UTHealth | School of Public Health
The University of Texas
Health Science Center at Houston

The Impact of Social Determinants of Health on Reportable Health Outcomes

PRESENTED BY CAROLINE SCHAEFER, MPH

35TH ANNUAL NAHDO CONFERENCE, AUGUST 17, 2020

About the presenter

- Undergraduate – University of Notre Dame, Mathematics
- Graduate – Saint Louis University, Biostatistics and Epidemiology
- Previous work – NASA Johnson Space Center, Houston, TX
  - Health and Human Performance Directorate
    - Lifetime Surveillance of Astronaut Health
    - Space Medicine Operations
    - Human Research Program
- Currently at UTHealth Science Center School of Public Health, Center for Health Care Data
  - Health effects of Hurricane Harvey on vulnerable populations
  - Aesthesia and maternal outcomes
  - Reporting state cost, utilization, disease prevalence and more for Texas Health and Human Services
  - Social Determinants of Health

Center for Health Care Data

- The largest claims database in the state
- Approximately 80% of the insured population of Texas
- Certified CMS Qualified Entity - QE
  - Health of Texas
- Projects
  - External Quality Review Organization, partner
  - Cross-agency coordination of health care strategies and measures
  - Targeted research in clinical outcomes, health economics, and quality improvement

UTHealth | School of Public Health
The University of Texas
Health Science Center at Houston

Objective and Design

- To study the contribution of social determinants of health (SDOH) on population health by associating common SDOH from public data sources at the county level with claims-based health outcome and utilizations metrics
- Claims outcomes attained from Texas Medicare & Medicaid and commercial data
  - Cost, emergency department visits, inpatient stays, and 3M™ Clinical Risk Group and severity
- Data from public data sources and publications to create county level SDOH[1-4]
  - Sources include, but not limited to: National Center for Health Statistics, Behavioral Risk Factor Surveillance System, USDA Food Environment Atlas, Bureau of Labor Statistics
  - Some SDOH unique to different populations, i.e. under 19, 65 plus, general population

1. Remington, P.L., Catlin, B.B. & Gennuso, K.P. The County Health Rankings: rationale and methods. Popul Health Metrics 13, 11 (2015). https://doi.org/10.1186/s12963-015-0044-2
2. Institute of Medicine. Capturing Social and Behavioral Domains and Measures in Electronic Health Records: Phase 2. Washington, DC: The National Academies Press; 2014. [Internet]. [cited 2020, Jan 15]. https://www.ncbi.nlm.nih.gov/books/NBK436060/.
3. Park, H., Roubal, A.M., Jovaag, A., Gennuso, K.P., & Catlin, B. (2015). Relative Contributions of a Set of Health Factors to Selected Health Outcomes. Am J Prev Med, 2015, 49(6): 961-9.
4. Athens, J. K., Catlin, B. B., Remington, P. L., & Gangnon, R. E. (2013). Using Empirical Bayes Methods to Rank Counties on Population Health Measures. Prev Chronic Dis, 10, E129.

What are Social Determinants of Health?

"Social determinants of health are conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks." – HealthyPeople.gov

- Part of the Healthy People 2020 initiative to create social and physical environments that promote good health for all
- Examples
  - Access to health care services
  - Food insecurity
  - Quality of housing
  - Access to exercise opportunities
  - Social cohesion
- Not limited to strictly "social" conditions

Why are SDOH Important?

- Measures of performance and quality target providers and health plans
- However, consumers of healthcare make decisions regarding treatment, compliance, and health behaviors that impact measures of performance and quality
- Consumers are affected by their environment

SDOH Categories

SDOH variables can be grouped into "categories" based on their area of impact, similar to Healthy People 2020

- Access to Health Care
- Health Behaviors (Smoking, Etc.)
- Health Outcomes (Perceived Health, Teen Births)
- Physical Environment (Air Quality, Housing)
- Social and Economic Environment (Unemployment, Children in Poverty)

Model Design

- Models for all outcomes included SDOH variables and adjusted for individual variables (age, sex, insurance type)
- SDOH "categories" reported
- Cost, emergency department visits, and inpatient admissions - linear regressions
- 3M CRG and severity - proportional odds models
- <u>Model coefficient estimates were then used to create weights for each SDOH and SDOH category to use in a conceptual framework</u>

SDOH Category Results

SDOH Category	Under 19	65 Plus	General Population
Access to Health Care	15.0%	8.6%	8.9%
Health Behaviors	12.7%	31.7%	25.8%
Health Outcomes	20.4%	36.5%	32.6%
Physical Environment	23.7%	10.3%	10.2%
Social & Economic Environment	28.2%	12.8%	22.5%

Category Impact on Specific Outcomes

Under 19:

- Social and Economic Environment - cost, inpatient admissions (tied with physical environment), and 3M severity
- Physical Environment - inpatient admissions (tied with social and economic environment) and 3M CRG
- Health Outcomes - emergency department visits

65 Plus:

- Health Outcomes – cost and 3M CRG
- Health Behaviors – inpatient admissions and emergency department visits
- Social and Economic Environment - 3M severity

General Population:

- Health Outcomes – cost, inpatient admissions, and 3M CRG
- Health Behaviors – emergency department visits
- Social and Economic Environment – 3M severity

