The Child Opportunity Index 2.0: A New Index of Neighborhood Opportunity for All US Neighborhoods

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BARI Spring Meeting, June 19, 2020 | Panel: Leveraging the 2020 Census Equitably

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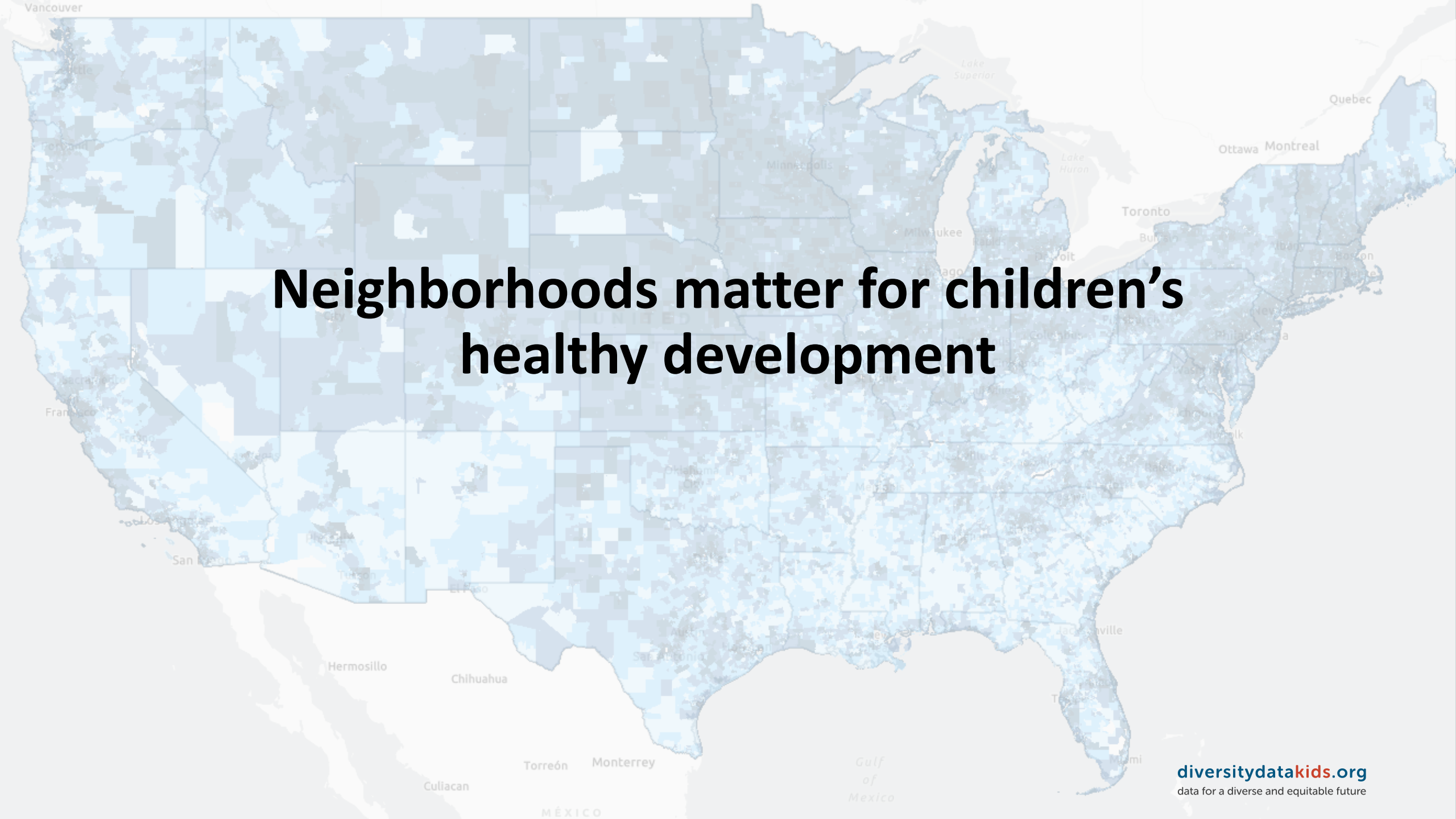

Neighborhoods matter for children's healthy development

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Neighborhoods influence children's health and education

