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8 November 2023

Addressing Challenges in Health Equity Research

Methods and Tools to Support Actionable Health Equity Research for Life Science

Kati Copley-Merriman
Chad Downey
Shahnaz Khan
Ashley Davis
Jarrod Bullard

Introduction

Kati Copley-Merriman

Vice President, Market Access and Outcomes Strategy

Health Equity

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"The attainment of the highest level of health for all people, where everyone has a fair and just opportunity to attain their optimal health regardless of race, ethnicity, disability, sexual orientation, gender identity, socioeconomic status, geography, preferred language, or other factors that affect access to care and health outcomes."

Centers for Medicare & Medicaid Services (Strategic Plan for Health Equity)

Source: https://www.cms.gov/files/document/health-equity-fact-sheet.pdf.

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Addresses the needs of underserved populations

Longstanding systemic inequities have undermined the physical, social, economic, and emotional health of historically underserved populations

- People of color
- Older persons
- People with disabilities
- LGBTQ+ people
- Women
- People living in rural areas
- People who have low or no income
- Underinsured people

"Lack of adequate representation threatens the integrity of science." —Bibbins-Domingo and Helman (2022)

LGBTQ+ = lesbian, gay, bisexual, transgender, queer, and other identities not covered by the other 5 listed.

Social Determinants of Health (SDOH)

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Education access and quality

- Educational support and intervention
- Financial assistance for college and other education costs

Healthcare access and quality

- Screening and preventive care
- Medications
- Health insurance
- High-quality providers

Economic stability

- Employment opportunities
- High-quality childcare
- Availability and access to affordable food, housing, healthcare, and education

Neighborhood and lived environments

- Safe neighborhood and workplace
- Clean air and water

Social and community context

Family, friends, colleagues, and community

Intersectionality in Health Equity Research

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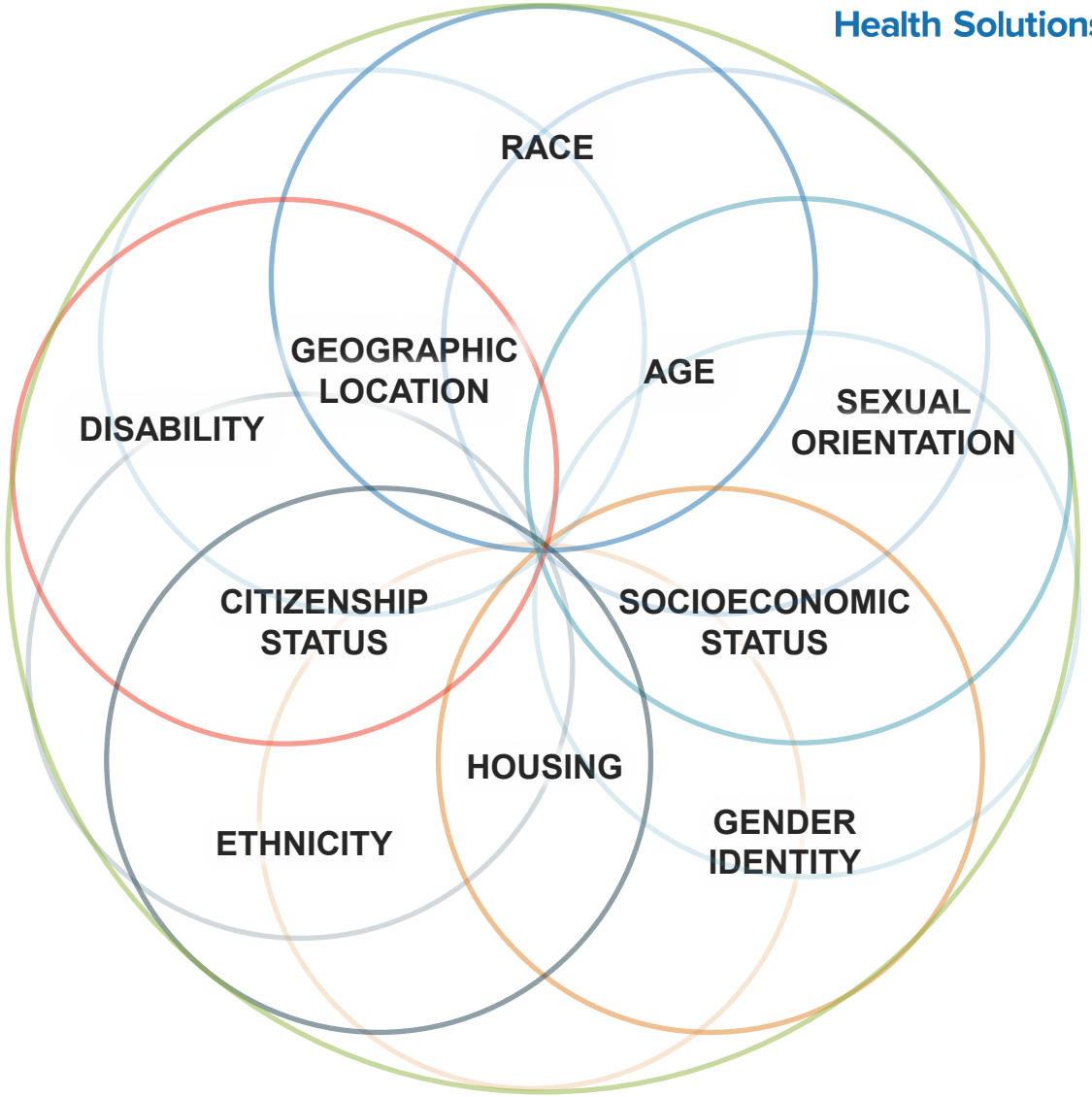
- Multiple social identities and systems of oppression **intersect** to shape people's healthcare access and outcomes.
  - More intersections = more barriers to health equity
- Examples for contextualizing inequities and the impact of multiple determinants
  - Developing interventions to reduce diabetes rates among rural Native American adults aged 65+ years
  - Improving COVID vaccination uptake among Latinx immigrant patients in low-income communities
  - Reducing HIV rates among Black transgender women



Learning Objectives

Examine the socioeconomic drivers of health disparities and populations affected

Understand why health equity is crucial for the biomedical sciences

Explore methods such as literature reviews and distributional cost-effectiveness analysis

Review social determinants data and tools to leverage in health equity research: *Introducing RTI Rarity*™

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A Framework for Understanding Why Health Equity Is Important to the Pharmaceutical Industry

Chad Downey

Associate Director, Project and Proposal Operations

Institutional Drivers of Inequity

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Inequities are fueled by systems, regardless of people's culture or behavior.

- Racism, discrimination, and bias, both structural and interpersonal,[1] are fundamental drivers of health inequities, health disparities, and disease.
- In the US, people of color (Black, Hispanic, and Native Americans, in particular) experience higher rates of poor health and disease for diabetes, hypertension, obesity, asthma, and heart disease, when compared with White individuals. The life expectancy of Black and African American individuals is 4 years less than that of White Americans.[2]
- These health disparities underscore the urgent need to address systemic racism as a root cause of racial and ethnic health inequities and a core element of our public health efforts.

Sources: [1] Jones (2000); [2] National Center for Health Statistics (2023).

