



Multidisciplinary Approaches to Cancer Symposium

The Impact of Social Determinants of Health on Cancer Outcomes

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Disclosures

- Consultant for AstraZeneca
- Grant/Research Support from AstraZeneca, National Cancer Institute, Lung Cancer Research Foundation, American Association of Thoracic Surgeons
- Other Financial/Material Interest Bristol Myers Squibb Foundation

This presentation and/or comments will be free of any bias toward or promotion of the above referenced companies or their product(s) and/or other business interests.

This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.

This presentation has been peer-reviewed and no conflicts were noted.

Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

STATE LAW:

The California legislature has passed Assembly Bill (AB) 1195, which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed AB 241, which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.

EXEMPTION:

Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

The following CLC & IB components will be addressed in this presentation:

- *The impact of social determinants on race and ethnicity-based differences.*
- *Will discuss biases especially as they relate to disparities in care and outcomes.*

Non small cell lung cancer (NSCLC) disparities



- Lung cancer is the leading cause of cancer-related death in the United States.
- Racial/ethnic minorities and those of lower socioeconomic status (SES) have higher rates of non–small cell lung cancer (NSCLC) incidence and mortality.
- Despite smoking less, Non-Hispanic Black/African American individuals have higher risk and mortality and develop NSCLC 5 years earlier than non-Hispanic White individuals.
- It remains unclear how socioenvironmental factors may influence lung cancer outcomes and disparities.

Yang R, Cheung MC, Byrne MM, et al. Do racial or socioeconomic disparities exist in lung cancer treatment? *Cancer*. 2010;116(10):2437-2447.

DeSantis CE, Miller KD, Goding Sauer A, Jemal A, Siegel RL. Cancer statistics for African Americans, 2019. *CA Cancer J Clin*. 2019;69(3):211-233.

Lee Y-C, Calderon-Candelario RA, Holt GE, Campos MA, Mirsaeidi M. State-Level Disparity in Lung Cancer Survival in the United States. *Frontiers in Oncology*. 2020;10(1449).

American Cancer Society. Cancer Facts & Figures for African Americans 2019-2021.

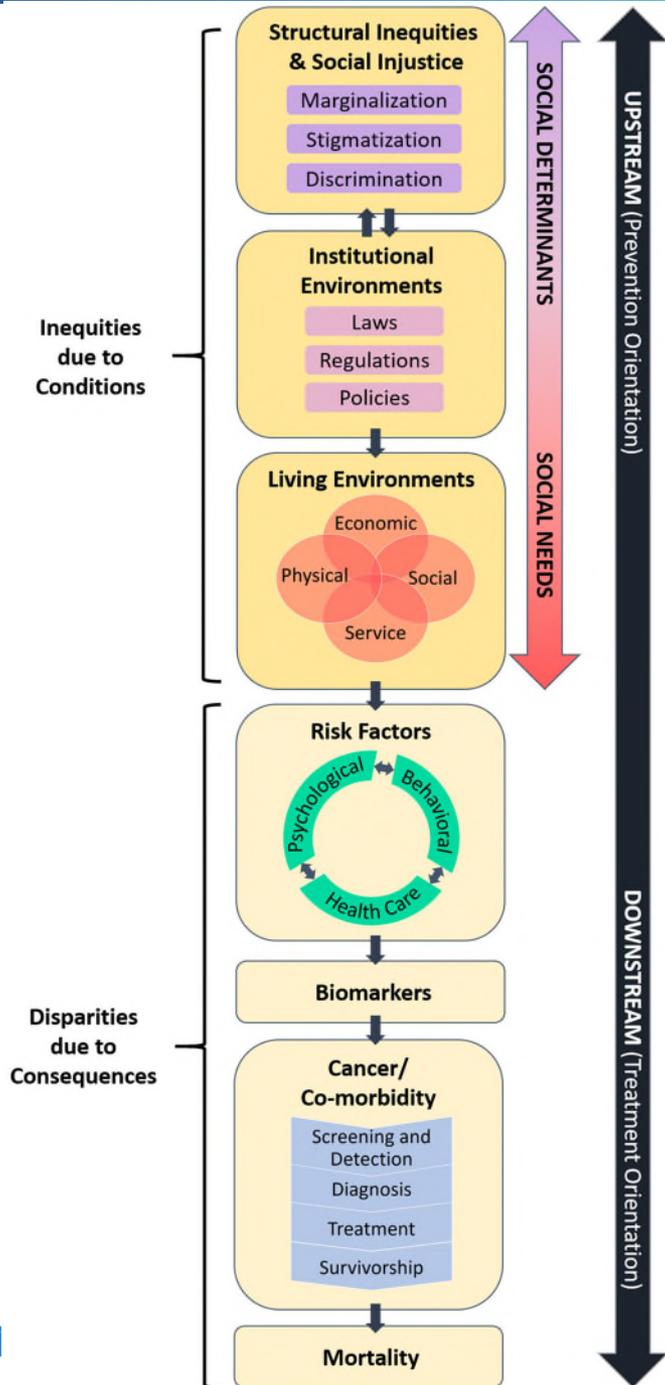
<https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/cancer-facts-and-figures-for-african-americans/cancer-facts-and-figures-for-african-americans-2019-2021.pdf>. Pub 2019. Accessed August 13, 2021.

CDC definition of health disparity



- Health disparities are **preventable** differences in the burden of disease ... that are experienced by **socially disadvantaged** populations
- Populations can be defined by
 - *race or ethnicity*
 - *gender*
 - *education or income*
 - *disability*
 - *geographic location (e.g., rural or urban)*
 - *sexual orientation*
- Health disparities are **unequal** and are directly related to the **past** and **current unequal** distribution of social, political, economic, and environmental resources.