Conceptual Matrix: Under age 19

Focus Area	Measure	Weight	Source
Health Outcomes (20%)			
Focus Area	Measure	Weight	Source
Healthcare status	Child Mortality Rate	20%	CDC WONDER mortality data
	Infant Mortality Rate	20%	The Compressed Mortality File (CMF)
	Percent of uninsured children	25%	Small Area Health Insurance Estimates
	Low birthweight	35%	National Center for Health Statistics – Natality files
Health Behaviors (15%)			
Focus Area	Measure	Weight	Source
Health Focus	Food environment index	35%	USDA Food Environment Atlas, Map the Meal Gap
	Access to exercise opportunities	15%	Business Analyst, Delorme map data, ESRI, & U.S. Census Files
Sexual activity	Sexually transmitted infections	25%	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
	Teen births	25%	National Center for Health Statistics – Natality files
Access (15%)			
Focus Area	Measure	Weight	Source
Access to care	Primary care physicians	45%	Area Health Resource File/American Medical Association
	Mental health providers	55%	CMS, National Provider Identification file
Social and Economic Environment (30%)			
Focus Area	Measure	Weight	Source
Education	High school graduation	10%	State-specific sources & EDFacts
Employment	Unemployment	25%	Bureau of Labor Statistics
Home Environment	Children in poverty	10%	Small Area Income and Poverty Estimates
	Food Insecurity	10%	Feeding America Data Map
	Children in single-parent households	15%	American Community Survey
Community safety	Violent crime	5%	Uniform Crime Reporting – FBI
	Injury deaths	15%	CDC WONDER mortality data
	Disconnected youth	10%	US census data and Measure of America.org
Physical Environment (20%)			
Focus Area	Measure	Weight	Source
Air and water quality	Air pollution - particulate matter	20%	Environmental Public Health Tracking Network
	Drinking water violations	10%	Safe Drinking Water Information System
Housing	Severe housing problems	30%	Comprehensive Housing Affordability Strategy (CHAS) data
	Food Desert	40%	United States Department of Agriculture Economic Research Service

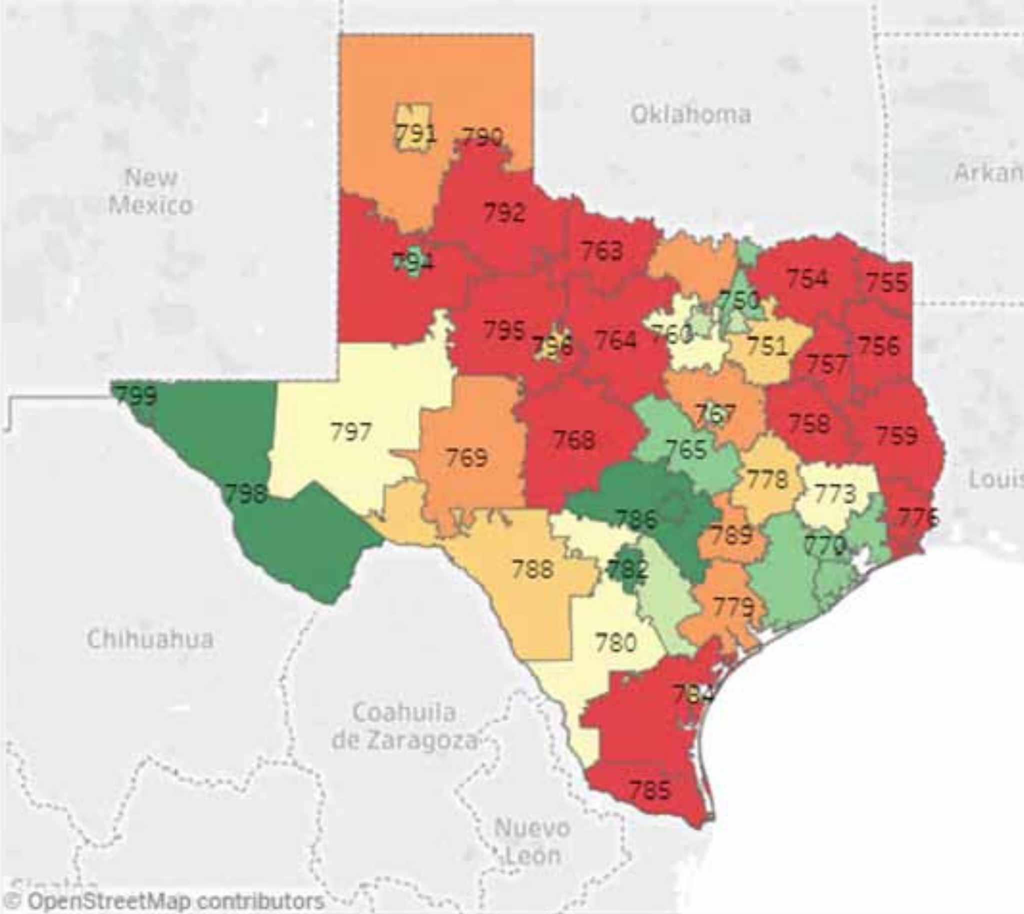
Conceptual Matrix: Under age 19

Health plans: How can we help communities that are experiencing wide-spread unemployment?