Why Health Equity Is Important to the Pharmaceutical Industry

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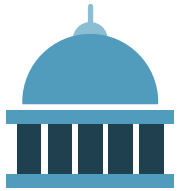
Improved social impact and brand identity

- Build trust with historically marginalized communities
- Positively impact brand and product recognition

Greater consumer benefit

- Increase medication adherence
- Improve patient outcomes
- Reduce healthcare costs



Alignment with government and regulatory bodies

- Legislation
- Regulation

Why Health Equity Is Important to the Pharmaceutical Industry

Societal awareness of health disparities

- Disproportionate impacts from events like the COVID-19 pandemic create opportunities for leadership

Innovation

- Better understand unmet needs of all patients
- Develop more accessible and beneficial products

Collaboration or competition with other industries

- Technology
- Consumer goods

Types of Health Equity Projects: Literature Reviews

Shahnaz Khan

Vice President, Market Access and Outcomes Strategy

Literature Reviews: Framing the Research Question

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Types of literature reviews:

Systematic lit review

Comprehensive review

Umbrella review

Structured lit review

Literature review

Evidence review

Narrative review

Targeted lit review

Potential topics to be explored via literature reviews:

What disparities exist in terms of **screening or diagnostic** practices?

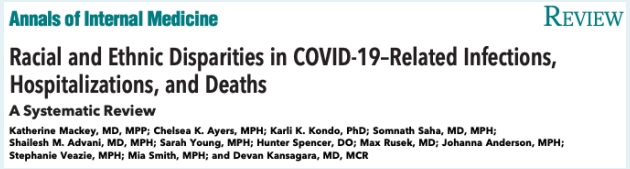

Review Article

Participation, barriers, and facilitators of cancer screening among LGBTQ+ populations: A review of the literature

Emily Heer, Cheryl Peters, Rod Knight, Lin Yang, Steven J. Heitman

ELSEVIER

What disparities exist in terms of **rates/occurrence** of a particular condition?


Annals of Internal Medicine

REVIEW

Racial and Ethnic Disparities in COVID-19–Related Infections, Hospitalizations, and Deaths

A Systematic Review

Katherine Mackey, MD, MPP; Chelsea K. Ayers, MPH; Karli K. Kondo, PhD; Somnath Saha, MD, MPH; Shailesh M. Advani, MD, MPH; Sarah Young, MPH; Hunter Spencer, DO; Max Rusek, MD; Johanna Anderson, MPH; Stephanie Veazie, MPH; Mia Smith, MPH; and Devan Kansagara, MD, MCR

What disparities exist in terms of **access to care, specialists, or treatments** for patients with a particular condition?


Access to Care Matters: Remote Health Care Needs During COVID-19

Juan Vazquez, Tanzina Islam, Jonathan Gursky, Jennifer Beller, and Daniel Jose Correa

What disparities exist in terms of **outcomes** related to a particular condition or based on a particular treatment?


JAMA Network Open

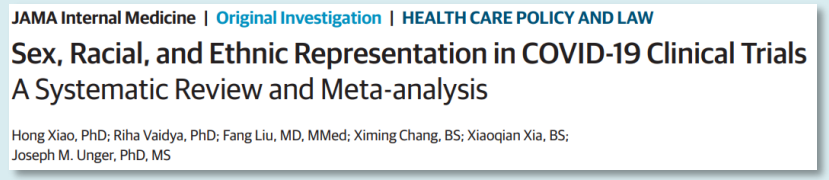
Original Investigation | Infectious Diseases

Disparities in COVID-19 Outcomes by Race, Ethnicity, and Socioeconomic Status

A Systematic Review and Meta-analysis

Shruti Magesh; Daniel John; Wei Tse Li, BS; Yuxiang Li; Aidan Mattingly-app; Sharad Jain, MD; Eric Y. Chang, MD; Weg M. Ongkeko, MD, PhD

What disparities exist in terms of **representation in clinical trials** for a particular condition?


JAMA Internal Medicine | Original Investigation | HEALTH CARE POLICY AND LAW

Sex, Racial, and Ethnic Representation in COVID-19 Clinical Trials

A Systematic Review and Meta-analysis

Hong Xiao, PhD; Riha Vaidya, PhD; Fang Liu, MD, MMed; Ximing Chang, BS; Xiaoqian Xia, BS; Joseph M. Unger, PhD, MS

Literature Reviews of Health Equity Topics: Source of Information

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- **Published Literature**
  - Use standard databases (PubMed, Embase, etc.) to identify studies published within the relevant period, as well as meeting abstracts if indexed

- **Society or Government Websites**
  - WHO, CDC, NIH, CMS, ACS, AHA, ACIP
- **Clinical Trials Registries**
  - ClinicalTrials.gov (US) or ISRCTN (UK)
- **Professional Congresses**
  - ISPOR, AMCP, disease-specific meetings

Gray literature

MeSH Terms

NIH National Library of Medicine
National Center for Biotechnology Information

Healthcare Disparities (Introduced 2008)
Differences in access to or availability of medical facilities and services.

Health Status Disparities (Introduced 2023)
Variation in rates of disease occurrence and disabilities between population groups defined by various factors, including socioeconomic status, age, ethnicity, economic resources, gender, geography, or similar measures.

Socioeconomic Disparities in Health (Introduced 2022)
Differences in health based on socioeconomic status.

Health Inequities (Introduced 2008)
Differences in health status or in the distribution of health resources between different population groups, arising from the social conditions in which people are born, grow, live, work, and age.

Minority Health (Introduced 2008)
The concept covering the physical and mental conditions of members of historically marginalized groups.

Literature Reviews of Health Equity Topics: Developing a Comprehensive Search Strategy

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Health disparities - general terms	
"Health Inequities"[Mesh] OR "health inequit*"[Text Word] OR "health inequalit*"[Text Word] OR "health care inequalit*"[Text Word] OR "healthcare inequalit*"[Text Word] OR "health care inequit*"[Text Word] OR "healthcare inequit*"[Text Word] OR "health disparit*"[Text Word] OR "health status disparit*"[Text Word] OR "health status inequalit*"[Text Word] OR "health status inequit*"[Text Word] OR "Healthcare Disparities"[Mesh] OR "healthcare disparit*"[Text Word] OR "health care disparit*"[Text Word] OR "disparities in health*"[Text Word] OR "disparity in health*"[Text Word] OR "Social Determinants of Health"[Mesh] OR "social determinant*"[Text Word] OR "structural determinants of health"[Text Word] OR "health structural determinant*"[Text Word] OR "social determining factor*"[Text Word] OR "social factors determining health"[Text Word] OR "social health determinant*"[Text Word] OR "Health Equity"[Mesh] OR "health equit*"[Text Word] OR "health status equit*"[Text Word] OR "health status equalit*"[Text Word] OR "health care equalit*"[Text Word] OR "healthcare equalit*"[Text Word] OR "health care equit*"[Text Word] OR "healthcare equit*"[Text Word]	88,891
Right to health	
"Right to Health"[Mesh] OR "health care right*"[Text Word] OR "health right*"[Text Word] OR "healthcare right*"[Text Word] OR "right to accessible health*"[Text Word] OR "right to health*"[Text Word]	2,543

- Work with an experienced library scientist
- Focus on specific research questions
- Include a broad set of terms related to disparities and SDOH

Reporting and Gap Analysis

What is known and what remains unanswered?

What additional questions need to be asked?

What additional studies need to be conducted?