CDC. Community Health and Program Services (CHAPS): Health Disparities Among Racial/Ethnic Populations. Atlanta: U.S. Department of Health and Human Services; 2008



Modifiable cancer risk factors have been framed as the result of individual-level behaviors or exposures rather than as the downstream effects of **structural inequities** that results in population-level differences in lung cancer risk factors between racial and ethnic groups.

Alcaraz K.I. et al. (2020), Understanding and addressing social determinants to advance cancer health equity in the US: A blueprint for practice, research, and policy. CA A Cancer J Clin, 70: 31-46.

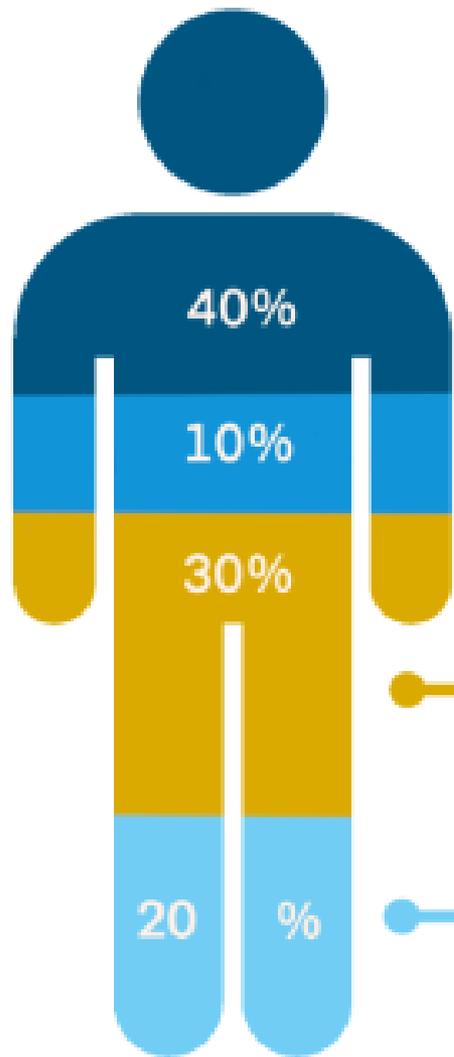


how do SDOH influence cancer incidence, treatment, and survival?

Social Determinants of Health



Conditions in which people are born, live, work, and play that strongly impact health outcomes



Socioeconomic Factors



Education



Job Status



Family Support



Income

Physical Environment



Housing

Health Behaviors



Tobacco Use



Diet & Exercise



Alcohol Use



Sexual Activity

Health Care



Access & Quality of Care

SDOH and Cancer Outcomes: The Connection



- How each SDOH category affects cancer outcomes:
 - **Economic Stability:** Income inequality, employment, access to insurance.
 - **Education:** Health literacy, access to preventive information.
 - **Healthcare Access and Quality:** Availability of screenings, timely diagnosis, quality of care.
 - **Social and Community Context:** Social support, racial/ethnic disparities, and stigma.
 - **Neighborhood and Environment:** Pollution, food deserts, access to healthy lifestyle options.

Individual vs Area-based SDOH



- Census based measures of income, education, deprivation, food access are often used as proxies for individual-level because the latter is not commonly available.
- Studies have revealed that individual-level and area-based SDOH measures are **significantly** and **independently** associated with cancer risk, quality of life, and survival.
- The agreement between the two is frequently poor but at times may be additive.
- For instance, low-income individuals have even lower outcomes and quality of life if they live in low-income neighborhoods.
- Therefore, the multi-level evaluation of SDOH allows for a more comprehensive understanding of the impact of SDOH on outcomes.

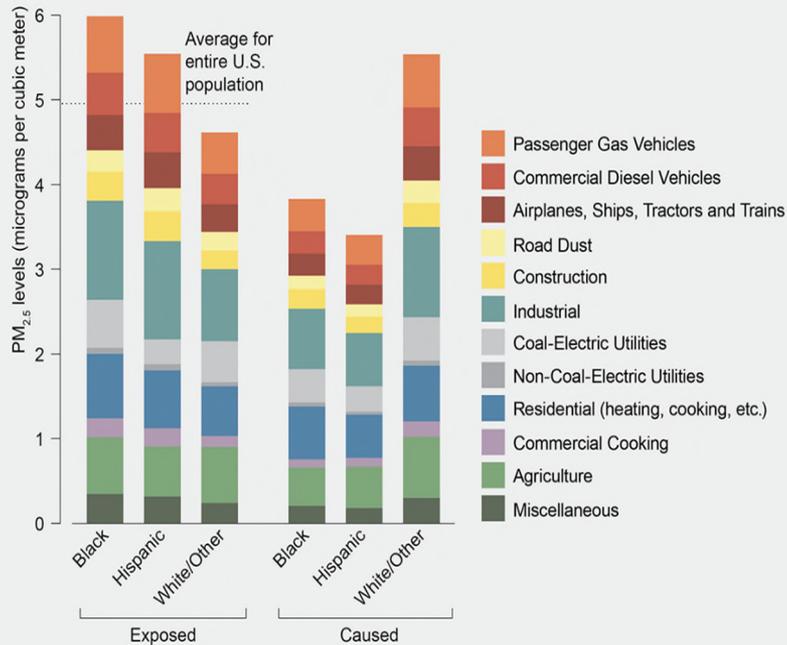
- Myers V, Drory Y, Goldbourt U, et al. Multilevel socioeconomic status and incidence of frailty post myocardial infarction. *Int J Cardiol* 2014;170:338-43. 66.
- Rocha V, Ribeiro AI, Severo M, et al. Neighbourhood socioeconomic deprivation and health-related quality of life: A multilevel analysis. *PLoS One* 2017;12:e0188736.
- Sanderson M, Coker AL, Perez A, et al. A multilevel analysis of socioeconomic status and prostate cancer risk. *Ann Epidemiol* 2006;16:901-7.
- Southern DA, McLaren L, Hawe P, et al. Individual-level & neighborhood-level income measures: agreement and association with outcomes in a cardiac disease cohort. *Med Care* 2005;43:1116