Green space and playgrounds

Early childhood education

Schools

Neighborhoods influence children's health and education

Air quality

Access to healthy food

Walkability

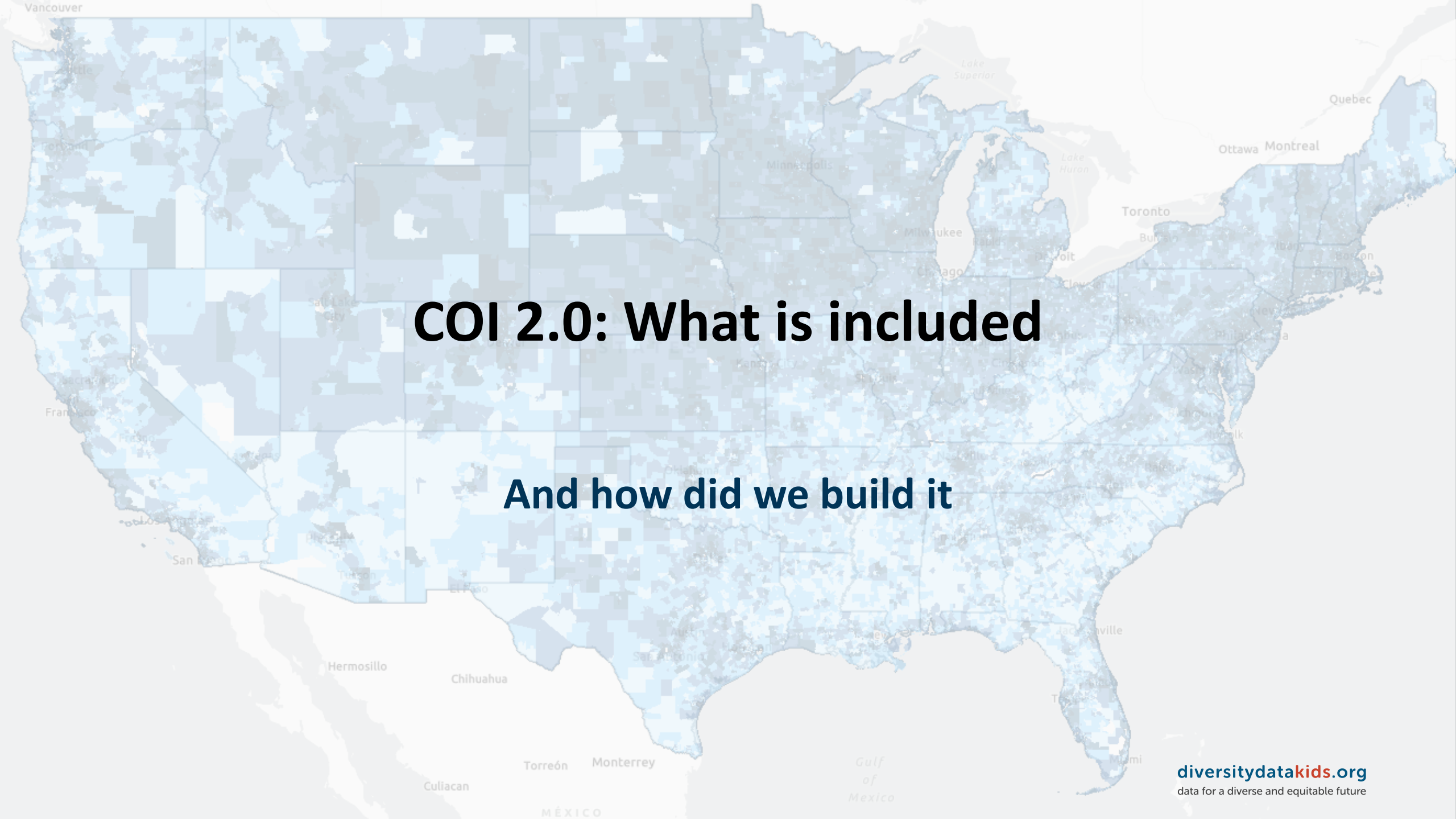
School quality

Neighborhoods influence children's norms and expectations for the future

- High school graduation
- College aspirations
- Employment prospects

COI 2.0: A metric of child opportunity for all U.S. neighborhoods

- Multi-sectoral: 29 indicators capturing three domains of opportunity
- Focus on neighborhood features that matter for children today
- Captures important social determinants of health
- Granular data on nearly all U.S. neighborhoods (72,000 census tracts)
- Data comparable across neighborhoods and over time (2010, 2015)
- Good predictive validity compared to similar metrics
- Users from academia, media, health, housing, and early childhood education sectors