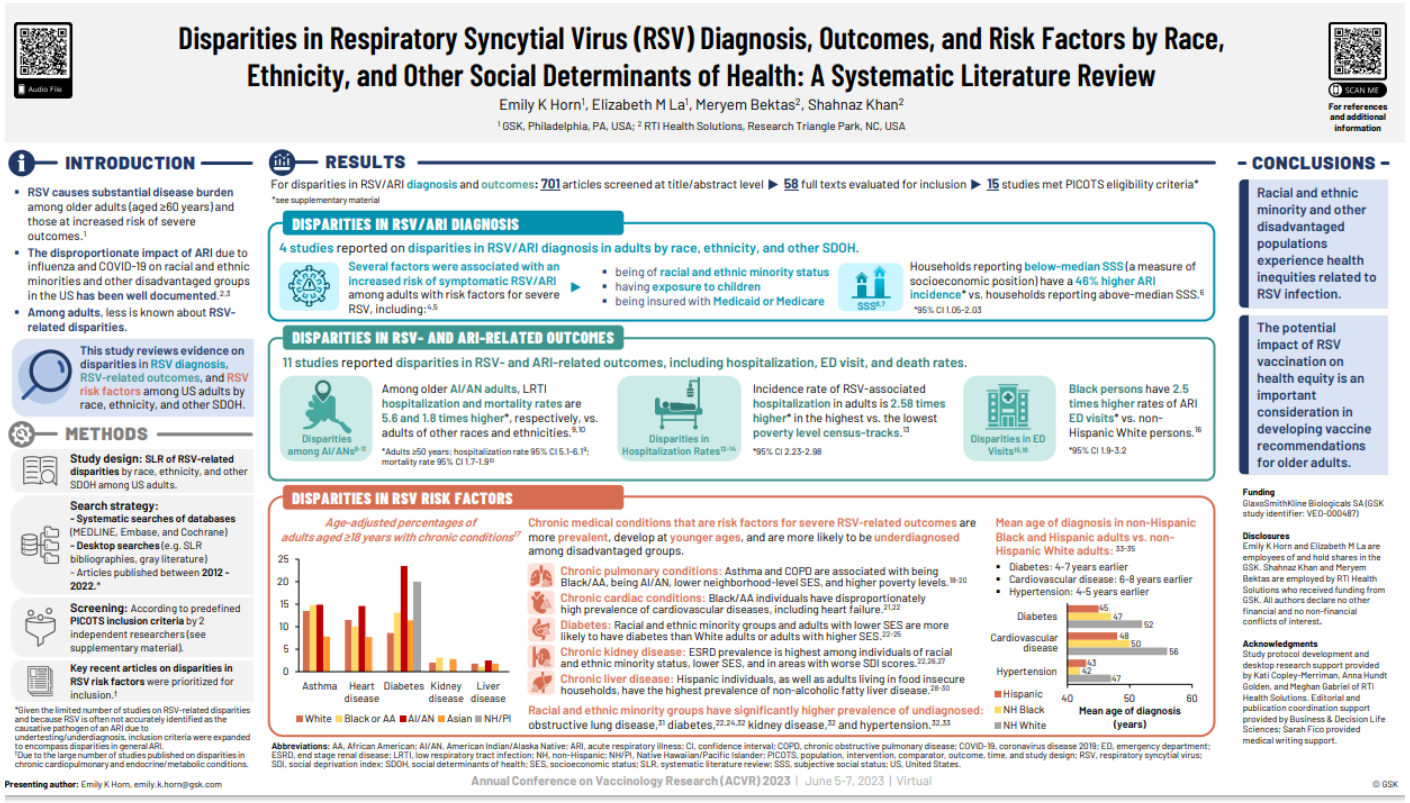
How can results be used to affect patients and address disparities?

Literature Reviews: Case Study

Objective: To assess disparities in RSV diagnosis, risk factors, and outcomes using data from the published literature and gray literature.

From 701 studies identified, 15 met the inclusion criteria based on study objectives.

Results: Available evidence indicated disparities in diagnosis by race, ethnicity, and SDOH; disparities in risk factors that led to those diagnoses; and disparities in outcomes following the diagnoses (e.g., higher rates of emergency department visits, hospitalization, and mortality).



Disparities in Respiratory Syncytial Virus (RSV) Diagnosis, Outcomes, and Risk Factors by Race, Ethnicity, and Other Social Determinants of Health: A Systematic Literature Review

Emily K Horn[1], Elizabeth M La[1], Meryem Bektas[2], Shahnaz Khan[2]

[1] GSK, Philadelphia, PA, USA; [2] RTI Health Solutions, Research Triangle Park, NC, USA

For references and additional information

INTRODUCTION

- RSV causes substantial disease burden among older adults (aged ≥60 years) and those at increased risk of severe outcomes.[1]
- The disproportionate impact of ARI due to influenza and COVID-19 on racial and ethnic minorities and other disadvantaged groups in the US has been well documented.[2,3]
- Among adults, less is known about RSV-related disparities.

This study reviews evidence on disparities in RSV diagnosis, RSV-related outcomes, and RSV risk factors among US adults by race, ethnicity, and other SDOH.

METHODS

Study design: SLR of RSV-related disparities by race, ethnicity, and other SDOH among US adults.

Search strategy:
- Systematic searches of databases (MEDLINE, Embase, and Cochrane)
- Desktop searches (e.g. SLR bibliographies, gray literature)
- Articles published between 2012 - 2022.*

Screening: According to predefined PICOTS inclusion criteria by 2 independent researchers (see supplementary material).

Key recent articles on disparities in RSV risk factors were prioritized for inclusion.†

*Given the limited number of studies on RSV-related disparities and because RSV is often not accurately identified as the causative pathogen of an ARI due to undertesting/underdiagnosis, inclusion criteria were expanded to encompass disparities in general ARI.
†Due to the large number of studies published on disparities in chronic cardiopulmonary and endocrine/metabolic conditions.

Presenting author: Emily K Horn, emily.k.horn@gsk.com

RESULTS

For disparities in RSV/ARI diagnosis and outcomes: 701 articles screened at title/abstract level ▶ 58 full texts evaluated for inclusion ▶ 15 studies met PICOTS eligibility criteria*

*see supplementary material

DISPARITIES IN RSV/ARI DIAGNOSIS

4 studies reported on disparities in RSV/ARI diagnosis in adults by race, ethnicity, and other SDOH.

Several factors were associated with an increased risk of symptomatic RSV/ARI among adults with risk factors for severe RSV, including:[4,5]
- being of racial and ethnic minority status
- having exposure to children
- being insured with Medicaid or Medicare

Households reporting below-median SSS (a measure of socioeconomic position) have a 46% higher ARI incidence* vs. households reporting above-median SSS.[6]
*95% CI 1.05-2.03

DISPARITIES IN RSV- AND ARI-RELATED OUTCOMES

11 studies reported disparities in RSV- and ARI-related outcomes, including hospitalization, ED visit, and death rates.

Disparities among AI/ANs[8-11]: Among older AI/AN adults, LRTI hospitalization and mortality rates are 5.6 and 1.8 times higher*, respectively, vs. adults of other races and ethnicities.[9,10]
*Adults ≥50 years; hospitalization rate 95% CI 5.1-6.1[9]; mortality rate 95% CI 1.7-1.9[10]

Disparities in Hospitalization Rates[12-14]: Incidence rate of RSV-associated hospitalization in adults is 2.58 times higher* in the highest vs. the lowest poverty level census-tracks.[13]
*95% CI 2.23-2.98

Disparities in ED Visits[15,16]: Black persons have 2.5 times higher rates of ARI ED visits* vs. non-Hispanic White persons.[16]
*95% CI 1.9-3.2

DISPARITIES IN RSV RISK FACTORS

Age-adjusted percentages of adults aged ≥18 years with chronic conditions[27]

Chronic medical conditions that are risk factors for severe RSV-related outcomes are more prevalent, develop at younger ages, and are more likely to be underdiagnosed among disadvantaged groups.