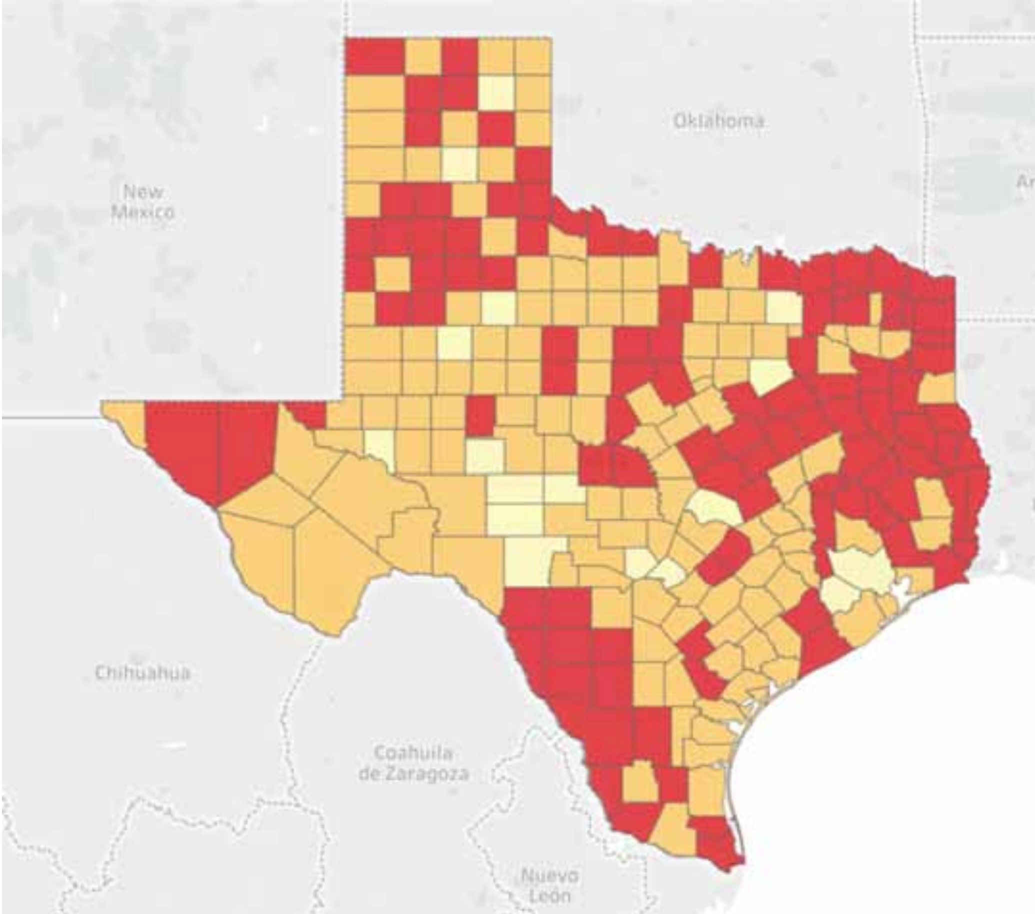
Local, state, & federal policy makers: Increasing access to healthy and affordable food options can have a large impact on the overall health of children and adolescents.

Social and Economic Environment (30%)			
Focus Area	Measure	Weight	Source
Education	High school graduation	10%	State-specific sources & EDFacts
Employment	Unemployment	25%	Bureau of Labor Statistics
Home Environment	Children in poverty	10%	Small Area Income and Poverty Estimates
	Food Insecurity	10%	Feeding America Data Map
	Children in single-parent households	15%	American Community Survey
Community safety	Violent crime	5%	Uniform Crime Reporting – FBI
	Injury deaths	15%	CDC WONDER mortality data
	Disconnected youth	10%	US census data and Measure of America.org
Physical Environment (20%)			
Focus Area	Measure	Weight	Source
Air and water quality	Air pollution - particulate matter	20%	Environmental Public Health Tracking Network
	Drinking water violations	10%	Safe Drinking Water Information System
Housing	Severe housing problems	30%	Comprehensive Housing Affordability Strategy (CHAS) data
	Food Desert	40%	United States Department of Agriculture Economic Research Service

COPD Rates



County Smoking Rates



Discussion

Variations in SDOH weights were seen across age groups and across health outcomes

- How we view social determinants and their relationship with health should change based on populations and what outcomes we are observing
- No one SDOH can explain or solve health disparities. Understand that social determinants are a suite of variables that describe an individual's environment.

Proposed a conceptual framework that can be used by policy decision-makers, insurance carriers, and providers to develop interventions that are targeted to address specific social factors and populations

Discussion

Limitations

- County level SDOH
- Inability to use individual race or income information
- Data on uninsured populations not captured

Future Work and Improvements

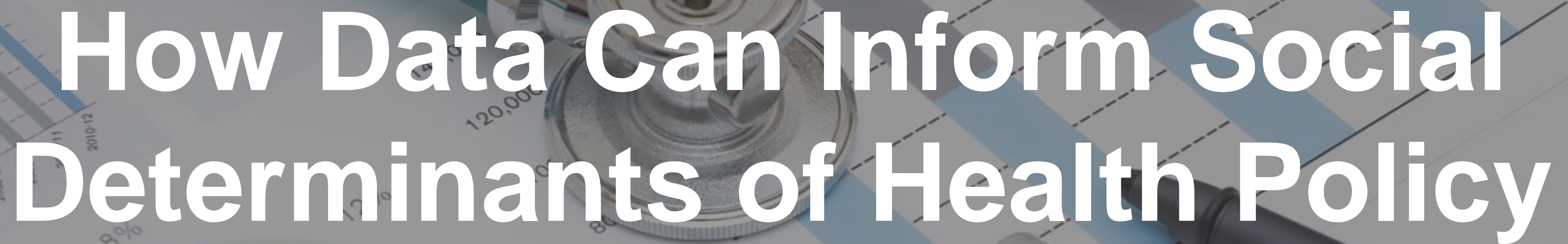
- Smaller geographic areas of social determinant variables
- Inclusion of additional health outcome variables

UTHealth | School of Public Health
The University of Texas
Health Science Center at Houston

Questions

CONTACT:

CAROLINE.M.SCHAEFER@UTH.TMC.EDU



How Data Can Inform Social Determinants of Health Policy

National Association of Health Data Organizations
35th Annual Conference
August 17, 2020

Applying publicly available data to address complex social issues

JENNIFER A. POOLER, MPP

IMPAQ HEALTH

Introduction

- Background & Problem
- Strategy
- Data & Methods
- Visualizing the Data
- Benefits & Challenges