Race and Ethnicity-based Disparities in Air Pollution Exposure

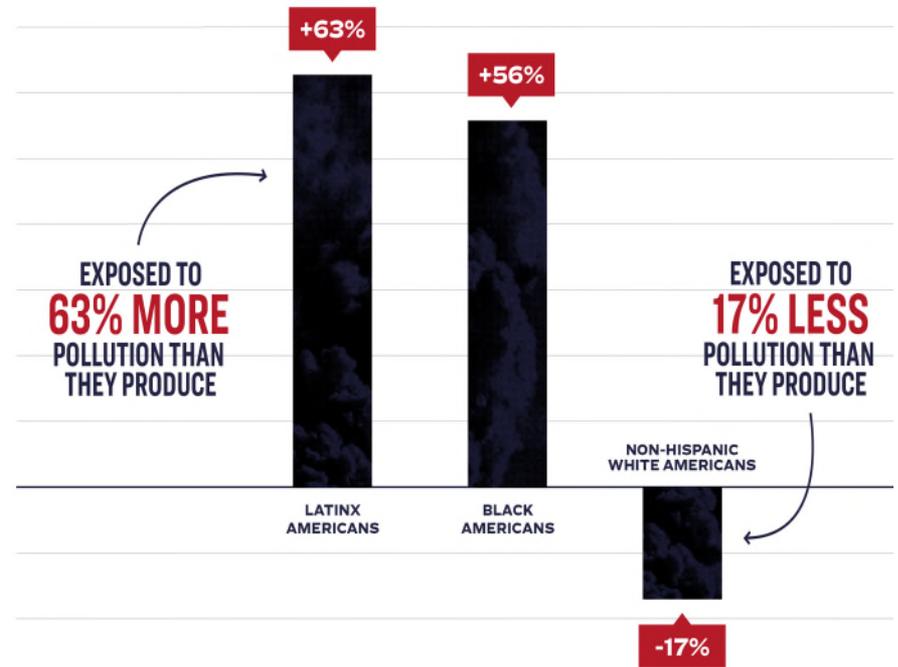


Racial Groups' Exposure vs. Contribution to Air Pollution

Black and Hispanic individuals in the U.S. are exposed to higher levels of fine particulate matter (PM_{2.5}), on average, than white individuals yet consume less of the goods and services that cause such pollution. Black people, on average, experience the highest absolute pollution levels of the groups studied, whereas Hispanic people are exposed to the highest levels relative to their consumption.



POLLUTION EXPOSURE BY POPULATION (2003–2015)



Source: Christopher W. Tessum et al., "Inequity in consumption of goods and services adds to racial-ethnic disparities in air pollution exposure," *Proceedings of the National Academy of Sciences* (March 2019).

Credit: Melissa Thomas Baum, Buckyball Design; Source: "Inequity in Consumption of Goods and Services Adds to Racial-Ethnic Disparities in Air Pollution Exposure," by Christopher W. Tessum et al., in *Proceedings of the National Academy of Sciences USA*, Vol. 116, No. 13; March 26, 2019

Neighborhood context: Deprivation and Residential Segregation



- Residents of segregated and deprived neighborhoods are exposed to more toxic waste and physiologic stress secondary to neighborhood crime, limited perceived safety, low social cohesion, and insufficient resources to promote health

- Segregated neighborhoods lack.....