- Chronic pulmonary conditions: Asthma and COPD are associated with being Black/AA, being AI/AN, lower neighborhood-level SES, and higher poverty levels.[18-20]
- Chronic cardiac conditions: Black/AA individuals have disproportionately high prevalence of cardiovascular diseases, including heart failure.[21,22]
- Diabetes: Racial and ethnic minority groups and adults with lower SES are more likely to have diabetes than White adults or adults with higher SES.[22-25]
- Chronic kidney disease: ESRD prevalence is highest among individuals of racial and ethnic minority status, lower SES, and in areas with worse SDI scores.[22,26,27]
- Chronic liver disease: Hispanic individuals, as well as adults living in food insecure households, have the highest prevalence of non-alcoholic fatty liver disease.[28-30]

Racial and ethnic minority groups have significantly higher prevalence of undiagnosed: obstructive lung disease,[31] diabetes,[22,24,32] kidney disease,[32] and hypertension.[32,33]

Mean age of diagnosis in non-Hispanic Black and Hispanic adults vs. non-Hispanic White adults:[33-35]
- Diabetes: 4-7 years earlier
- Cardiovascular disease: 6-8 years earlier
- Hypertension: 4-5 years earlier

Abbreviations: AA, African American; AI/AN, American Indian/Alaska Native; ARI, acute respiratory illness; CI, confidence interval; COPD, chronic obstructive pulmonary disease; COVID-19, coronavirus disease 2019; ED, emergency department; ESRD, end stage renal disease; LRTI, low respiratory tract infection; NH, non-Hispanic; NH/PI, Native Hawaiian/Pacific Islander; PICOTS, population, intervention, comparator, outcome, time, and study design; RSV, respiratory syncytial virus; SDI, social deprivation index; SDOH, social determinants of health; SES, socioeconomic status; SLR, systematic literature review; SSS, subjective social status; US, United States.

CONCLUSIONS

Racial and ethnic minority and other disadvantaged populations experience health inequities related to RSV infection.

The potential impact of RSV vaccination on health equity is an important consideration in developing vaccine recommendations for older adults.

Funding
GlaxoSmithKline Biologicals SA (GSK study identifier: VEO-000487)

Disclosures
Emily K Horn and Elizabeth M La are employees of and hold shares in the GSK. Shahnaz Khan and Meryem Bektas are employed by RTI Health Solutions who received funding from GSK. All authors declare no other financial and no non-financial conflicts of interest.

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Study protocol development and desktop research support provided by Kati Copley-Merriman, Anna Hundt Golden, and Meghan Gabriel of RTI Health Solutions. Editorial and publication coordination support provided by Business & Decision Life Sciences; Sarah Fico provided medical writing support.

Annual Conference on Vaccinology Research (ACVR) 2023 | June 5-7, 2023 | Virtual

CDC ACIP

CENTERS FOR DISEASE CONTROL AND PREVENTION

EQUITY

WORK GROUP JUDGEMENTS	EVIDENCE
What would be the impact on health equity? ○ Reduced ○ Probably reduced ○ Probably no impact ○ Probably increased ○ Varies ○ Don't know	Summarize the findings from a review of the literature addressing issues of health inequities or groups who may be disadvantaged.

Types of Health Equity Projects: Distributional Cost-Effectiveness Analysis

Ashley Davis

Senior Director, Health Economics

Cost-Effectiveness Analysis, an Economic Model

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What it does

- Compares the costs and benefits of an intervention, treatment, or policy with alternative options (e.g., assessing the impact of RSV vaccination)

Why it is useful

- Allows decision-makers to compare options by considering the associated health and cost outcomes at the population level
- Possible incremental outcomes may include the incremental cost per QALY gained, life-year gained, or case averted

What are its limitations from a health equity lens?

- Does not consider how an intervention's benefits are distributed throughout a population:
  - Who benefits most from this intervention?
  - Do underserved groups experience health gains too?
  - Does this intervention increase or decrease existing health disparities?

QALY = quality-adjusted life-year.

Distributional Cost-Effectiveness Analysis

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What it does

- Expands traditional cost-effectiveness modeling approaches to incorporate fairness in the distribution of costs and effects as well as efficiency/equity tradeoffs for the indicated population

Why it is useful

- Provides traditional cost-effectiveness outcomes in the context of whether the intervention also improves or worsens health equity
- Accounts for disparate effects in an intervention's uptake and accessibility, efficacy, and opportunity costs within the population

When it is used

- When gains do not match needs (e.g., a group with high need receives an intervention at a lower rate or with less effectiveness)
- When you anticipate that equity will be an important factor for a decision-maker

Source: ISPOR (2023).

Distributional Cost-Effectiveness Analysis: Methodology

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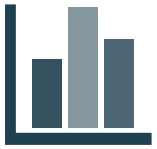
Describe current health inequities

Estimate current health metrics for equity-relevant groups (e.g., quality-adjusted life expectancy) based on literature and publicly available data.

Identify potential causes of disparate impact

Consider mechanisms by which disparate impacts may occur (e.g., differences in uptake, adherence, effectiveness across equity groups).



Estimate health outcomes

Calculate the distribution of health benefits and opportunity costs from the intervention, noting which equity-relevant groups incur gains/losses.

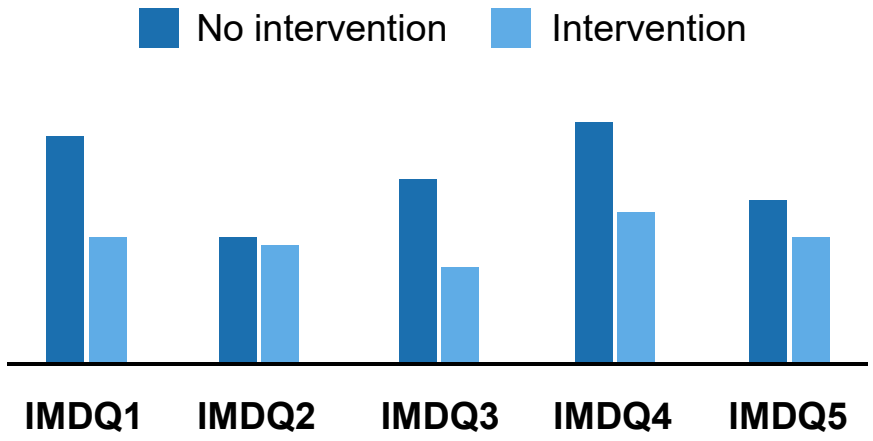
Evaluate overall equity impact

Compare the intervention's equity impact with decision-makers' attitudes toward reducing inequality. Adjust for value judgements and analyze tradeoffs.