COI 2.0: What is included

And how did we build it

Education

Early childhood education (ECE)
ECE centers within five miles
High quality ECE centers within five miles
ECE enrollment

Primary school
Third grade reading proficiency
Third grade math proficiency

Secondary and post-secondary
High school graduation rates
AP enrollment
College access/enrollment

Resources
School poverty
Teacher experience
Adult educational attainment

Health and Environment

Healthy environments
Access to healthy food
Access to green space
Walkability
Housing vacancy rates

Toxic exposures
Superfund sites
Industrial pollutants
Microparticles
Ozone
Heat

Health care access
Health insurance coverage

Social and Economic

Economic opportunities
Employment rate
Commute duration

Economic resource index
Poverty rate, public assistance rate, high skill employment, median household income, home ownership

Family structure
Single parenthood

How we built the index

Indicators standardized (converted to z-scores) so that they are on a common scale

Standardized indicators averaged into three domain scores

- Weights capture how strongly each indicator predicts four different health and socio-economic outcomes

Domain scores averaged into one overall score

Scores converted into two easily interpretable metrics

COI 2.0 metrics

Child Opportunity Scores

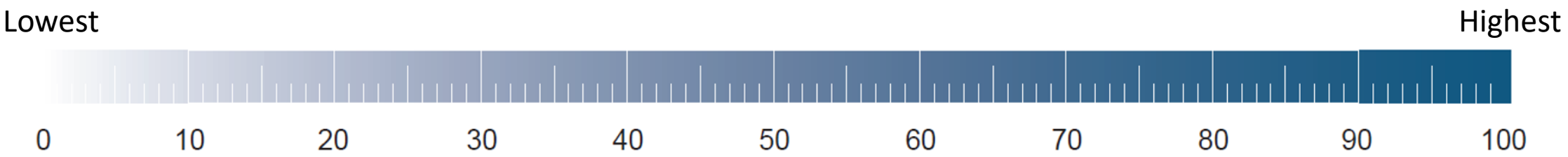
Vary from 1 to 100

To construct them,

we ranked all neighborhoods on domain and overall scores,

grouped neighborhoods into 100 groups containing 1% of the child population each,

and assigned each group a score from 1 (lowest) to 100 (highest)



