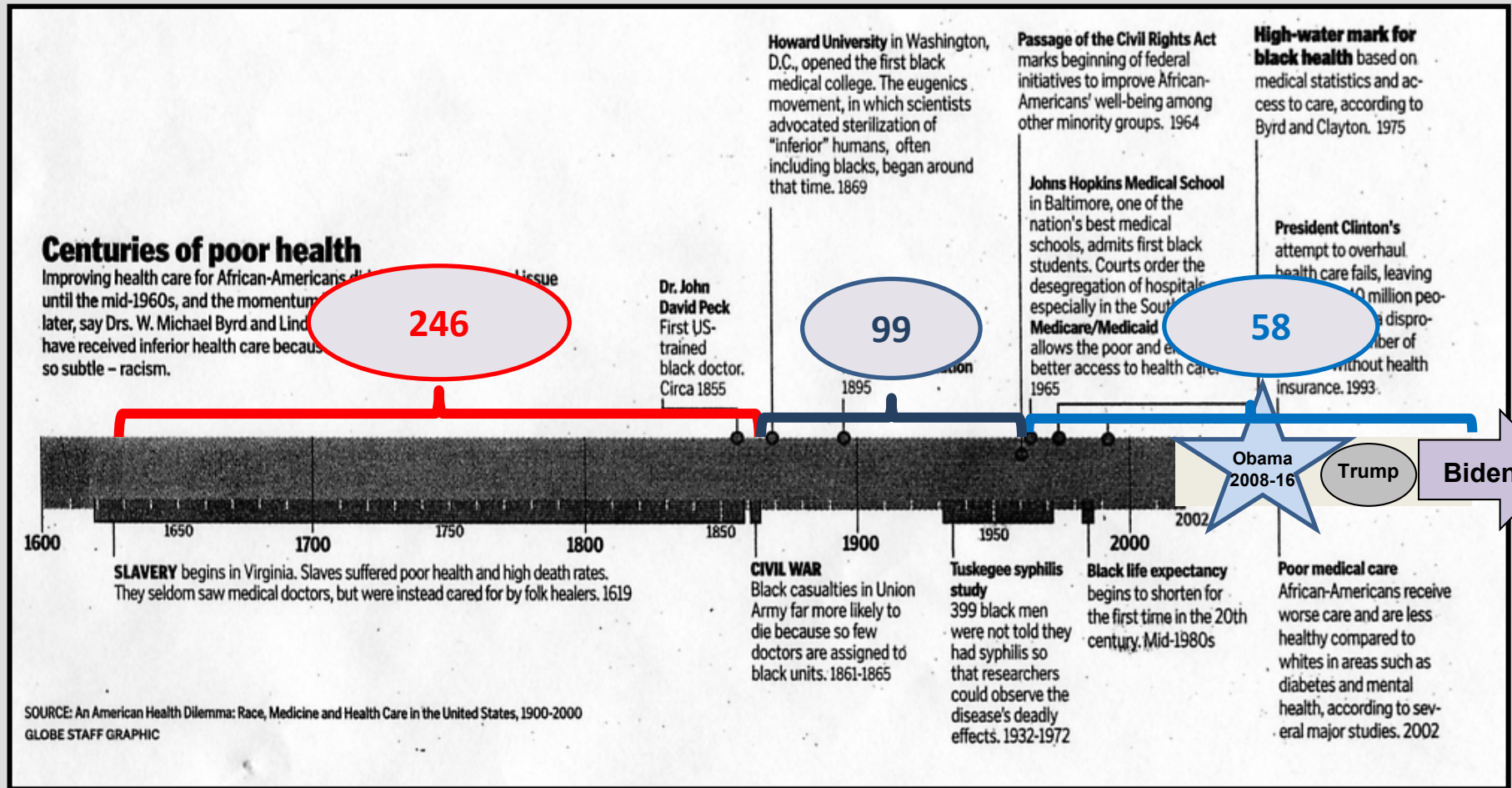
Why Is The BWHS Needed?