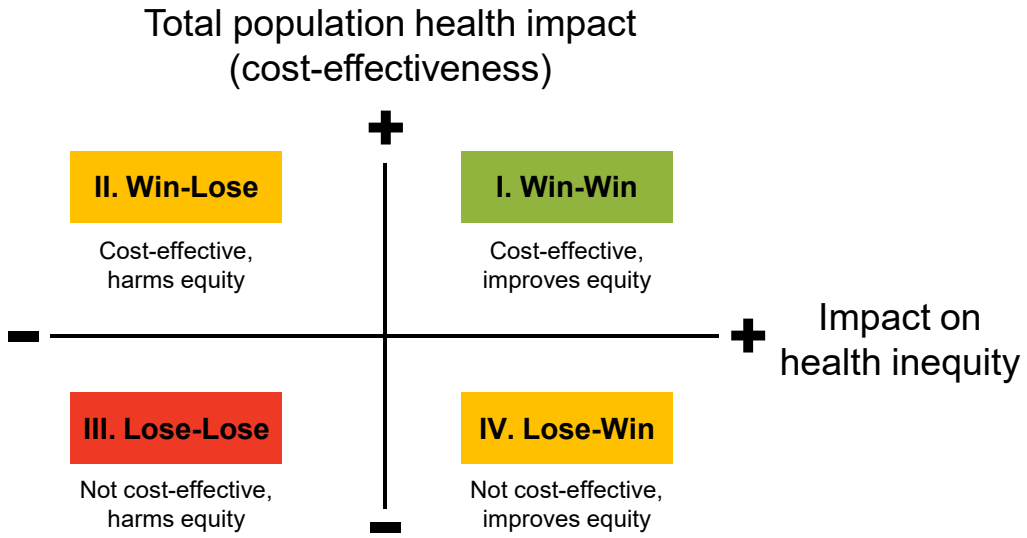
Sources: Asaria et al. (2015); ISPOR (2023).

Distributional Cost-Effectiveness Analysis: Graphics

Cost-effectiveness outcomes can be evaluated across a spectrum of socioeconomic subgroups.



Overall health impacts and cost-effectiveness outcomes are considered in parallel with health equity.



IMDQ = Index of Multiple Deprivation Quintile.

Sources: Asaria et al. (2015); ISPOR (2023).

Distributional Cost-Effectiveness Analysis: Example

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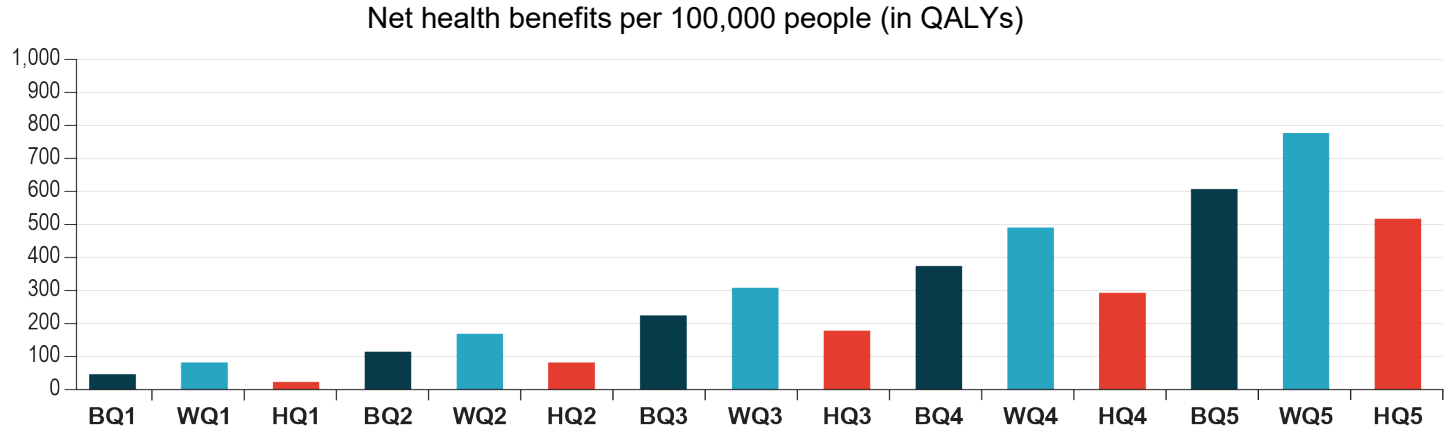
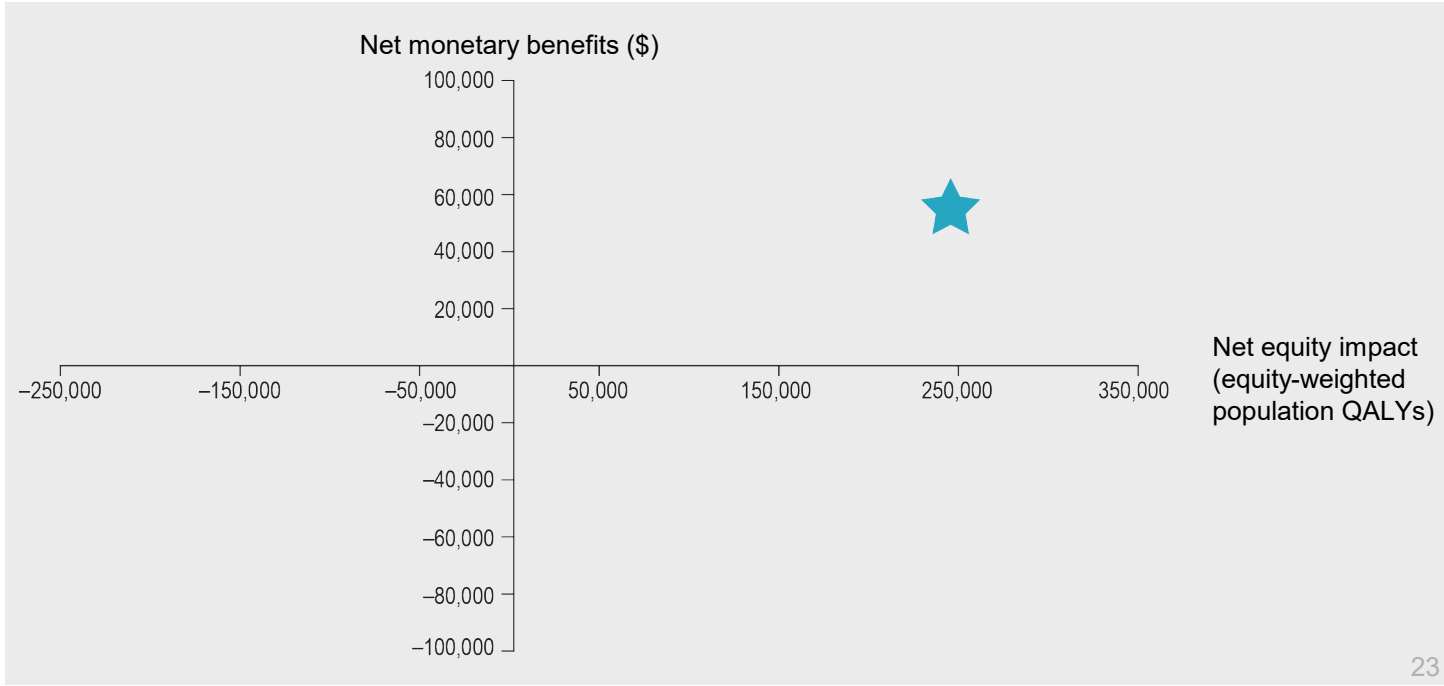
Kowal et al. (2023)

- **Objective:** How did Medicare funding of inpatient COVID-19 treatment affect health equity in the US?
- **Equity groups:** 15 equity-relevant groups informed by race/ethnic groups and social vulnerability
- **Health equity metric:** Quality-adjusted life expectancy





B = Black; H = Hispanic; Q = social vulnerability quintile; W = White.

Source: Kowal et al. (2023).