Background

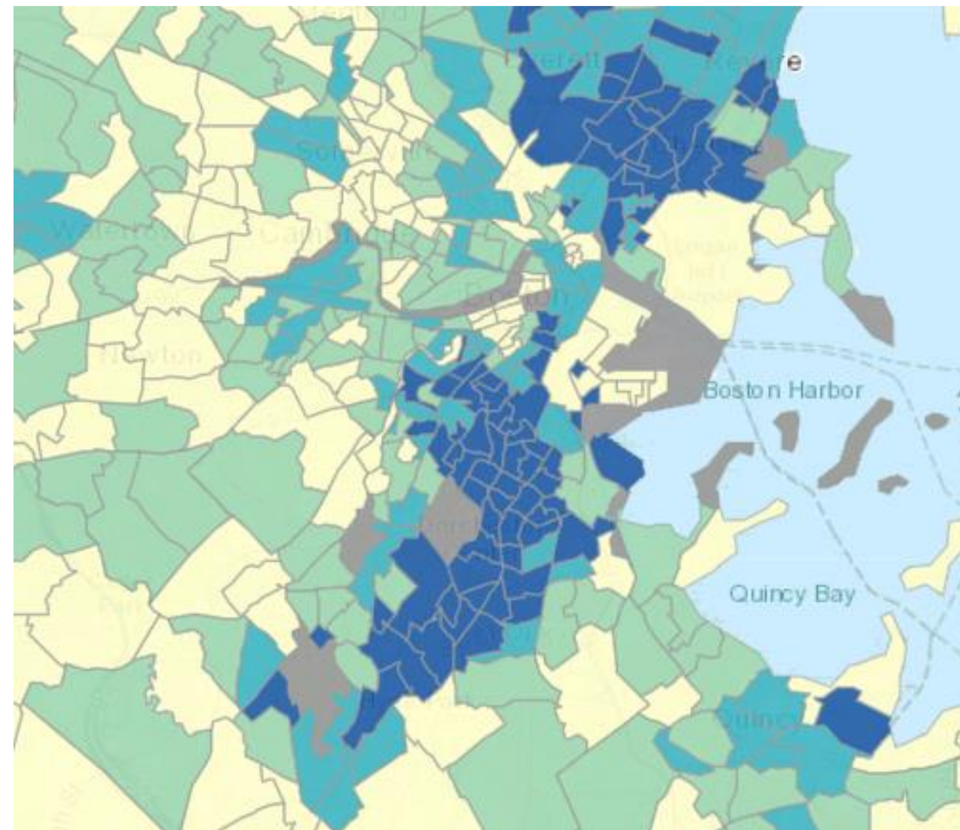
- Access to nutritious food is a key social determinant of health
- Many factors contribute to limited food access:
  - Socio-economic factors – Can individuals/families afford to buy healthy food?
  - Community factors – Do community members live in proximity to stores that offer nutritious foods (e.g., supermarkets, farmers markets)? Can community members get to those stores?
  - Other contextual factors – Can individuals/families prepare healthy meals?

Problem

- COVID-19 created new challenges in food access
  - Increasing unemployment
  - School / summer food program site closures
  - Stay-at-home orders and closure of public transportation
  - Older adults and those at high risk may be reluctant to visit grocery stores
- How do we ensure the people who need food, receive it?
  - How can we inform the multitude of organizations, policies, and programs that seek to alleviate hunger?

Driving Strategy

- Using publicly available data, we aim to create a Food Access Index to identify census tracts at highest risk of having limited food access
  - What community and individual-level factors contribute to limited food access?
  - What data are available to distinguish food access risk between communities?



Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. Social Vulnerability Index

Data

- U.S. Census Bureau's American Community Survey (ACS)
- U.S. Department of Agriculture's Food Access Research Atlas
- Urban Institute – low-income job loss (based on U.S. Bureau of Labor Statistics Current Employment Statistics and ACS)
- U.S. Department of Education, National Center for Education Statistics, Common Core of Data

Methods

- Consultation with experts in food insecurity and organizations involved in charitable and community food services
    - Identification of indicators influencing food access
- Acquisition of publicly available data address those indicators
- Variable reduction – eliminate redundancy, focus on factors that distinguish between communities
- Calculate the index
- Visualize the data

Visualizing the Data

The Food Access Index will allow users to **easily identify communities** at heightened risk of limited food access.

The Food Access Index will **rank census tracts** based on their relative risk for limited food access, providing community-based organizations, policy makers, and planners with a tool to target resources to specific communities.

The Food Access Index will be presented as an **interactive data visualization** using Tableau software.

The Food Access Index will be hosted on IMPAQ's website and accessible to the public. As data source updates are released and made **publicly available**, IMPAQ plans to update the tool.

Benefits & Challenges

- Benefits of relying on publicly available data?
  - Cost-effective
  - Often comparable across years and geographies
  - Useful for covering large geographic areas
- Challenges of relying solely on publicly available data?
  - Proxies – often what you find is “close, but not quite” what you’re looking for
  - If focusing on smaller geographic areas, public data may not be granular enough

Elisa Wong, National Program Lead, Social Health

Kaiser Permanente National Community Health

At Kaiser Permanente, social health is equally important as physical and mental health

Using data to identify risk and connect individuals to resources

KAISER PERMANENTE

Identification

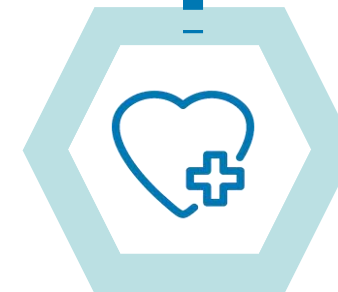
Social needs identified by KP staff, providers, patients, caregivers, or community partners

Information

Thrive Local provides information on community resources and tracks referrals with community partners

Connection via Thrive Local

Using the Thrive Local network, health or social service providers can locate the appropriate community, government, or health care systems resources to meet social needs



Optimization

Information from the Thrive Local network is used by Kaiser Permanente and community partners to better understand social needs, identify community wide social care gaps, and improve community conditions for health