Over 400 Years of Inequality



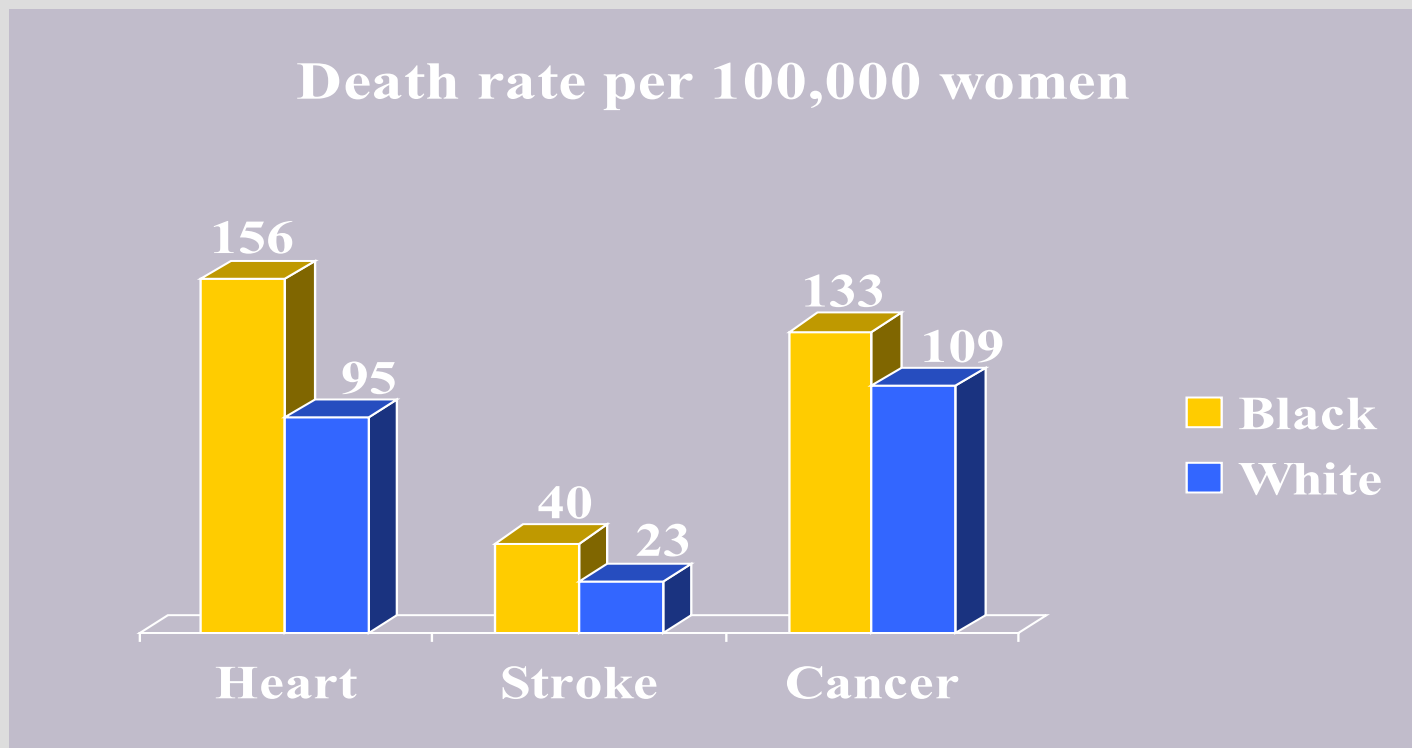
Centuries of Poor Health



Clayton and Byrd, 2000-2001

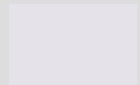
Why is the BWHS Needed?

- Rates of illness and death from many diseases are higher in African-American women
- Lack of health research studies involving African-American women, particularly **large** studies



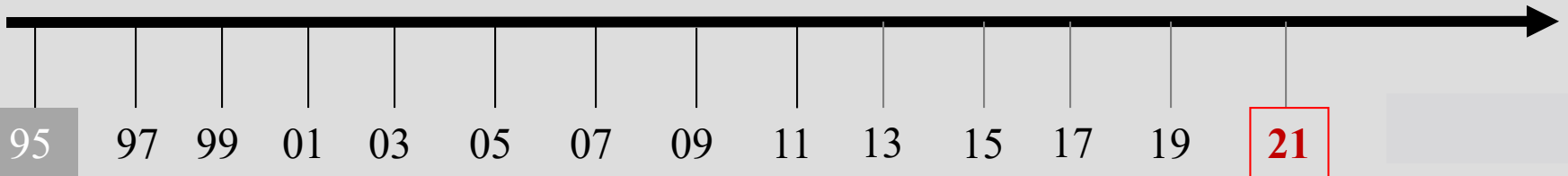
BWHS Aims and Methods

- To establish prevalence and incidence rates of disease among black women
- To identify and quantify risk factors for breast cancer and other illnesses
- Establishment of a cohort of U.S. black women
- Follow-up for exposure and outcome information every 2 years



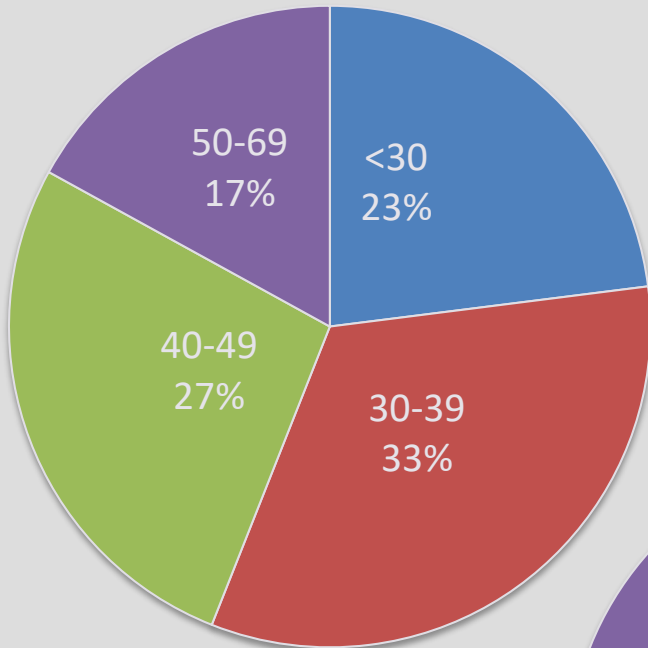
Black Women's Health Study

- Prospective cohort study of 59,000 black women ages 21-69 at baseline (1995)
- *Essence* subscribers enrolled by postal questionnaire
- Baseline: demographic and lifestyle factors, reproductive and medical history
- Data updated biennially
- Subject self-report

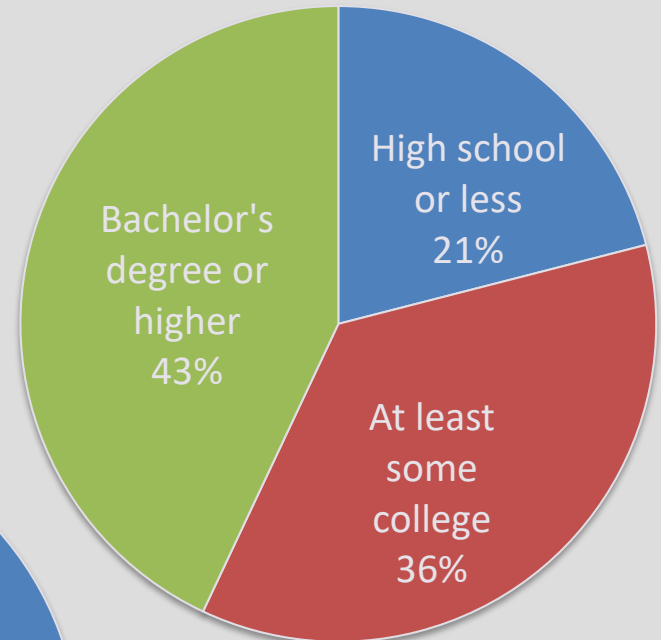


BWHS Participants in 1995

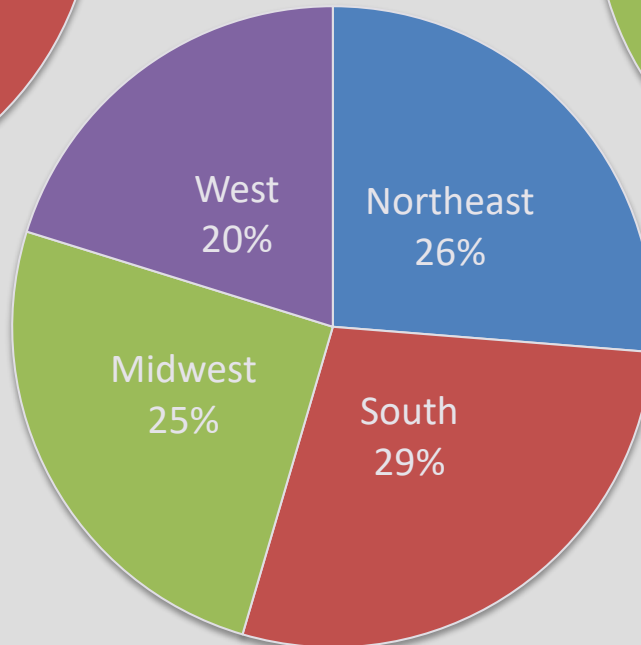
Age



Education




Geographic region




- Demographics
- Anthropometry
- Reproductive history
- Lifestyle factors
 - Smoking
 - Diet
 - Exercise
 - Sleep
- Medical history
 - Physical and mental health
- Medication use
- Psychosocial factors (e.g, racism, stress, trauma)
- Other
 - Environmental exposures (chemical hair straighteners)
 - Oral health
 - Memory / cognition

ss, trauma)