Recent Distributional Cost-Effectiveness Analyses in Literature

Publication	Country	Disease Area	Intervention	Description
Kowal et al. (2023)	US	COVID	Funding hospitalizations	Analyzed health equity impacts across 15 equity-relevant groups informed by race/ethnic groups and SVI. Accounted for different incidence and mortality across the groups.
Goshua et al. (2023)	US	Sickle-cell disease	Gene therapy	Analyzed health equity impact on male and female patients with sickle-cell disease to measure how gene therapy could close the gaps in health outcomes between these populations.
Meunier et al. (2023)	UK	Cancer	Atezolizumab vs. docetaxel and alectinib vs. crizotinib	Analyzed health equity impact across 5 socioeconomic groups, classified using an IMD score that incorporates differences in income, employment, education, health, crime, housing, and living environment.
Quan et al. (2021)	US	HIV	Equity-focused implementation of MOUD, EMR reminders, rapid testing, and ART case management	Analyzed health impact across racial/ethnic groups, focusing on 3 populations (Black, Hispanic, White) to assess whether an equity-focused implementation approach would lead to an equitable distribution of health benefits.

ART = antiretroviral therapy; EMR = electronic medical record; IMD = Index of Multiple Deprivation; MOUD = medication for opioid use disorder; SVI = Social Vulnerability Index.

Discussion and Limitations

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- Most cost-effectiveness models can be readily adapted to the distributional cost-effectiveness analysis framework to explore health equity questions.
- Evaluating the benefits of new interventions from both cost-effectiveness and health-equity perspectives can lead to more informed healthcare decisions.
- Data availability is the biggest challenge.
  - Can we classify the population into important groups with different social vulnerability?
  - Are clinical trial data and other intervention-related impacts (e.g., uptake, adherence) available to compare differences in outcomes between groups?
  - Can we estimate an appropriate inequality aversion parameter (i.e., do we know how much a decision-maker values reducing health inequality)?

Types of Health Equity Projects: Database Studies

Jarrod Bullard

Senior Research Data Scientist, Health Economics

Database Studies in Pharma Research

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Database studies can provide critical real-world evidence (RWE) about pharmaceutical product impact on patient outcomes and how outcomes can vary across populations.

Type of analysis	Example study purpose
Cost	• Determine cost now versus cost then
Comparative	• Compare costs or outcomes for Medication A vs. Medication B • Compare costs or outcomes for Patient Group 1 vs. Patient Group 2
Outcome	• Determine clinical outcomes • Determine economic outcomes
Pharmaceutical trend	• Provide insight into pharmaceutical prescribing and utilization trends
Epidemiological	• Gain insight of disease activity and how it effects defined patient populations

Source: Sax (2005).

Common Types of Databases Used in Health Research

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Type	Advantages	Disadvantages	Examples
Reimbursement and administrative	• Useful for tracking healthcare utilization and costs • Includes any service reimbursed by health insurance • Generally, demographic information	• Cost data limited to clinical cost drivers. Does not capture complete cost data • Must request data and be knowledgeable about the process and standards used in claim submissions • Usually requires lots of data management	• Medicare • MarketScan
Disease surveillance	• Captures granular disease-specific data • Captures outcome events	• Varying amounts of healthcare utilization information • Limited information on individual characteristics • No control group	• SEER • SEER-Medicare
Electronic health records (EHR)	• Good clinical context • Medical and clinical data	• Unstructured data • Lack of consistency/data quality • May require manual medical record abstraction	• EPIC • Cerner
Patient-reported data	• Patient and/or caregiver outcomes • Unique perspective • Offers additional information on treatment and outcomes beyond a clinical encounter • Obtaining intended compliance information	• Literacy, language barriers can lead to underrepresentation • Can be lost to follow-up • Limited confidence in reporting clinical information and utilization information (recall bias)	• MEPS

Lack of, incomplete, or inconsistent data on social needs/risks

EPIC = European Investigation into Cancer and Nutrition; MEPS = Medical Expenditure Panel Survey; SEER = Surveillance, Epidemiology, and End Results.

Source: Gliklich et al. (2014).

Where to Start

Uncover care gaps and understand the drivers

- Identify the care gap
  - E.g., low treatment rates
  - Stratify treatment rates, adherence rates, and outcomes by populations to uncover gaps and disparities

- Identify the drivers
  - Is it a socioeconomic issue (income, health literacy, etc.)?
  - Is it a lifestyle issue (physical activity, alcohol consumption, diet, smoking, etc.)?
  - Is it an access to healthcare issue (remote or rural, health provider shortage area, etc.)?
  - Is it a transportation issue?

Source: https://www.mmitnetwork.com/aishealth/spotlight-on-market-access/pharma-is-stepping-up-focus-on-sdoh-urging-use-of-data-driven-approach.

Area-Level Databases

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- Accessing area-level data and analyzing how these data affect treatment and adherence rates by therapeutic area can help to uncover the drivers behind the gaps in care and/or outcomes and where efforts should be prioritized to reach full value.
  - Publicly available indices such as the Area Deprivation Index (ADI) and the CDC's Social Vulnerability Index (SVI) are used extensively to identify and account for SDOH and SES at the area level.

Composite measure	SDOH domains	Data source(s)	Variables	Geo level
Area Deprivation Index (ADI)	Education, employment, SES, housing, transportation, household composition	American Community Survey	17	Census Block
Social Vulnerability Index (SVI)	SES, household composition and disability, minority status and language, housing and transportation	American Community Survey	15	Census Block, Tract, ZCTA
Social Deprivation Index (SDI)	Poverty, education, household composition, housing, transportation, employment	American Community Survey	7	County, Census Tract, ZCTA

SES = socioeconomic status; ZCTA = Zip-Code Tabulation Area.

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an AI solution of RTI International