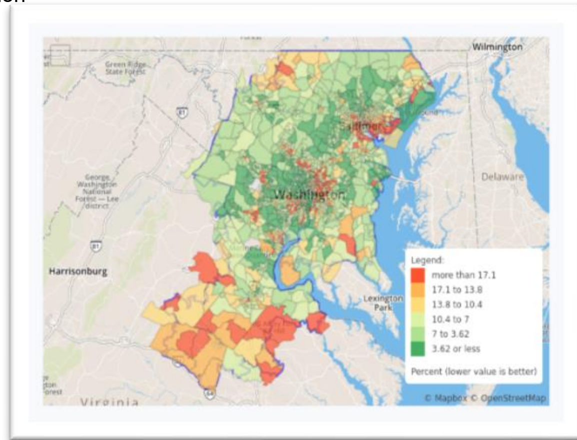
Using data to focus community engagement and investments

KAISER PERMANENTE

KP's Community Health Needs Assessment (CHNA):

- Aggregation and comparison of 120 indicators of health across KP regions & service areas

Adults with no high school diploma, Mid-Atlantic States region



Community engagement through focus groups, town halls, key informant interviews & surveys:

- Defined scope and severity of needs
- Provided insights into health factors and racial/ethnic and geographic disparities
- Surfaced issues that are difficult to understand with quantitative data
- Identified barriers and community resources

KP's enterprise Community Health priorities

- Medicaid
- Charity Care
- Food security
- Housing for health
- Economic opportunity
- Environmental stewardship
- Healthy school environments
- Local policies for wellness

Thrive Local data will also inform future investment and partnership priorities

Using data to inform and advance policy efforts

KAISER PERMANENTE

Food for Life

Housing for Health

Data

Food for Life

- 1 of top 3 CHNA priorities across all KP communities
- 30% of KP members experience food insecurity*
- Food insecurity can lead to higher healthcare utilization[1]
- Under-enrollment in federal nutrition programs
    - SNAP enrollment at 72% among those eligible in California
    - WIC enrollment at 40% in Colorado

Housing for Health

- 1 of top 3 CHNA priorities across all KP communities
- 16% of members experience housing instability*
- Decreased healthcare utilization associated with solutions such as permanent supportive housing[2]

Policy Efforts

Food for Life

Supporting policies that **remove barriers to enrollment and participation** in food stamps and other nutrition programs, e.g.

- Waiving in-person appointments
- Extending eligibility and certification periods
- Allowing for online purchase of foods

Housing for Health

- Highlight need for **expanded federal support for affordable housing**
- Promote **inclusionary zoning policies** to require lower-income housing in new market-rate developments
- Convene health sector stakeholders to catalyze affordable housing projects and **prevent displacement of existing residents**
- Supported a $4 billion California housing bond in 2018 to create new affordable housing and **provide low-interest housing loans to veterans**

*preliminary results from 2020 KP member survey

[1]Berkowitz et al (2019), Association between receipt of a medically tailored meal program and health care use, JAMA Intern Med, 179 (6) (2019), pp. 786-793, https://doi.org/10.1001/jamainternmed.2019.0198
[2]National Academies of Sciences, Engineering, and Medicine. Permanent Supportive Housing: Evaluating the Evidence for Improving Health Outcomes Among People Experiencing Chronic Homelessness The National Academies Press, Washington, DC (2018), https://doi.org/10.17226/25133

Linking Neighborhood + Individual Health with EHR Data

Nrupen Bhavsar, PhD
Duke University School of Medicine

Neighborhoods Linked to Health

Environment

Physical & Social

Behavior

Proximal Clinical Factors

Cardiovascular Disease

Defining the Health of Neighborhoods

National Initiatives

Durham County
PH COMMUNITY HEALTH ASSESSMENT

durham neighborhood compass

UCSF HEALTH ATLAS

Local Initiatives

What is Gentrification?

Alligator Shoe Store (Harlem, NYC)

Whole Foods

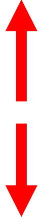
What is Gentrification?

Alligator Shoe Store (Harlem, NYC)

Gentrification

Increase neighborhood wealth/resources due to influx of healthier, wealthier, younger people

Physical displacement/ decreased social cohesion of long-term residents



Health

Health

Whole Foods

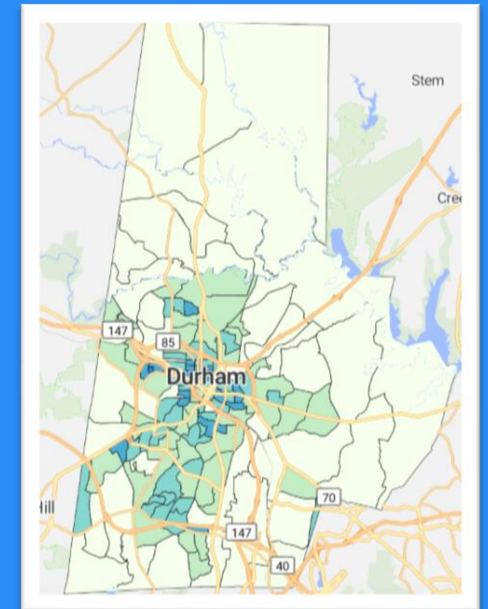
How to Define Gentrification Using Data

PLOS ONE

Defining gentrification for epidemiologic research: A systematic review

Nrupen A. Bhavsar[1]*, Manish Kumar[2], Laura Richman[3]

- Multiple definitions with common nSES variables
    1. Median income
    2. Median rent price
    3. % of population that is professional
    4. % living below poverty level
- Neighborhoods must be eligible to be gentrified
- Gentrification (in our study from 2008 – 2016)
    - + change in income, rent $, and professional population
    - - change in poverty level