2021 Questionnaire



Black Women's Health Study 2021



1. Please write in your age and date of birth.

Age

Month
(example: June = 06)

Day

Year

2. Since March 2019, have you had a:
(Fill in all that apply.)

☐ Physical exam

☐ Breast biopsy

☐ Blood sugar test

☐ Colonoscopy

☐ Pap smear

☐ Dental cleaning

☐ Mammogram

☐ Bone mineral density test

4. How many cigarettes do you currently smoke each day?

5. Have you ever used e-cigarettes, vapes or Juuls?
☐ No ☐ Yes If yes, age started? years old
 If yes, used for how long? years

3. Please write in your current weight.

Pounds

6. How many alcoholic beverages do you drink each week?

7. Do you know or believe that you have had COVID-19? ☐ No ☐ Yes If yes:

	No	Yes	Uncertain
a. Were you diagnosed by a doctor or nurse?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Not seen by a doctor or nurse but had COVID-19 symptoms?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Have you ever had a COVID-19 test?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Have you ever had a POSITIVE COVID-19 test?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. What type of test(s) have you had? Please mark all that apply:			
Nasal swab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blood test	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest X-ray or CT scan of the lung	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other test. Please specify: <input style="width: 150px;" type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Have you ever had an overnight stay in a hospital for suspected or diagnosed COVID-19?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Did you require any of the following treatments? Please mark all that apply:			
Oxygen by face mask or nasal canula (in your nose)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Intensive care unit" or ICU monitoring?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Breathing tube or ventilator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other treatment, please specify: <input style="width: 150px;" type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Have you received a COVID-19 vaccine ? ☐ No ☐ Yes Vaccine type (e.g., AstraZeneca, Moderna):

a. If no, do you intend to get a vaccine: ☐ No ☐ Yes

b. If you do not intend to get a vaccine, why?

☐ Might be unsafe

☐ Already had COVID-19

☐ Possible expense

☐ Difficulty getting

☐ Have immune disorder

☐ Other:

9. Since March 2019, have you used female hormone pills or used patches or injections (e.g., estrogen) for menopause?

☐ No ☐ Yes → How many months?

Type:

☐ Premarin or other estrogen pills

☐ Patch estrogen


☐ Estrogen with progestin pills

☐ Patch estrogen with progestin

☐ Estrogen injection


☐ Other:


Next page, please. →



Page 1

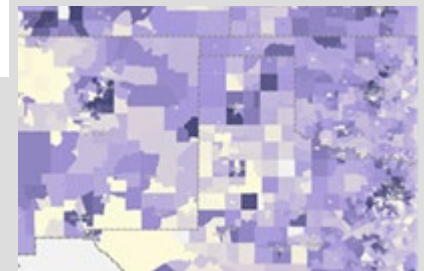
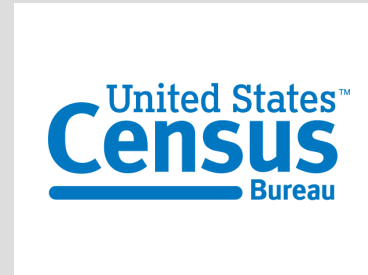
BWHHS_2021v1





Data Linkages

- Cancer registries
- Medicare
- NDI (mortality)
- Census bureau
 - Neighborhood SES
 - Built environment
- EPA
 - Environmental exposures



Biorepository

Saliva samples from ~27,600 participants

- Buccal DNA
- Oral microbiome



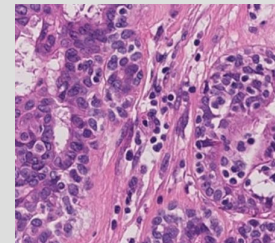
Blood samples from ~13,000 participants

- CBC, hemoglobin A1c, vitamin D



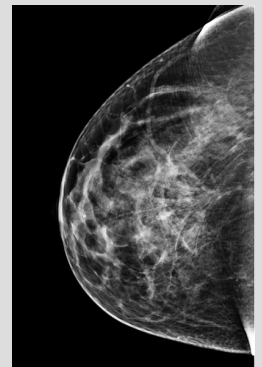
Tumor tissue blocks & slides

- ~850 breast cancers
- Ongoing collection for other cancers

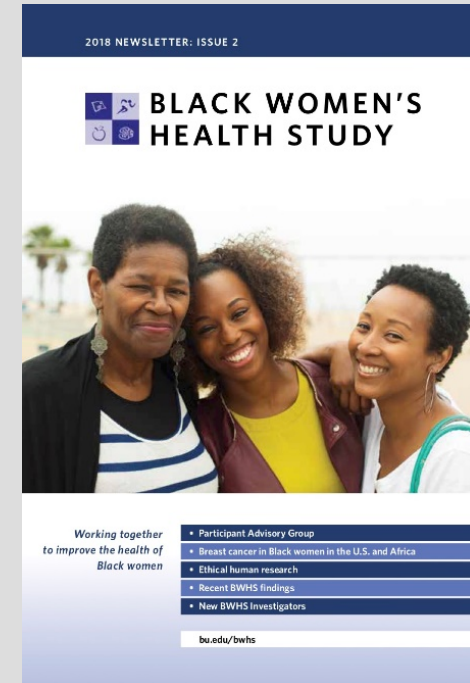


Digital mammogram image repository

- 37,000 images from among 10,000 women



Connecting With Participants



Participant Advisory Group

1995 – 2021 Questionnaire Data

Select prevalent and incident diseases and conditions:

Hypertension

Diabetes

High cholesterol

Heart attack

Angina

Stroke

Clot in lung, leg

Cyst in breast

Fibroids

Endometriosis

Lupus

Sickle cell anemia

Breast cancer

Lung cancer

Colon/rectal cancer

Cognitive function

Cervical cancer

Rheumatoid arthritis

Osteoarthritis

Gingivitis

Depression

Sarcoidosis

Asthma

Toxemia/Pre-eclampsia

Gastric/duodenal ulcer

Hydatidiform mole

Polycystic ovary

Glaucoma

Multiple Sclerosis

Kidney disease

Inflammatory Bowel Disease

Other - specify

Outcomes Studied to Date

Breast cancer

Gynecologic cancers

Liver cancer

Hypertension

Coronary heart disease

Lupus (SLE)

Rheumatoid arthritis

Uterine Fibroids

Thromboemboli / DVTs

Mortality

Oral Health

Kidney Stones

Cognitive function

Stroke

Lung cancer

Pancreatic cancer

Multiple Sclerosis

Hysterectomy

Large bowel cancer

Preterm birth

Diabetes Mellitus

Sarcoidosis

End-stage Renal Disease

Urinary Incontinence

Insomnia

COVID-19

BWHS publications (N>300), 1996-present

www.bu.edu/bwhs

<i>Cancers</i>	
Breast	80
Endometrium	10
Liver	9
Colorectal	8
Lung	4
Ovarian	3
Pancreatic	2
Cervical	1

<i>Non-cancer conditions</i>	
Obesity	30
Type 2 diabetes	23
Uterine fibroids	21
Mortality	9
Hypertension	7
Lupus	6
Preterm birth	6
Sarcoidosis	6
Asthma	6
Oral health	3

An additional 38 publications addressed cardiovascular disease, cognitive health, and other outcomes

Perceptions and Experiences of [interpersonal] Racism

2021/22 Highlights



Black Women's Health Study (1997)

*Race
Consciousness*

How often do you think about your race?

Never	Once a day
Once a year	Once an hour
Once a month	Once a minute
Once a week	Constantly

In your day-to-day life, how often have any of the following things happened to you?

You receive poorer service than other people at restaurants or stores.

Never	Once a week
A few times a year	Almost every day
Once a month	

People act as if they think you are not intelligent.

Never	Once a week
A few times a year	Almost every day
Once a month	

Everyday Racism

People act as if they are afraid of you.

Never	Once a week
A few times a year	Almost every day
Once a month	

People act as if they think you are dishonest.

Never	Once a week
A few times a year	Almost every day
Once a month	

People act as if they are better than you.

Never	Once a week
A few times a year	Almost every day
Once a month	

Lifetime Racism

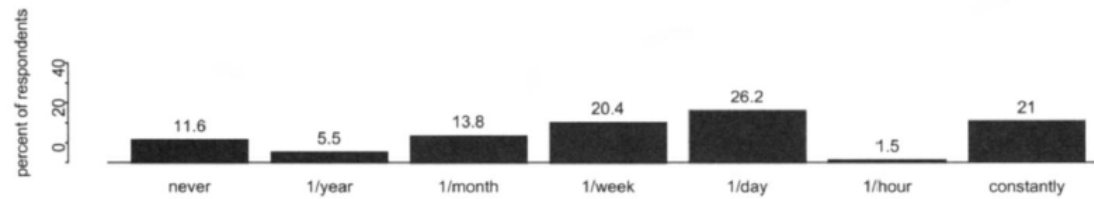
26. Have you ever been treated unfairly due to your race in any of the following circumstances?

Job (hiring, promotion, firing)
Housing (renting, buying, mortgage)
Police (stopped, searched, threatened)

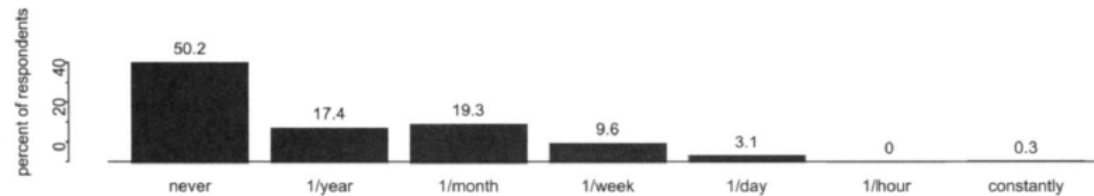
How often do you think about your race?



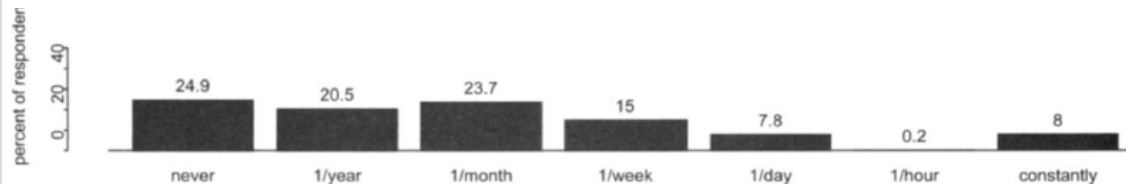
Black women (Black Women's Health Study, n = 49,709)



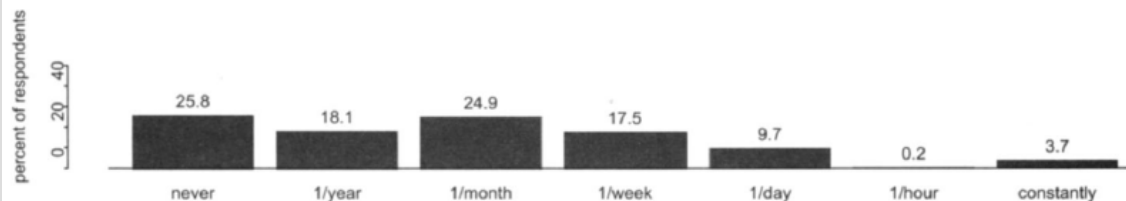
Black women (Nurses' Health Study II, n = 1,292)



White women (Nurses' Health Study II, n = 88,188)



Asian women (Nurses' Health Study II, n = 1,509)



Hispanic women (Nurses' Health Study II, n = 1,243)

Jones CP. Phylon
2002;50(1/2):7-22

Cozier Y et al., Am
J Epidemiol
2000;151:S24


Racism and Health in the BWHS

- Everyday racism associated with 3-fold increased risk of **preterm birth** among women with ≤ 12 years of education (Rosenberg et al., Epidemiology 2002;13:646-652).
- Everyday racism associated with a 2- to 3-fold increased incidence of **hypertension** among foreign-born women (Cozier et al. Annals of Epidemiology 2006;16:681-687).
- Lifetime racism associated with a 45% increased incidence of **breast cancer** among women aged <50 years (Taylor et al. Am J Epidemiology 2007;165(1):46-54).
- Everyday and lifetime racism associated with a 25% increased incidence of **uterine fibroids** (Wise et al. Epidemiology 2007;18(6):747-757).
- Everyday racism and lifetime racism were positively associated with increased 12-year incidence of **obesity**, an association not modified by residential segregation (Cozier et al., Am J Epidemiology 2014;179(7):875-83).
- Perceived everyday and lifetime racism were associated with increased risk of **type 2 diabetes** and appear to be at least partly mediated by BMI (Bacon KL, et al. Diabetologia 2017;60(11):2221-2225).
- Among women who reported consistent levels of everyday and lifetime racism in 1997 and 2009, the **asthma** IRRs for the highest categories were 2.12 (95% CI, 1.55-2.91) and 1.66 (95% CI, 1.20-2.30), respectively (Coogan et al., Chest. 2014;145(3):480-485).