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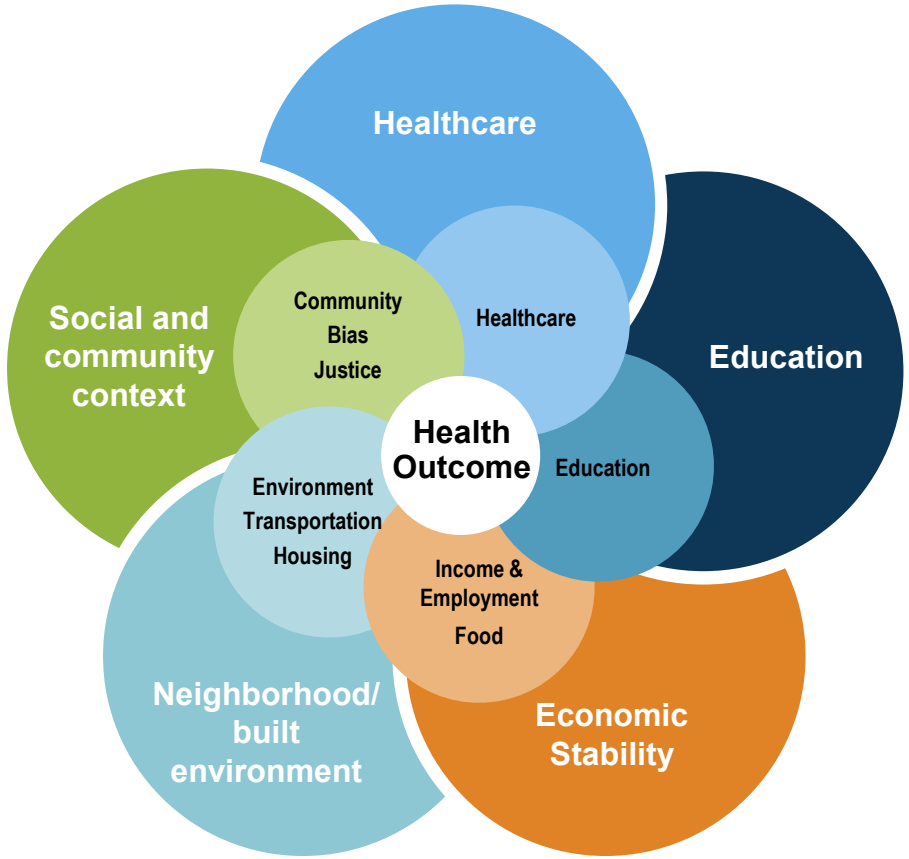
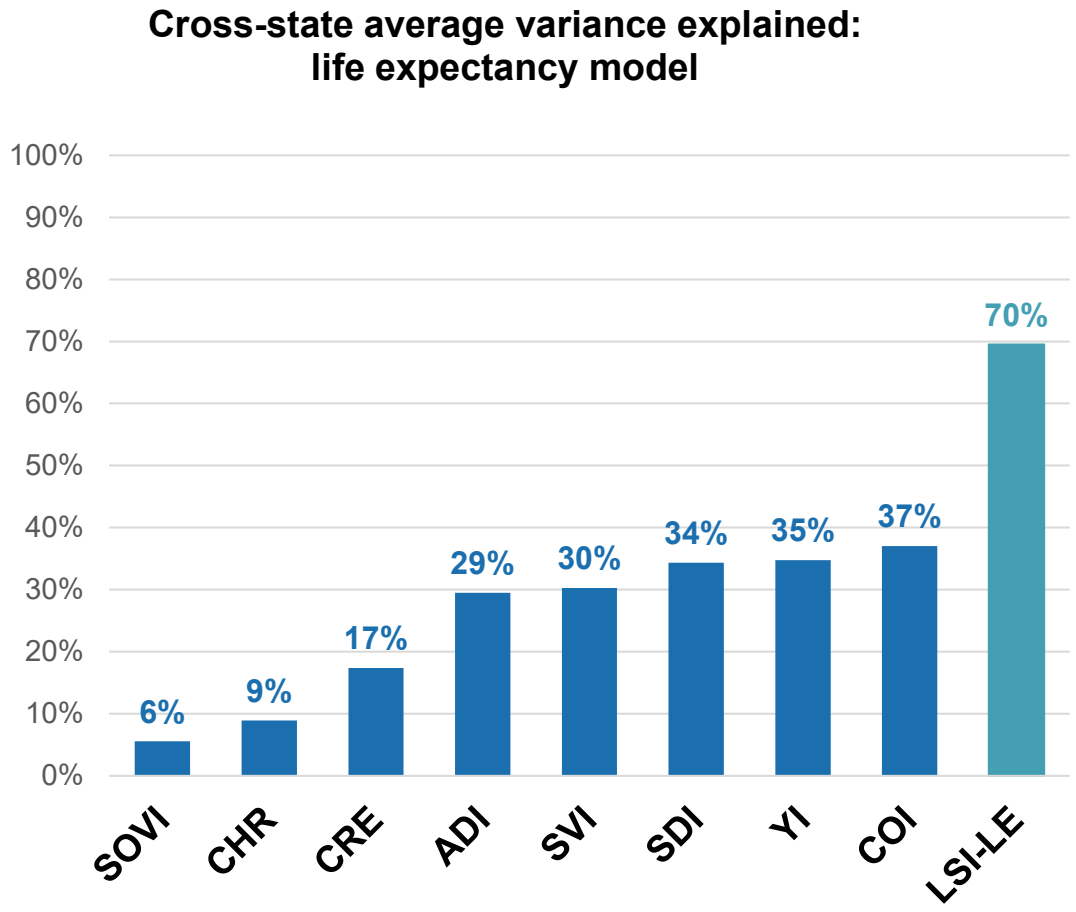
An SDOH curated data set and tool using random forest models to derive Local Social Inequity (LSI) scores, which predict health outcomes in small geographic areas (Census tracts) using 10 domains of social and behavioral factors.

200+ variables from over 40 sources	Data from 1978 through 2022
Continually adding new measures	Automated updates to existing measures



RTI Rarity Compared With Other Social Risk Indices

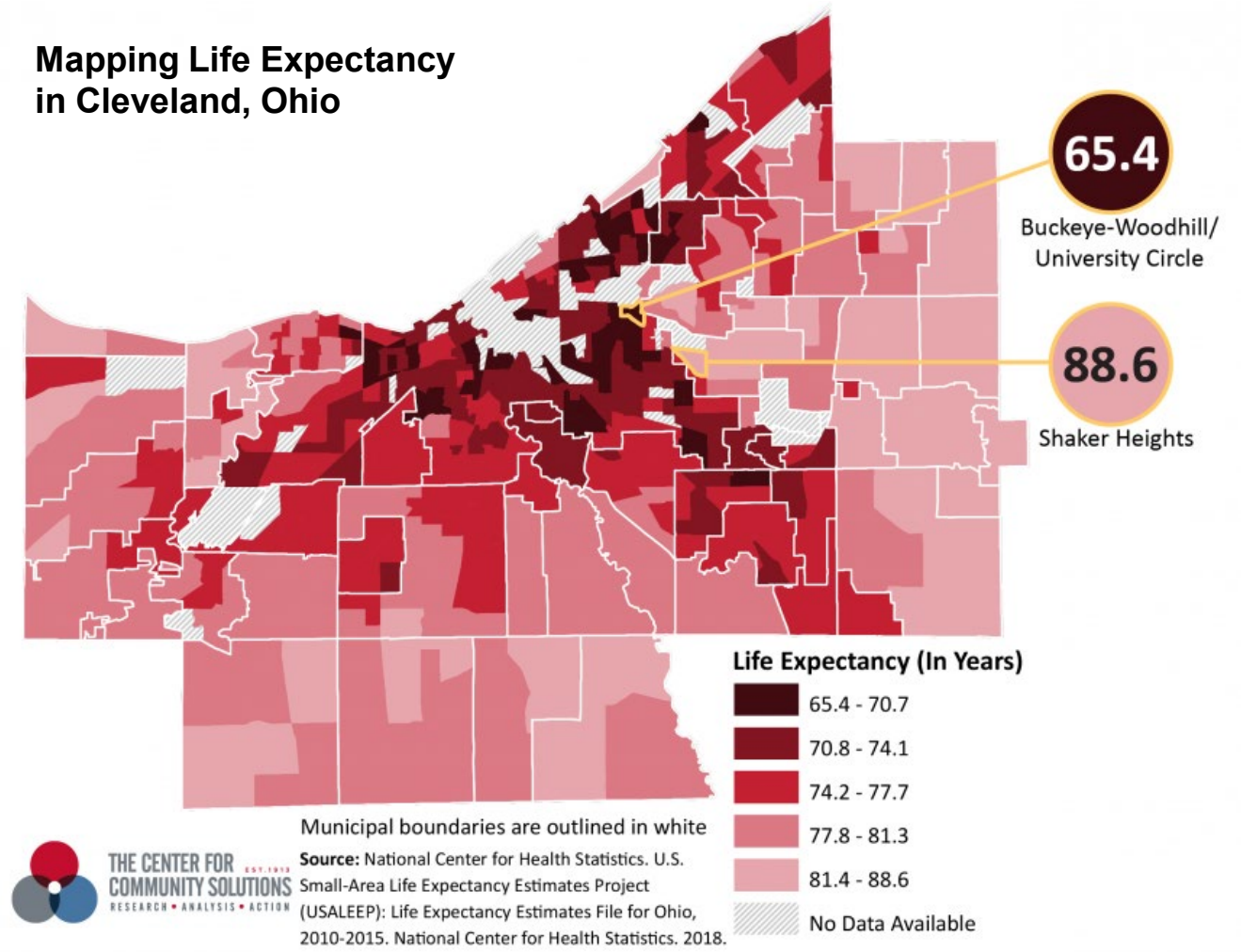
Composite measure	SDOH domains	Data sources	Variables
Area Deprivation Index (ADI)	Education, employment, SES, housing, transportation, household composition	American Community Survey	17
Social Vulnerability Index (SVI)	SES, household composition and disability, minority status and language, housing and transportation	American Community Survey	15
Social Deprivation Index (SDI)	Poverty, education, household composition, housing, transportation, employment	American Community Survey	7
Local Social Inequity (LSI)	• Educational attainment • Healthcare access, coverage, costs, quality • Community health, well-being, healthy behaviors • Bias, stress, trauma • Justice, crime, incarceration • Food security, access to healthy food • Poverty, inequality, employment • Housing adequacy, crowding, structural health • Environmental quality • Transportation access, infrastructure, safety	More than 40 federal and private data sources	Over 200