Data Linkage

e 4: Data linkage using FIPS codes

rce: U.S. Census Bureau					Data source: EPA		Data source: Durham City/County		Data source: EHR Data					
	Level	Total Population	Black (%)	Household Income (Median)	FIPS	PM2.5 Concentration	FIPS	Number of Parks	Patient ID	FIPS	Age	Race	Sex	Stroke
01011	Block Group 1, Census Tract 1.01, Durham County, North Carolina	1369	34	38446	370630001011	8.8	370630001011	0	1	370630001011	35	Black	F	Yes
01012	Block Group 2, Census Tract 1.01, Durham County, North Carolina	1705	56	45455	370630001012	8.8	370630001012	0	2	370630001012	67	Black	M	Yes
01021	Block Group 1, Census Tract 1.02, Durham County, North Carolina	2900	38	29483	370630001021	9	370630001021	2	3	370630001021	78	White	M	No
01022	Block Group 2, Census Tract 1.02, Durham County, North Carolina	1620	19	51740	370630001022	8.9	370630001022	1	4	370630001022	42	Asian	F	Yes
02001	Block Group 1, Census Tract 2, Durham County, North Carolina	1320	36	30329	370630002001	9.2	370630002001	0	5	370630002001	80	White	M	No

A

B

H Data Resource

	Total Population	Black (%)	Household Income (Median)	PM2.5 Concentration	Number of Parks
1	1369	34	38446	8.8	0
2	1705	56	45455	8.8	0
21	2900	38	29483	9	2
22	1620	19	51740	8.9	1
01	1320	36	30329	9.2	0

B

Linked SDOH + EHR Dataset

Patient ID	FIPS	Age	Race	Sex	PM2.5 Concentration	Number of Parks	Stroke
1	370630001011	35	Black	F	8.8	0	Yes
2	370630001012	67	Black	M	8.8	0	Yes
3	370630001021	78	White	M	9	2	No
4	370630001022	42	Asian	F	8.9	1	Yes
5	370630002001	80	White	M	9.2	0	No

ke

Data Sources

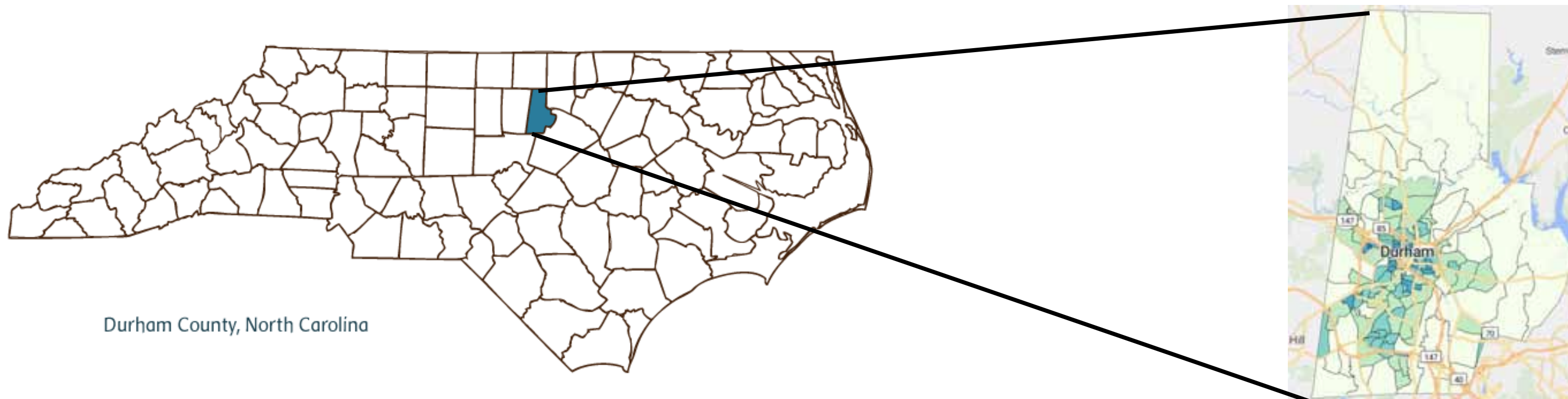
Duke University Health System

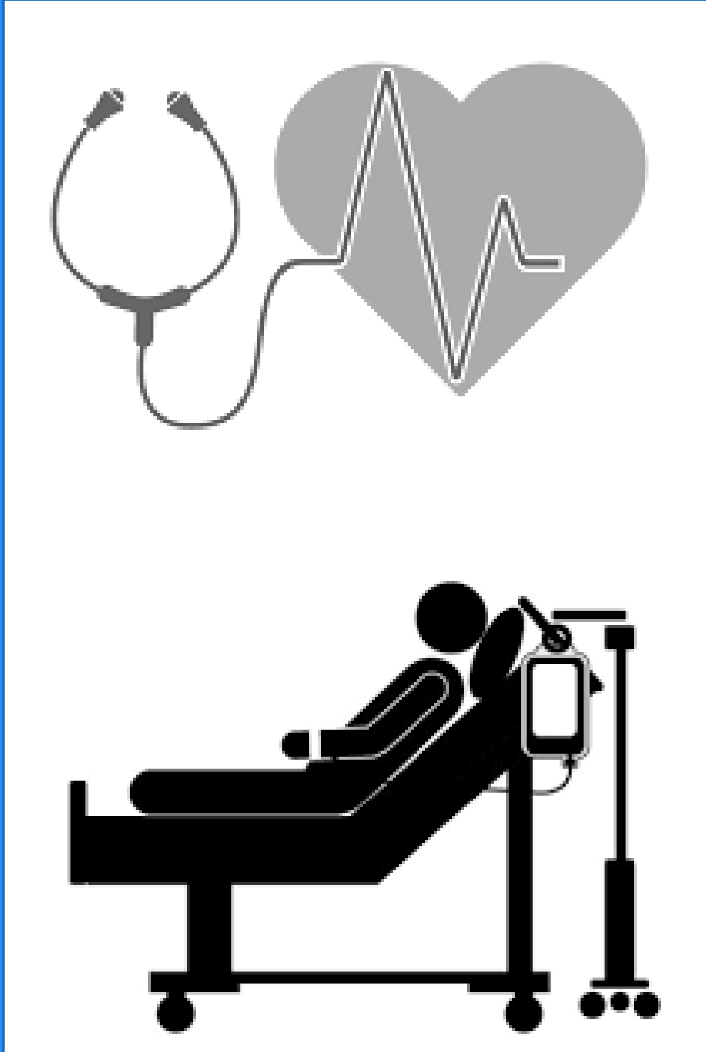
- Duke University Medical Center
- Duke Regional Hospital
- Duke Raleigh Hospital