ACCEPTED MANUSCRIPT

Perceived racial discrimination and risk of insomnia among middle-aged and elderly Black women

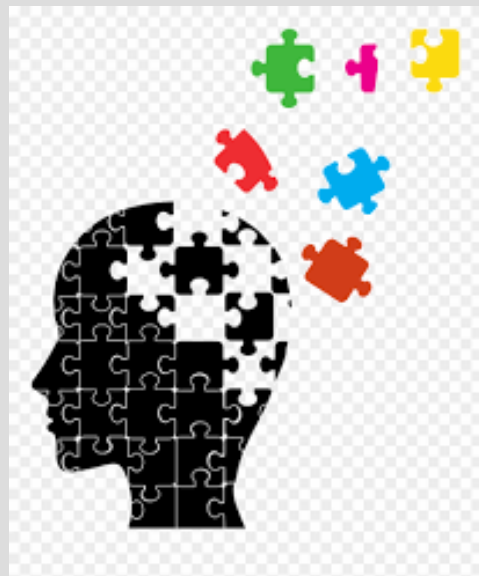
Traci N Bethea , Eric S Zhou, Eva S Schernhammer, Nelsy Castro-Webb, Yvette C Cozier, Lynn Rosenberg

Sleep. 2020 Jan 13;43(1):zsz208.

- 26,139 participants aged 40-90 years
- 2009 racism questions, the Insomnia Severity Index (ISI)
- Higher levels of everyday racism and lifetime racism were positively associated with subthreshold (mild) ($p_{\text{trend}} < 0.01$) and clinical insomnia ($p_{\text{trend}} < 0.01$)
- Results remained unchanged after further adjustment for sleep duration and shift work.

Experiences of racism and subjective cognitive function in African American women

Patricia Coogan¹ | Karin Schon² | Shanshan Li¹ | Yvette Cozier¹ | Traci Bethea³ |
Lynn Rosenberg¹



- Utilized questions from the Structured Telephone Interview for Dementia Assessment (STIDA)
- Experiences of daily and institutional racism (2009) were associated with lower cognitive function in 17,320 women aged 55 and older
- Women who reported the highest levels of daily or institutional racism were estimated to have ≥ 2.5 times the risk of poor cognitive function as women who reported the lowest levels

Coping with Stress

Coping (2005)

The next items deal with ways you've been coping with the stress in your life. Use these response choices to tell how much you've been doing each of the things listed. Don't answer on the basis of whether it seems to be working or not — just whether or not you're doing it.

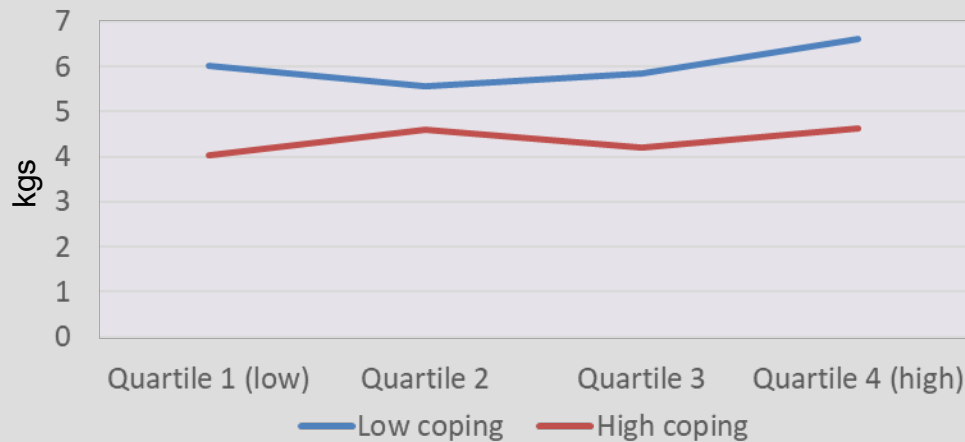
39. I've been...	I haven't been doing this at all	I've been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
concentrating my efforts on doing something about the situation I'm in	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
getting emotional support from others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
taking action to try to make the situation better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
getting help and advice from other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
trying to see it in a different light, to make it seem more positive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
getting comfort and understanding from someone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
looking for something good in what is happening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
accepting the reality of the fact that it has happened	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
trying to get advice or help from other people about what to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
learning to live with it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Perceived Racism in Relation to Weight Change in the Black Women's Health Study

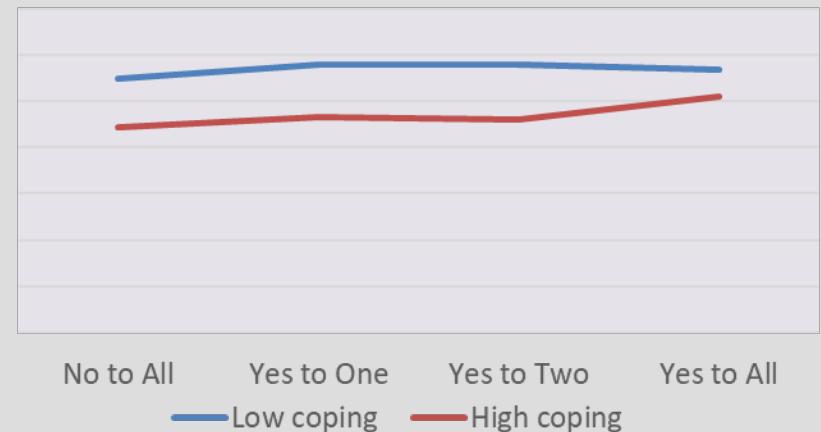
YVETTE C. COZIER, DSc, LAUREN A. WISE, ScD, JULIE R. PALMER, ScD, AND LYNN ROSENBERG, ScD

Mean 8-year weight change (kg), (N=43,103)