Supermarkets



Well-funded schools



Job opportunities



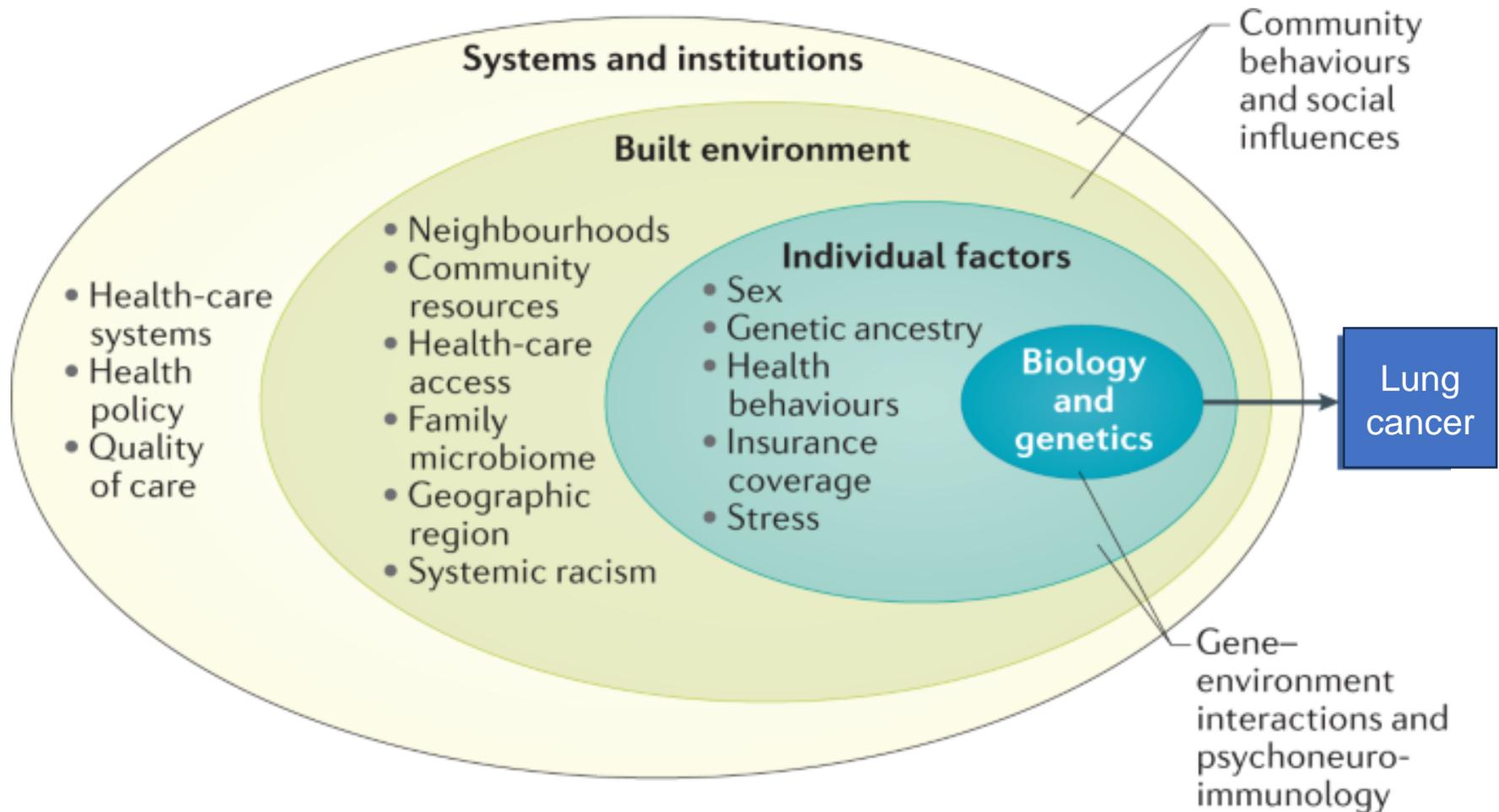
Appropriate housing



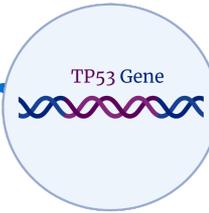
Safe spaces for recreation



Social Determinants Impact Tumor Biology



Air Pollution Exposure & TP53 mutation

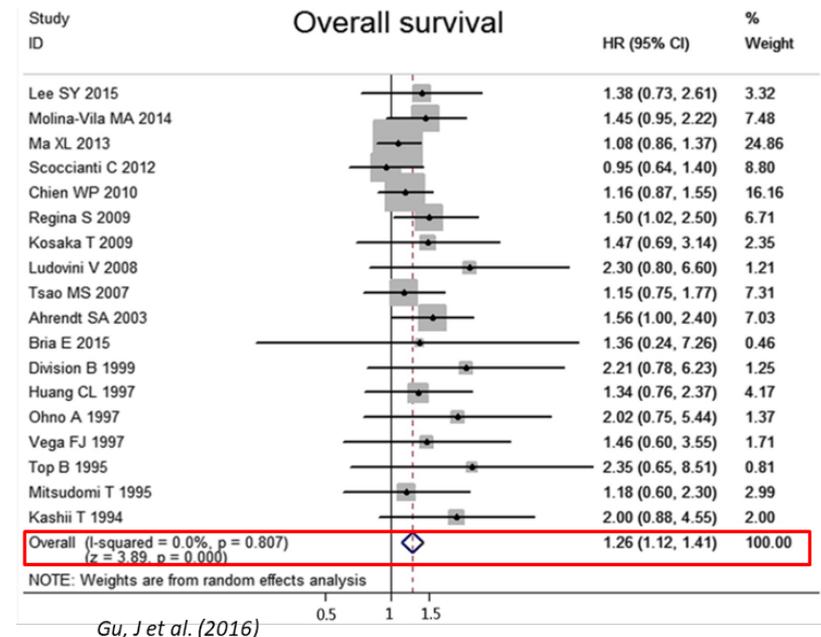
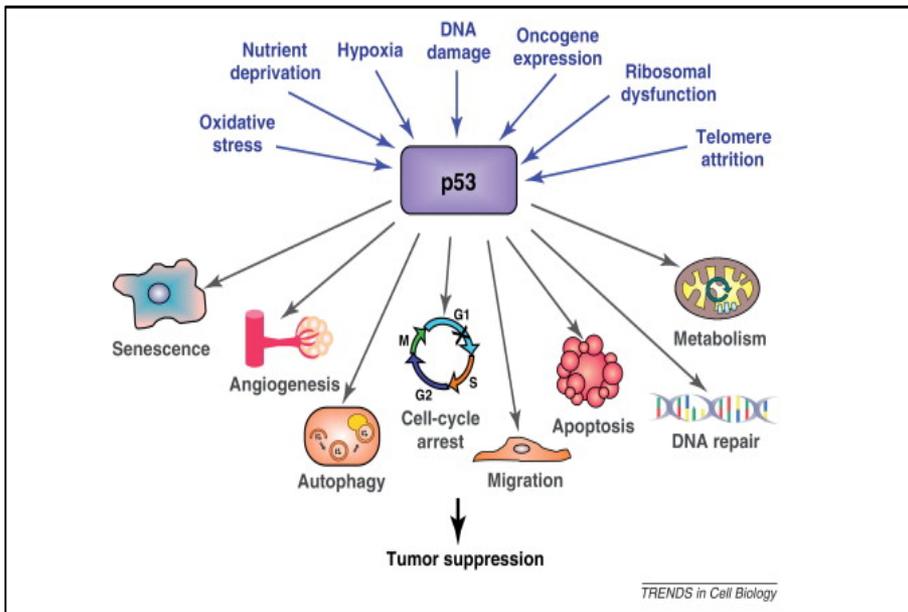


CANCER EPIDEMIOLOGY, BIOMARKERS & PREVENTION | RESEARCH ARTICLE

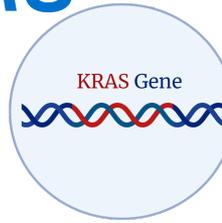
The Association between Polluted Neighborhoods and TP53-Mutated Non-Small Cell Lung Cancer