Lincoln Community Health Center

- Un-insured
- Under-insured
- Undocumented

>90% Durham residents





Health Outcomes

- **Proximal health indicators:**
  - Diabetes
  - Hypertension
  - Obesity
- **CVD hospitalization:**
  - Myocardial infarction
  - Stroke
- **Healthcare utilization:**
  - Emergency department
  - Inpatient
  - Outpatient

Results: What We Learned

Diabetes

Proximal health indicators differ by gentrification status

Hypertension

Cardiovascular Disease

Healthcare utilization not differ by gentrification status

Healthcare utilization

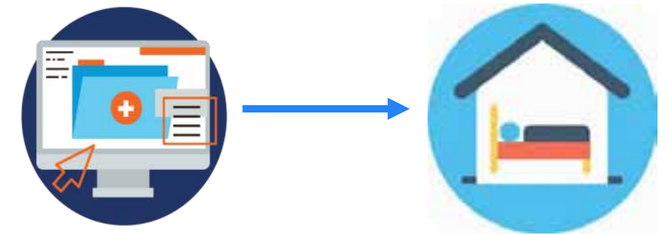
Benefits/Challenges of EHR Data

- Benefits
  - Cheaper and faster to access
  - Broad data elements
- Challenges
  - Dependent on patient interaction for outcomes
  - Residents move and and receive care outside of health system
  - Data curation requires an interdisciplinary team
    - Informaticists
    - Epidemiologists
    - Statisticians
    - Clinicians
    - Community members

Engaging the Community

- Durham Compass – website that allows community members to visualize SDOH and summary health data

- Identify populations in need and provide interventions
    - EHR to identify patients experiencing homelessness and provide medical respite (Biederman DJ et al., 2019)



- Active participation
    - Focus groups to identify most pressing SDOH
    - Community member participation in grants/projects

Acknowledgements

Matthew Phelan, MS

Megan Shepherd-Banigan, PhD

Julia Scialla, MD, MHS

Dinushika Mohottige, MD, MPH

Benjamin Goldstein, PhD

Jana Hirsch, PhD

Nia S. Mitchell, MD, MPH

Clarissa Diamantidis, MD, MHS

Joseph Lunyera, MBChB, MHS

Matthew Maciejewski, PhD

Ebony Boulware, MD, MPH

Donna Biederman, DrPH, MN, RN

Funding: NHLBI K01HL140146 (NAB), CTSA UL1TR002553

Duke University School of Medicine

Duke Center for Community and Population Health Improvement

Duke Clinical & Translational Science Institute

DISCUSSION

UTHealth | School of Public Health
The University of Texas
Health Science Center at Houston

Caroline Schaefer Back-Up Slides

3M Clinical Risk Group and Severity

3M CRG core health status groups (1-9)	Base 3M CRGs (Total = 330)	Description/Example of base 3M CRG	Severity levels	Number of 3M CRGs (Total = 1,408)
9 - Catastrophic condition status	10	History of major organ transplant	4	40
8 - Dominant and metastatic malignancies	30	Colon malignancy - under active treatment	4	120
7 - Dominant chronic disease in 3 or more organ systems (triplets)	28	Diabetes mellitus, congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD)	6	168
6 - Significant chronic disease in multiple organ systems (pairs)	78	Diabetes mellitus and CHF	6	468
5 - Single dominant or moderate chronic disease	125	Diabetes mellitus	4	500
4 - Minor chronic disease in multiple organ systems	1	Migraine and benign prostatic hyperplasia (BPH)	4	4
3 - Single minor chronic disease	50	Migraine	2	100
2 - History of significant acute disease	6	Chest pains	None	6
1 - Healthy/Non-Users	2	Healthy (no chronic health problems)	None	2

https://multimedia.3m.com/mws/media/765833O/3m-crgs-measuring-risk-managing-care-white-paper.pdf

Conceptual Matrix: Under age 19

Health Outcomes (20%)			
Focus Area	Measure	Weight	Source
Healthcare status	Child Mortality Rate	20%	CDC WONDER mortality data
	Infant Mortality Rate	20%	The Compressed Mortality File (CMF)
	Percent of uninsured children	25%	Small Area Health Insurance Estimates
	Low birthweight	35%	National Center for Health Statistics – Natality files
Health Behaviors (15%)			
Focus Area	Measure	Weight	Source
Health Focus	Food environment index	35%	USDA Food Environment Atlas, Map the Meal Gap
	Access to exercise opportunities	15%	Business Analyst, Delorme map data, ESRI, & U.S. Census Files
Sexual activity	Sexually transmitted infections	25%	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
	Teen births	25%	National Center for Health Statistics – Natality files
Access (15%)			
Focus Area	Measure	Weight	Source
Access to care	Primary care physicians	45%	Area Health Resource File/American Medical Association
	Mental health providers	55%	CMS, National Provider Identification file
Social and Economic Environment (30%)			
Focus Area	Measure	Weight	Source
Education	High school graduation	10%	State-specific sources & EDFacts
Employment	Unemployment	25%	Bureau of Labor Statistics
Home Environment	Children in poverty	10%	Small Area Income and Poverty Estimates
	Food Insecurity	10%	Feeding America Data Map
	Children in single-parent households	15%	American Community Survey
Community safety	Violent crime	5%	Uniform Crime Reporting – FBI
	Injury deaths	15%	CDC WONDER mortality data
	Disconnected youth	10%	US census data and Measure of America.org
Physical Environment (20%)			
Focus Area	Measure	Weight	Source
Air and water quality	Air pollution - particulate matter	20%	Environmental Public Health Tracking Network
	Drinking water violations	10%	Safe Drinking Water Information System
Housing	Severe housing problems	30%	Comprehensive Housing Affordability Strategy (CHAS) data
	Food Desert	40%	United States Department of Agriculture Economic Research Service