Everyday Racism



Lifetime Racism



Coping (2009)

27. If you feel you have been treated unfairly due to your race, do you: *(Please select the best response.)*

- ☐ Usually accept it as a fact of life
- ☐ Usually try to do something about it

28. If you have been treated unfairly due to your race, do you: *(Please select the best response.)*

- ☐ Usually talk to other people about it
- ☐ Usually keep it to yourself



Contents lists available at [ScienceDirect](#)

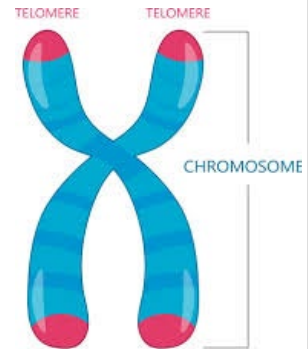
Annals of Epidemiology



Original article

Perceived racism in relation to telomere length among African American women in the Black Women's Health Study

Darlene Lu, PhD ^{a, b}, Julie R. Palmer, ScD ^{b, c}, Lynn Rosenberg, ScD ^{b, c},
Alexandra E. Shields, PhD ^{d, e}, Esther H. Orr, BS ^{f, g}, Immaculata DeVivo, PhD ^g,
Yvette C. Cozier, DSc ^{b, c, *}



- Among ~1,000 women aged 40-70 years (mean=55.6 years)
- Mean telomere length was 0.77 (range 0.21-1.38)
- There was an inverse association between everyday racism and log-RTL (i.e., high racism, shorter telomeres) among women who did not discuss their experiences of racism with others.

Structural Racism

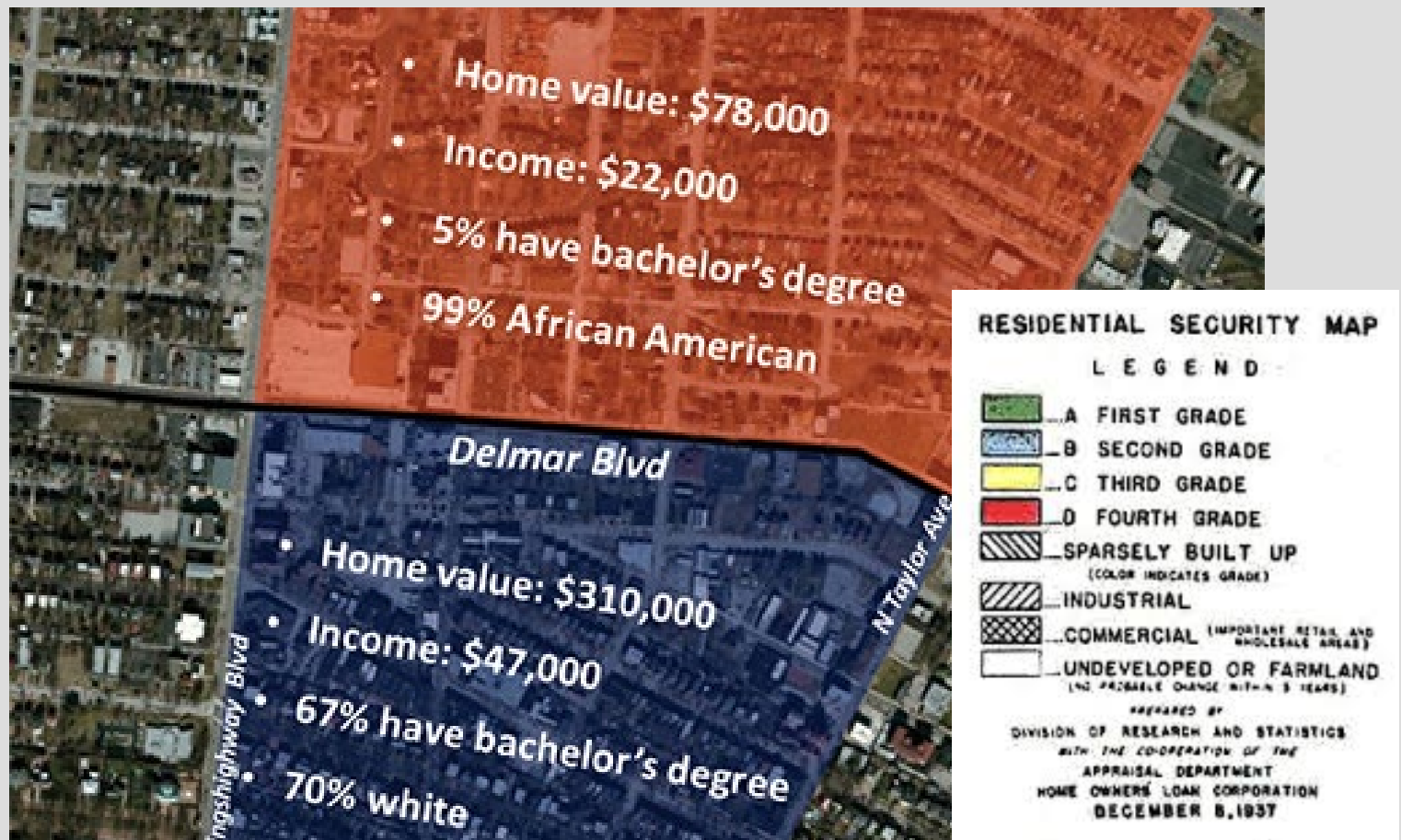
Residential Neighborhoods

- Have positive and negative effects on lifestyle and health
 - Physical environment
 - Social environment
 - Available resources/services (e.g., schools)
 - Health-promoting behaviors
- *Differ by racial composition*