Loretta Erhunmwunsee^{1,2}, Sam E. Wing², Jenny Shen², Hengrui Hu², Ernesto Sosa², Lisa N. Lopez², Catherine Raquel², Melissa Sur², Pilar Ibarra-Noriega², Madeline Currey², Janet Lee³, Jae Y. Kim¹, Dan J. Raz¹, Arya Amini⁴, Sagus Sampath⁴, Marianna Koczywas⁵, Erminia Massarelli⁵, Howard L. West⁵, Karen L. Reckamp⁶, Rick A. Kittles², Ravi Salgia⁵, Victoria L. Seewaldt², Susan L. Neuhausen², and Stacy W. Gray^{2,5}

TP53 mutations



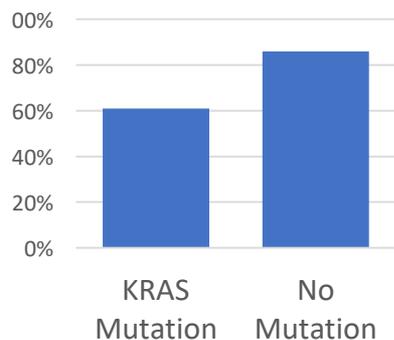
Neighborhood deprivation and risk of *KRAS* mutation



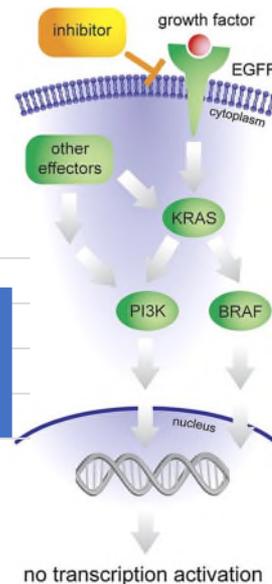
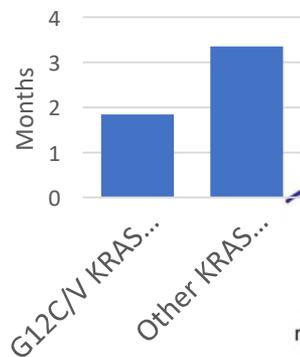
- *KRAS* = encodes proteins for GTP/GDP signaling pathways
- Mutations in *KRAS* make pathways continuously active

Hypothesis: Adverse neighborhood disadvantage will be associated with *KRAS* somatic mutations.

5 Year Survival (Stage I, Lung Adeno.)¹⁸



Survival (NSCLC)¹⁷



- Wildtype
- Wildtype-like signature
- Responsive to EGFR inhibition

- **Participants: Retrospective cohort:** All adult COH patients with a primary NSCLC diagnosis from 2015-2018
- **Data collection:**
 - **Medical Record Abstraction (MRA)**
 - We abstracted demographic, clinical and smoking data from the EMR
 - **Publicly available neighborhood disadvantage indices**
 - We used addresses to determine neighborhood linkage to widely used and validated disadvantage measures
- **Statistical Method:** Multiple Logistic Regression

29% of cohort had *KRAS* mutation-positive tumors.

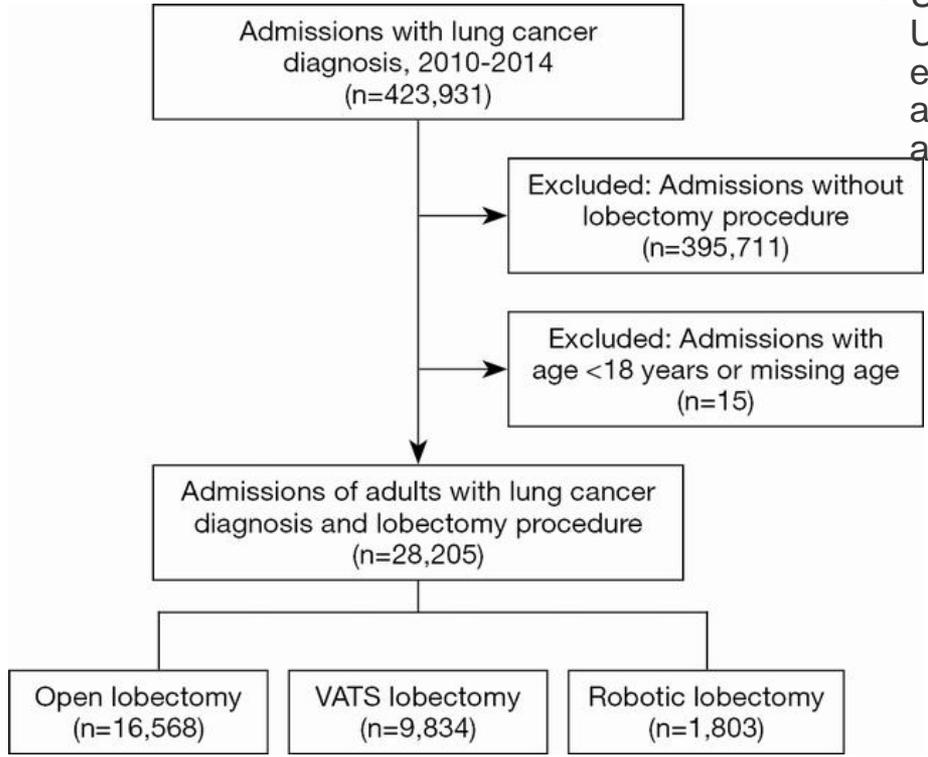
Original Article



Socioeconomic, rural, and insurance-based inequities in robotic lung cancer resections

Loretta Erhunmwunsee¹, Prasha Bhandari², Ernesto Sosa³, Melissa Sur³, Philip H. G. Ituarte¹, Natalie S. Lui²