Conceptual Matrix: 65 Plus

Health Outcomes (35%)			
Focus Area	Measure	Weight	Source
Health Outcomes	Life Expectancy	15%	National Center for Health Statistics – Mortality files
	Perceived Poor or fair health	30%	Behavioral Risk Factor Surveillance System
	Perceived Poor physical health days	25%	Behavioral Risk Factor Surveillance System
	Perceived Poor mental health days	30%	Behavioral Risk Factor Surveillance System
Health Behaviors (30%)			
Focus Area	Measure	Weight	Source
Tobacco use	Adult smoking	5%	Behavioral Risk Factor Surveillance System
Diet and exercise	Adult obesity	15%	CDC Diabetes Interactive Atlas
	Food environment index	35%	USDA Food Environment Atlas, Map the Meal Gap
	Physical inactivity	15%	CDC Diabetes Interactive Atlas
	Insufficient Sleep	5%	Behavioral Risk Factor Surveillance System
Alcohol and drug use	Excessive drinking	20%	Behavioral Risk Factor Surveillance System
	Alcohol-impaired driving deaths	5%	Fatality Analysis Reporting System
Access (10%)			
Focus Area	Measure	Weight	Source
Access to care	Primary care physicians	25%	Area Health Resource File/American Medical Association
	Mental health providers	75%	CMS, National Provider Identification file
Social and Economic Environment (15%)			
Focus Area	Measure	Weight	Source
Income	Median Household Income and Percent of Pop >65	10%	American Community Survey
	Food Insecurity	25%	Feeding America Data Map
Family and social support	Social associations	25%	County Business Patterns
Community safety	Violent crime	20%	Uniform Crime Reporting – FBI
	Injury deaths	20%	CDC WONDER mortality data
Physical Environment (10%)			
Focus Area	Measure	Weight	Source
Air and water quality	Air pollution - particulate matter[1]	30%	Environmental Public Health Tracking Network
	Drinking water violations	15%	Safe Drinking Water Information System
Housing	Severe housing problems	25%	Comprehensive Housing Affordability Strategy (CHAS) data
	Food Desert	30%	United States Department of Agriculture Economic Research Service

Conceptual Matrix: General Population

Health Outcomes (30%)			
Focus Area	Measure	Weight	Source
Health Outcomes	Life Expectancy	25%	National Center for Health Statistics – Mortality files
	Perceived Poor or Fair Health	40%	Behavioral Risk Factor Surveillance System
	Perceived Poor Physical Health Days	15%	Behavioral Risk Factor Surveillance System
	Perceived Poor Mental Health Days	20%	Behavioral Risk Factor Surveillance System
Health Behaviors (25%)			
Focus Area	Measure	Weight	Source
Tobacco Use	Adult Smoking	10%	Behavioral Risk Factor Surveillance System
Diet and Exercise	Adult Obesity	5%	CDC Diabetes Interactive Atlas
	Food Environment Index	10%	USDA Food Environment Atlas, Map the Meal Gap
	Physical Inactivity	10%	CDC Diabetes Interactive Atlas
	Access to Exercise Opportunities	5%	Business Analyst, Delorme map data, ESRI, & U.S. Census Files
	Insufficient Sleep	5%	Behavioral Risk Factor Surveillance System
Race and Ethnicity	Race	15%	U. S. Census Bureau, American Community Survey, 5-Year Estimates
	Language Factor	15%	American Community Survey, 5-year estimates
Alcohol and Drug Use	Excessive Drinking	5%	Behavioral Risk Factor Surveillance System
	Alcohol-impaired Driving Deaths	5%	Fatality Analysis Reporting System
Sexual Activity	Sexually Transmitted Infections	5%	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
	Teen Births	10%	National Center for Health Statistics – Natality files
Access (10%)			
Focus Area	Measure	Weight	Source
Access to Care	Primary Care physicians	15%	Area Health Resource File/American Medical Association
	Mental Health Providers	25%	CMS, National Provider Identification file
	Rural as Indicator of Access to Specialists	30%	The Texas Demographic Center (U.S. Bureau of the Census State Data Center Program)
	Uninsured Adults	30%	Small Area Health Insurance Estimates
Social and Economic Environment (25%)			
Focus Area	Measure	Weight	Source
Education	High School Graduation	5%	State-specific sources & EDFacts
	Some College	10%	American Community Survey
Income	Median Household Income	10%	American Community Survey
	Average Household Size	15%	U. S. Census Bureau, American Community Survey, 5-Year Estimates
Employment	Unemployment	15%	Bureau of Labor Statistics
Family and social support	Food Insecurity	10%	Feeding America Data Map
	Social Associations	5%	County Business Patterns
	Children in single-parent households	10%	American Community Survey
Community safety	Violent crime	10%	Uniform Crime Reporting – FBI
	Injury deaths	10%	CDC WONDER mortality data
Physical Environment (10%)			
Focus Area	Measure	Weight	Source
Air and water quality	Air pollution - particulate matter	30%	Environmental Public Health Tracking Network
	Drinking water violations	5%	Safe Drinking Water Information System
Housing	Severe housing problems	35%	Comprehensive Housing Affordability Strategy (CHAS) data
	Food Desert	30%	United States Department of Agriculture Economic Research Service