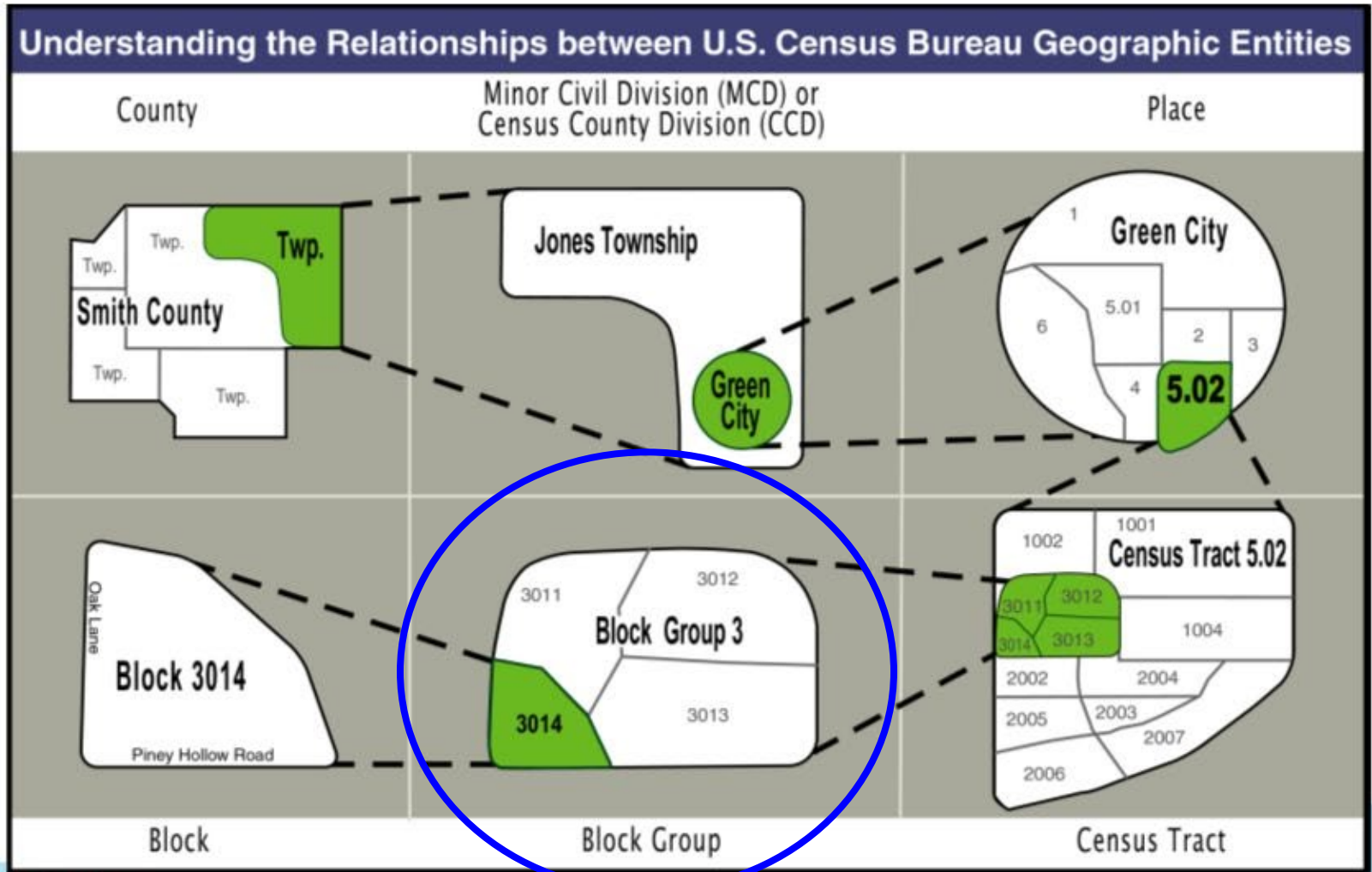
Racial Differences in Residential Environment

- *“In the 171 largest cities in the U.S., there is not even one city where whites live in ecological equality to blacks in terms of poverty rates or rates of single-parent households.”*
- *“The worst urban context in which whites reside is considerably better than the average context of black communities.”*

Zip code better predictor of health than genetic code



Small Area Census Geography



Census Measures of Neighborhood SES In The BWHS

- Select block group variables:
 - Median housing value (\$)
 - Median household income (\$)
 - % white collar employed
 - % households with assets
 - % of adults who graduated college
 - % single female parent headed households
 - % African American/Black

Neighborhood Socioeconomic Status (SES) and Health in the BWHS

- Median housing value is inversely associated with **incident hypertension** in Black women, independent of individual risk factors (Cozier et al., Am J Public Health 2007;97(4):718-24).
- Neighborhood SES score is inversely associated with **incident Type 2 diabetes**, an association primarily mediated by BMI, and present among those with increased education and income (Krishnan et al., Am J Epidemiology 2010;171(5):564-70).
- Low neighborhood SES was associated with increased **incidence of obesity** during 10 years of follow-up among women of normal weight at baseline (BMI <25 kg/m²). The associations were most evident among BWHS participants who had graduated from college (Coogan et al., Obesity (Silver Spring) 2010 Oct;18(10):2064-5).
- Women living in the poorest neighborhoods had the least favorable **biomarker levels** (e.g., CRP, hgA1C, HDL). As neighborhood SES increased, CRP and hgA1C decreased, while HDL increased. These associations were present within strata of individual educational level (Cozier et al., J Urban Health 2016;93(2):279-91).
- Lower neighborhood SES is associated with greater **risk of mortality** – 42% increase for all-cause and 54% increase for cancer mortality. The association was present even among women with high levels of education (Bethea et al., Ethn Dis. 2016;26(2):157-64).

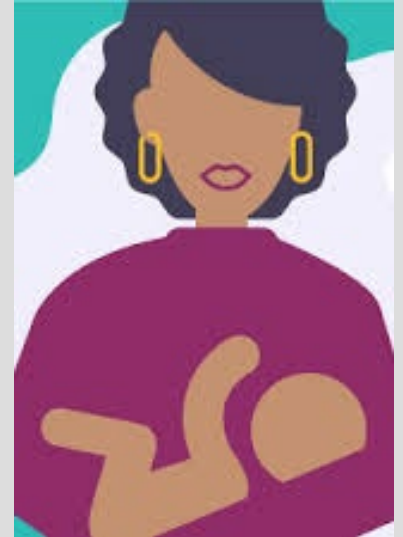
Experiences of Racism and Breastfeeding Initiation and Duration Among First-Time Mothers of the Black Women's Health Study

Michele K. Griswold, PhD, MPH, RN, IBCLC¹, Sybil L. Crawford, PhD², Donna J. Perry, PhD, RN¹, Sharina D. Person, PhD³, Lynn Rosenberg, ScD⁴, Yvette C. Cozier, D.Sc.⁴, Julie R. Palmer, ScD⁴

Predictors of lower initiation and/or duration of breastfeeding:

- Racism in the job setting
- Living in a segregated neighborhood
- Being born in the U.S., having a parent born in the U.S.

Conclusion—Experiences of institutionalized racism influenced breastfeeding initiation and duration. Structural level interventions are critical to close the gap of racial inequity in breastfeeding rates in the U.S.