Income, insurance & rurality impacts cancer treatment



Utilized the National Inpatient Sample Healthcare Cost and Utilization Project (HCUP) database from 2010 to 2014 to evaluate patient or hospital characteristics affecting the application of robotic versus open or VATS lobectomy among adults with a lung cancer diagnosis

- **Low-income** patients were less likely to undergo robotic versus open lobectomy (AOR =0.78, P<0.01).
- Compared to patients in urban teaching hospitals, patients in **rural** hospitals were much less likely to undergo robotic versus open (AOR =0.28, P<0.01) or VATS (AOR =0.64, P<0.01) lobectomy.
- Patients with **Medicaid** were less likely than Medicare patients to undergo robotic compared to open (AOR =0.80, P<0.01) or VATS (AOR =0.88, P=0.049) lobectomy.
- **Uninsured** patients were also less likely to undergo robotic versus open (AOR =0.62, P<0.01) or VATS (AOR =0.50, P<0.01) lobectomy.

COH Dept of Surgery Research: Food deserts impact cancer survival



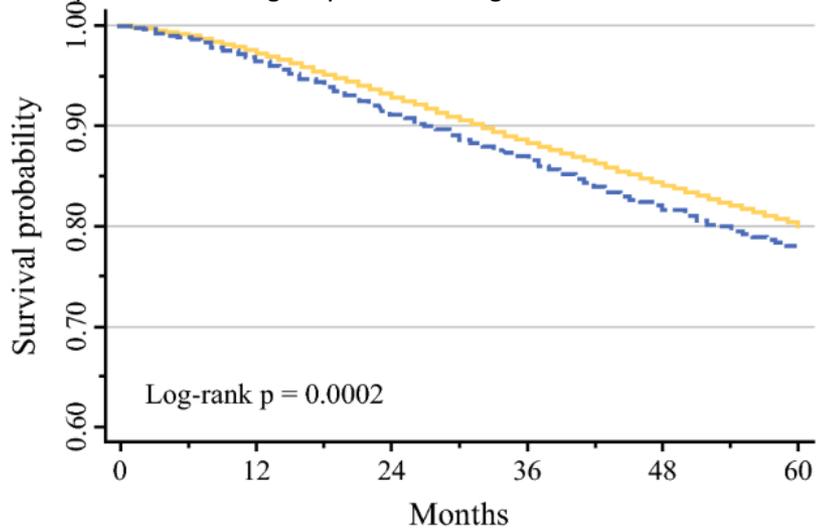
Health Services Research and Global Oncology | Published: 25 August 2020

Association of Living in Urban Food Deserts with Mortality from Breast and Colorectal Cancer

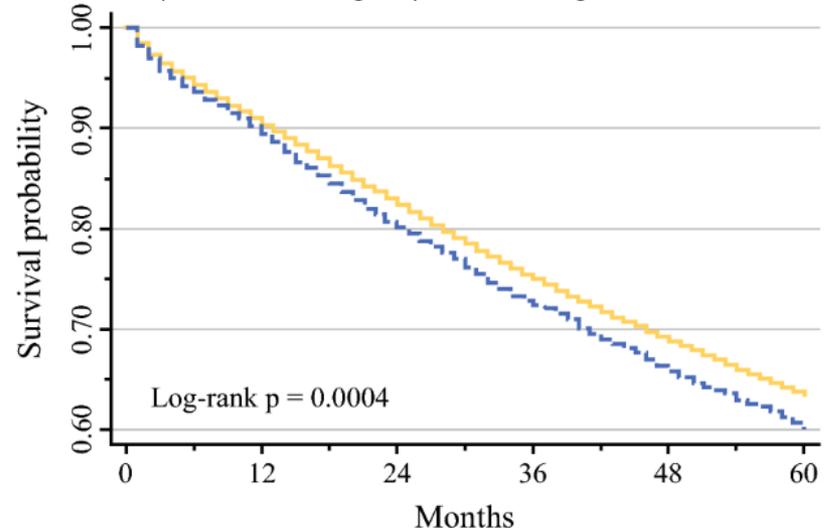
Abigail J. Fong MD, Kelly Lafaro MD, Philip H. G. Ituarte PhD & Yuman Fong MD ✉

Annals of Surgical Oncology 28, 1311–1319 (2021) | [Cite this article](#)

Survival of patients with surgically treatable stage II and III breast cancer.



Survival of patients with surgically treatable stage II and III colorectal cancer.



Number at risk		0	12	24	36	48	60
Not desert	61175	59093	54186	45165	37885	31837	18912
Desert	3691	3543	3209	2671	2213	1849	1209