CHR = County Health Ranking; COI = Child Opportunity Index; CRE = Commercial Real Estate; LSI-LE = Local Social Inequity-Life Expectancy; SOVI = Social Vulnerability Index; YI = Youth Index.

A Merged Solution: RTI Rarity and RWD

- RTI Rarity provides a composite measure of social risk (LSI) for neighborhoods across the US.
- RWD coupled with RTI Rarity can help uncover nonmedical factors that affect diagnosis, treatment, response, and adherence outcomes across multiple populations and geographies.
- RTI Rarity can also help improve diversity in clinical trials by existing as a tool to identify diverse geographies and neighborhoods across a spectrum of demographic and social factors.



RWD = real-world data.

What Can RTI Rarity Solve?

Question of interest

- Where, geographically, are there populations with higher prevalence of diabetes or heart disease?
- What areas should I target for recruiting individuals 65 years of age and older?
- Where are the most racially and ethnically diverse neighborhoods?
- What neighborhoods can be targeted to recruit more members of the LGBTQI+ community in a clinical trial?

Shifting the Health Equity Focus in Pharma

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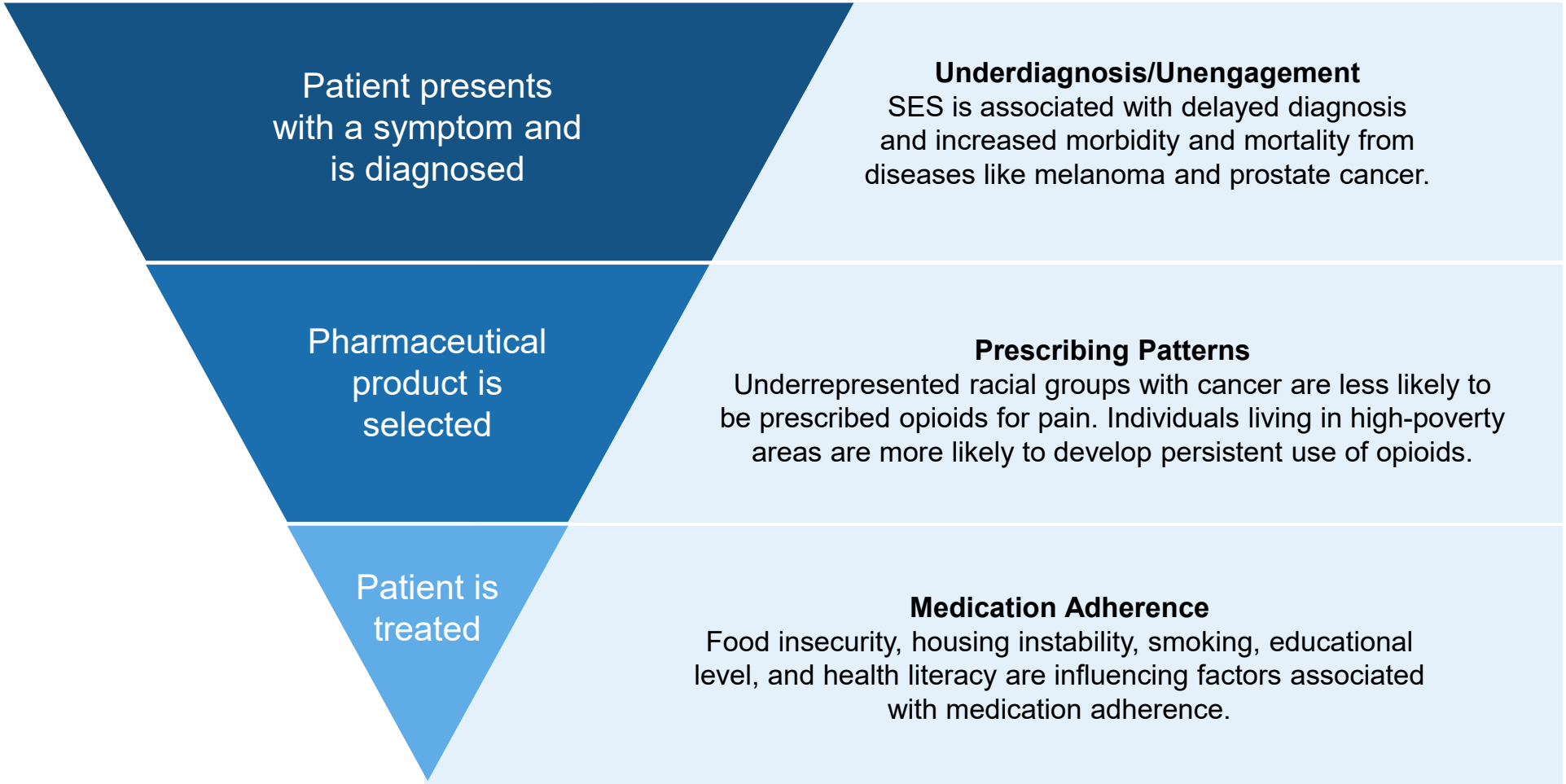
The Patient Funnel



Source: https://www.mmitnetwork.com/aishealth/spotlight-on-market-access/pharma-is-stepping-up-focus-on-sdoh-urging-use-of-data-driven-approach.

Takeaways

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Systemic inequities have undermined the physical, social, economic, and emotional well-being of historically marginalized communities.

Intersectionality is an essential framework for understanding how parts of one's identity interact with systems of power and oppression to affect their experiences and health outcomes.

A targeted or systematic literature review can serve as an initial step for exploring what is known and unknown about a particular topic related to health equity.

The distributional cost-effectiveness analysis framework expands on traditional cost-effectiveness modeling approaches to explore health equity questions. Considering health equity alongside cost-effectiveness may lead to more-informed healthcare decisions.

Databases commonly used in healthcare and economic research lack data on nonmedical factors that influence outcomes, such as social needs and socioeconomic status.

A combination of RWD and specialized databases capturing social risk and needs data can be used for health equity research to identify historically excluded and underincluded populations.

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Health Solutions

Thank You!

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