RESEARCH ARTICLE

Open Access



Neighborhood disadvantage and individual-level life stressors in relation to breast cancer incidence in US Black women

Lauren E. Barber^{1,2}, Gary R. Zirpoli², Yvette C. Cozier^{1,2}, Lynn Rosenberg^{1,2}, Jessica L. Petrick^{2,3}, Kimberly A. Bertrand^{2,3} and Julie R. Palmer^{2,3*} 



Residing in a disadvantaged or low-SES neighborhood was associated with ~25% increased risk of ER-negative and triple-negative (ER-, PR-, Her2-) breast cancer

Air pollution and risk of diabetes and hypertension



	PM _{2.5} (10 unit increase)	NO _x (range)
Hypertension	1.32	1.11*
Diabetes	1.15	1.24*

* $p \leq .05$



PUBLIC HEALTH

Study Finds Racial Gap Between Who Causes Air Pollution And Who Breathes It

March 11, 2019 · 6:01 PM ET

JONATHAN LAMBERT



“The researchers found that air pollution is disproportionately caused by white Americans' consumption of goods and services, but disproportionately inhaled by black and Hispanic Americans.”

Religiosity/Spirituality

Religiosity/Spirituality (2005)

How often do you attend religious services?

Never	2-3 times a month
Less than once a month	Once a week
About once a month	Several times a week

How often do you pray?

Rarely or never	Several times a week
Less than once a week	Once or twice a day
Once a week	Many times a day

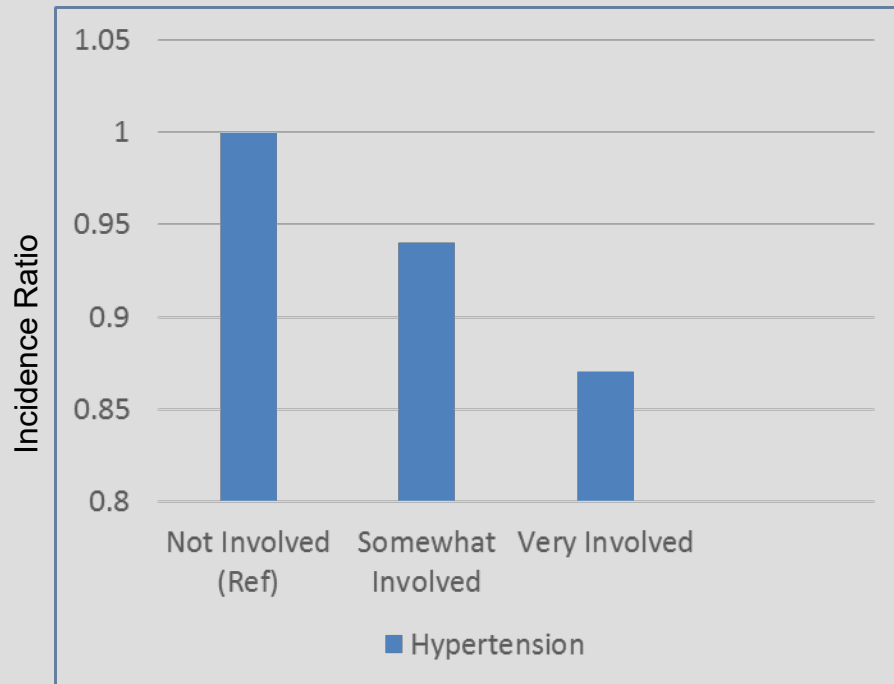
To what extent do you consider yourself a religious or spiritual person?

Not religious/spiritual	Moderately religious/spiritual
Slightly religious/spiritual	Very religious/spiritual

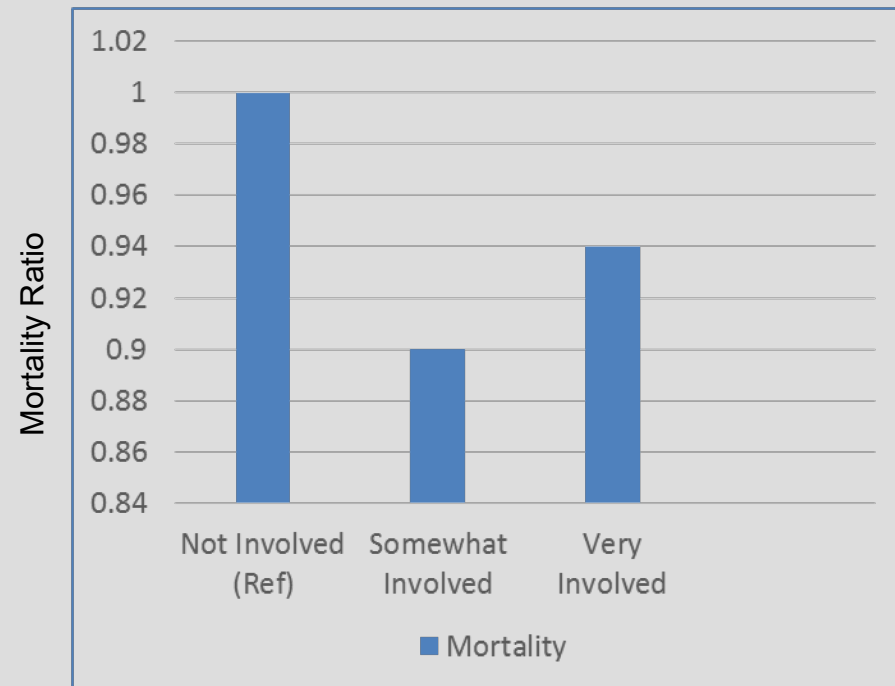
To what extent is your religion/spirituality involved in understanding or dealing with stressful situations in any way?

Not involved at all	Somewhat involved
Not very involved	Very involved

To what extent is your religion/spirituality involved in understanding or dealing with stressful situations in any way?



***P* trend = 0.02**



***P* trend = 0.93**

Cozier YC et al. Ann Behav Med. 2018 Nov 12;52(12):989-998.

VanderWeele TJ et al, Am J Epidemiol. 2017 Apr 1;185(7):515-522

Future Directions

2020-2021

25th Anniversary Webinar Series

Honoring your contributions to Black women's health



**BLACK WOMEN'S
HEALTH STUDY**



*Working together to improve
the health of Black women*

Future Areas of Inquiry

- Stroke
- Multiple myeloma
- Inflammatory bowel disease
- Parkinson's Disease
- Chronic kidney disease
- COVID-19
 - Long COVID

Conclusion

- The BWHS is a valuable resource for understanding causes of illness in black women
- Can address a wide range of risk factors
 - Traditional
 - Psychosocial
 - Genetic
- Can lead to more effective prevention programs

Thank You

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Black Women's Health Study

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RESEARCH

NEWSLETTERS

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