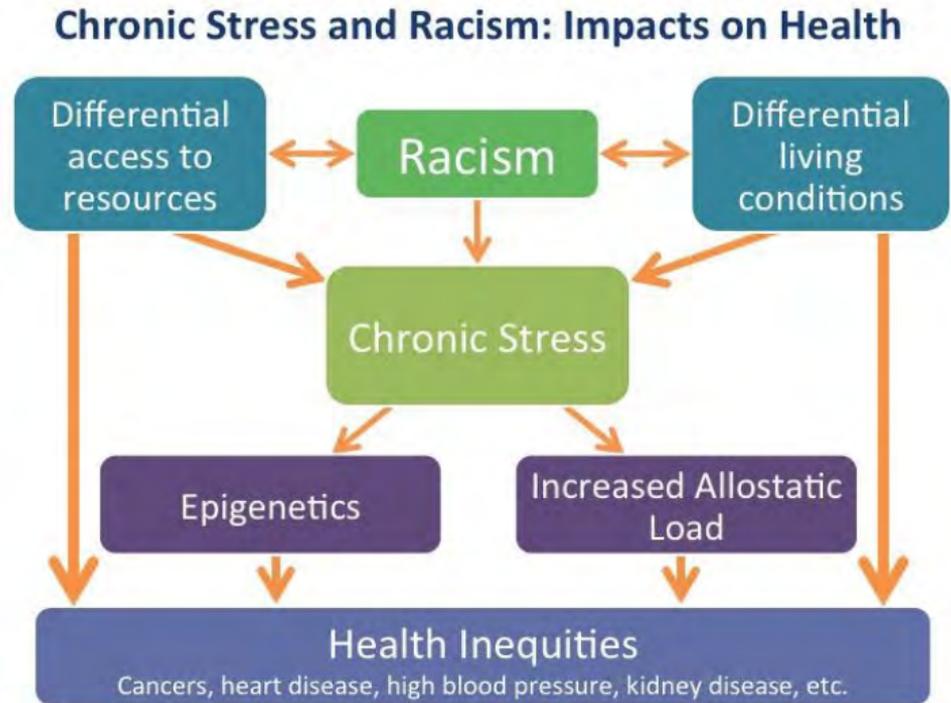
Number at risk		0	12	24	36	48	60
Not desert	44445	40096	35129	28195	23137	18912	1209
Desert	3004	2687	2310	1842	1488	1209	1209

Fong, A.J., Lafaro, K., Ituarte, P.H.G. *et al.* Association of Living in Urban Food Deserts with Mortality from Breast and Colorectal Cancer. *Ann Surg Oncol* 28, 1311–1319 (2021). <https://doi.org/10.1245/s10434-020-09049-6>

Potential mechanisms linking adverse SDOH, e.g., racism to cancer



- Exposure to structural racism may cause **psychological distress**, which may in turn compromise the function of the immune, neuroendocrine, and autonomic systems.
- Structural racism affects **physiologic responses** primarily through allostatic load, which may lead to changes in immune function and therefore have implications in cancer susceptibility and treatment.
- Additionally, the stress caused by structural racism may lead to “wear and tear” on the body that can dysregulate multiple biological systems and lead to premature illness and mortality.



Doyle DM, Molix L. Minority stress and inflammatory mediators: covering moderates associations between perceived discrimination and salivary interleukin-6 in gay men. *J Behav Med.* 2016;39(5):782-792.
McEwen BS. Protective and damaging effects of stress mediators. *N Engl J Med.* 1998;338(3):171-179
Seeman TE, Crimmins E, Huang MH, et al. Cumulative biological risk and socio-economic differences in mortality: MacArthur studies of successful aging. *Soc Sci Med.* 2004;58(10):1985-1997.

JAMA Oncology | Review

Structural Racism and Lung Cancer Risk

A Scoping Review

Sidra N. Bonner, MD, MPH, MSc; Richard Curley, DrPH; Kyra Love, MMLIS; Tola Akande, BA; Aamna Akhtar, BA; Loretta Erhunmwunsee, MD

Structural racism

The totality of ways in which societies foster racial discrimination via mutually reinforcing inequitable systems that in turn reinforce discriminatory beliefs, values, and distribution of resources, reflected in history, culture, and interconnected institutions

Built environment and housing

- Inequities in:**
- Pollution exposure
 - Housing quality
 - Housing safety
 - Housing policies
 - Residential patterns

Occupation and employment

- Inequities in:**
- Manual labor with occupation risks
 - Employment exposures to asbestos and silica
 - Agricultural occupational exposure to pesticides

Health care

- Inequities in:**
- Primary care services
 - Tobacco cessation education
 - High-quality insurance to access tobacco programming

Economic and educational opportunity

- Inequities in:**
- Postsecondary education
 - Household income

Private industry

- Inequities in:**
- Targeted tobacco advertisement and marketing
 - Proximity to tobacco retailers

Perceived stress and discrimination

- Inequities in:**
- Perceived stress secondary to social and economic causes
 - Social and interpersonal discrimination

Criminal justice involvement

- Inequities in:**
- Lower access to community-based services after incarceration
 - Economic and employment contributing to stress and higher tobacco use

Increased lung cancer risk

why should we care? implications of disparities on health

Limit overall improvements in quality of care and health for the broader population

- Social justice / Human rights
- Improving the health of Americans
 - Overall quality of care
 - Population health

Unnecessary costs

- \$93 billion in excess medical care costs
- \$42 billion in lost productivity per year
 - Economic losses due to premature deaths

The gap widens otherwise

Ani Turner, *The Business Case for Racial Equity, A Strategy for Growth*, (W.K. Kellogg Foundation and Altarum, April 2018), <https://altarum.org/publications/the-business-case-for-racial-equity-a-strategy-for-growth>.

Healthy People 2020 defines Health Equity



- the attainment of the highest level of health for all people.
- achieving health equity requires
 - valuing everyone equally
 - addressing avoidable inequalities
 - addressing historical and contemporary injustices
 - eliminating health and health care disparities

Health Equity: The Role of Clinicians



■ Patient-Level Interventions:

- Screen for social needs (e.g., food insecurity, housing instability).
- Partner with social workers and care coordinators to address non-clinical needs.

■ Clinical-Level Interventions:

- Implement culturally competent practices to reduce implicit bias.
- Standardize care pathways to reduce variation in treatment decisions.

■ Community and Policy-Level Advocacy:

- Participate in hospital committees addressing equity and inclusion.
- Collaborate with public health departments to address community needs.

Actionable Strategies for Clinicians



Education and Training:

Pursue continuous learning on health equity and cultural competence.



Use Data to Identify Gaps:

Analyze outcomes data stratified by race, gender, and socioeconomic status.



Advocate for Institutional Change:

Promote equity-focused policies within clinical departments and hospitals.



Engage in Research:

Contribute to research on the impact of health inequities in clinical care.

Overcoming Barriers to Addressing Health Inequities



Time and Resource Constraints:

Solutions: Incorporate SDOH assessments into clinical evaluations.



Lack of Awareness or Training:

Promote inclusion of health equity in medical education and CME programs.



Institutional Challenges:

Encourage collaboration with hospital leadership to prioritize equity.

COH use of SDOH questions enterprise wide

The screenshot displays a patient's EHR profile for 'Smoketestsix Orders'. The patient is a 26-year-old male, born 9/14/1995, with MRN 55103390 and bed 3E-CTC. The profile includes a search bar, COVID-19 status (Travel Screened 7/21/2022), and a warning: 'Allergies have not been verified.' The primary care physician is James S Andersen, MD, Attending. The patient was admitted on 7/21/2022 (18 D) as an inpatient with no active principal problem. Physical exam findings for height, weight, BMI, and BSA are listed as '—'. There are 10 active medications, 7 scheduled, and 3 PRN. The left sidebar lists various clinical areas, with 'BestPractice' highlighted in yellow. The main content area shows a 'SIGNED/HELD ORDERS' section with tabs for Admission, Transfer, and Discharge. The 'Admission' tab is active, showing several screening questions. The 'Food Insecurity' section is highlighted with a red box and contains two questions, both marked with a red exclamation point icon. The first question is 'Within the past 12 months, you worried that your food would run out before you got the money to buy more.' The second is 'Within the past 12 months, the food you bought just didn't last and you didn't have money to get more.' Both questions have response options: 'Never true', 'Sometimes true', 'Often true', and 'Patient refused'. Below the questions is a 'Create Note' button and a navigation bar with 'Restore', 'Close', and 'Cancel' buttons. At the bottom, there are 'Previous' and 'Next' navigation buttons and a 'Flowsheets' link.

Smoketestsix Orders
Male, 26 y.o., 9/14/1995
MRN: 55103390
Bed: 3E-CTC
Code: FULL (no ACP docs)
Legal Guardian: Orders.Contact
COH PCP: FORMAN, STEPHEN J

COVID-19: Travel Screened 7/21/2022
Allergies have not been verified.

James S Andersen, MD
Attending

Allergies: Not on File
Collection: Unit

ADMITTED: 7/21/2022 (18 D)
Patient Class: Inpatient
No active principal problem

Height: —
Last Wt: —
BMI: —
BSA: —

ACKNOWLEDGE ORDERS (10+)

NO NEW RESULTS, LAST 36H

ACTIVE MEDS (10)
Scheduled (7)
PRN (3)

BestPractice

Admission | Transfer | Discharge

SIGNED/HELD ORDERS
Med Rec Status
Release Orders

OVERVIEW
Outside Records
Consents
Travel Screening
Vital Signs
Preferred Name
Interpreter Services
Allergies
Transfusion
Home Meds
History
Directives
Health Care Agents
Implants
Belongings

ASSESSMENTS
Nutrition
SDOH
ADLs
Psychosocial
Suicide Risk
Fall Risk
Skin Risk
LDAs
Discharge Planning
Care Plan
Education

INTERVENTIONS

In the last 12 months, how many places have you lived?
Housing Stability Vital Sign. Children's HealthWatch.

In the last 12 months, was there a time when you did not have a steady place to sleep or slept in a shelter (including now)?
Yes No Patient refused
Housing Stability Vital Sign. Children's HealthWatch.

Transportation Needs

In the past 12 months, has lack of transportation kept you from medical appointments or from getting medications?
Yes No Patient refused
National Association of Community Health Centers, Association of Asian Pacific Community Health Organizations, Oregon Primary Care Association, and Institute for Alternative Futures. The Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE). 2016. www.nachc.org/prapare

In the past 12 months, has lack of transportation kept you from meetings, work, or from getting things needed for daily living?
Yes No Patient refused
National Association of Community Health Centers, Association of Asian Pacific Community Health Organizations, Oregon Primary Care Association, and Institute for Alternative Futures. The Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE). 2016. www.nachc.org/prapare.

Food Insecurity

⚠ Within the past 12 months, you worried that your food would run out before you got the money to buy more.
Never true Sometimes true Often true Patient refused
Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., Frank, D. A. (2010). Development and validity of a 2-Item screen to identify families at risk for food insecurity. PEDIATRICS, 126(1), e26–e32. doi:10.1542/peds.2009-3146.

⚠ Within the past 12 months, the food you bought just didn't last and you didn't have money to get more.
Never true Sometimes true Often true Patient refused
Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., Frank, D. A. (2010). Development and validity of a 2-Item screen to identify families at risk for food insecurity. PEDIATRICS, 126(1), e26–e32. doi:10.1542/peds.2009-3146.

Create Note

Restore Close Cancel

Previous Next

Activities of Daily Living Screening

New Reading at: 0730

Flowsheets

Takeaways and Call to Action



Key Takeaways:

Clinicians must understand that SDOH profoundly impact patient outcomes.

Addressing health inequities is essential for providing high-quality, ethical care.



Call to Action:

Take the first step by integrating SDOH into clinical practice today—start small but aim for long-term change.

Conclusions



- In order to achieve better outcomes in cancer, we must target disparate SDOH and the sources of each.
- The path to equitable care requires a comprehensive approach, including
 - Obtaining SDOH
 - Intervening on SDOH that drive poor health
 - e.g., acknowledging the impact of structural inequities, like racism
 - e.g., improving insurance coverage and access
 - e.g., employing patient navigation support
 - e.g., supporting clean energy, urban planning and housing efforts
 - e.g., advocating for improved food access, fair wages, and education opportunities

- https://cdn.who.int/media/docs/default-source/infographics-pdf/social-determinants-of-health/who_whatshiap_infographic_web-070220b68d2714-bca0-4edf-9d64-b84767a7d900.pdf?sfvrsn=e746ec05_1

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Southern Community Cohort Study

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