COI 2.0 metrics

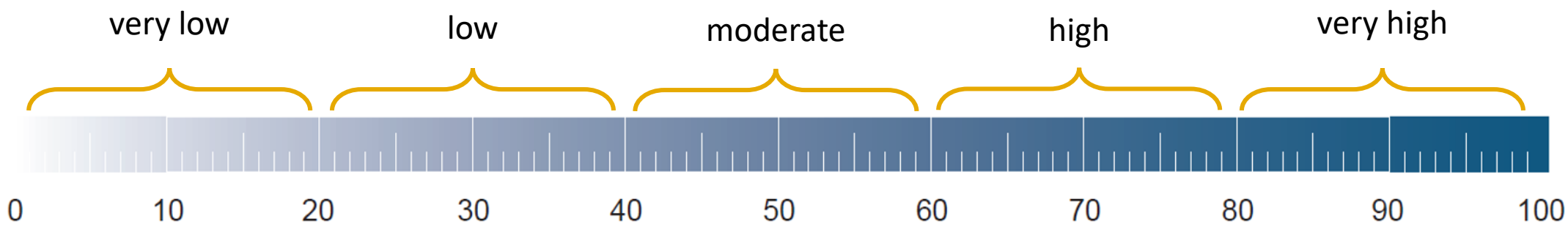
Child Opportunity Levels

5 categories: very low, low, moderate, high, very high

To construct them,

we ranked all neighborhoods on domain average or overall average z-scores

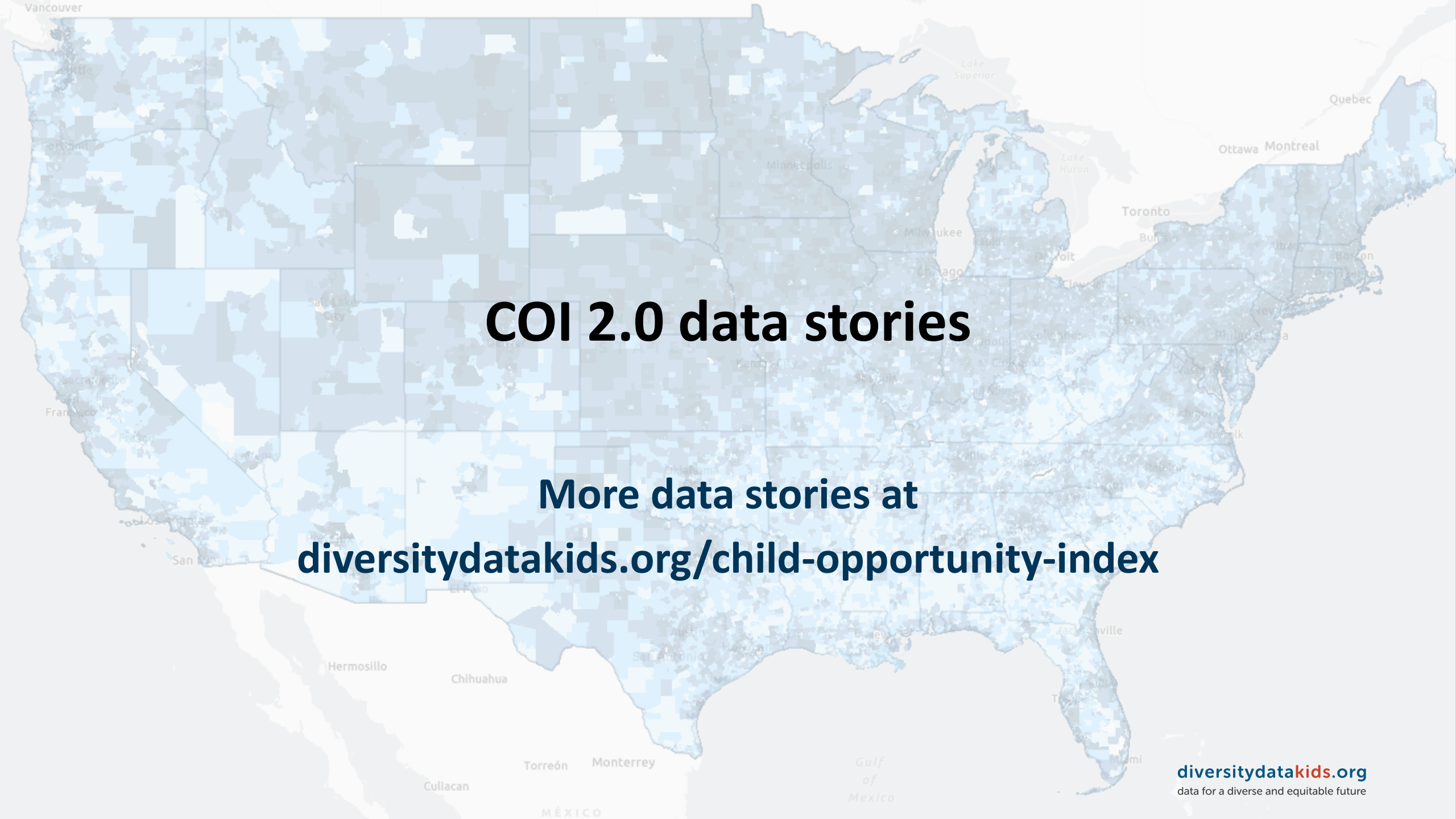
and grouped neighborhoods into 5 categories containing 20% of the child population each



COI 2.0 metrics

Metro-, state- and nationally normed opportunity scores and levels

- To compare neighborhoods within one metro area, use metro normed metrics
- To compare neighborhoods within one state, use state normed metrics
- For all other use cases, use nationally normed metrics



COI 2.0 data stories

More data stories at diversitydatakids.org/child-opportunity-index

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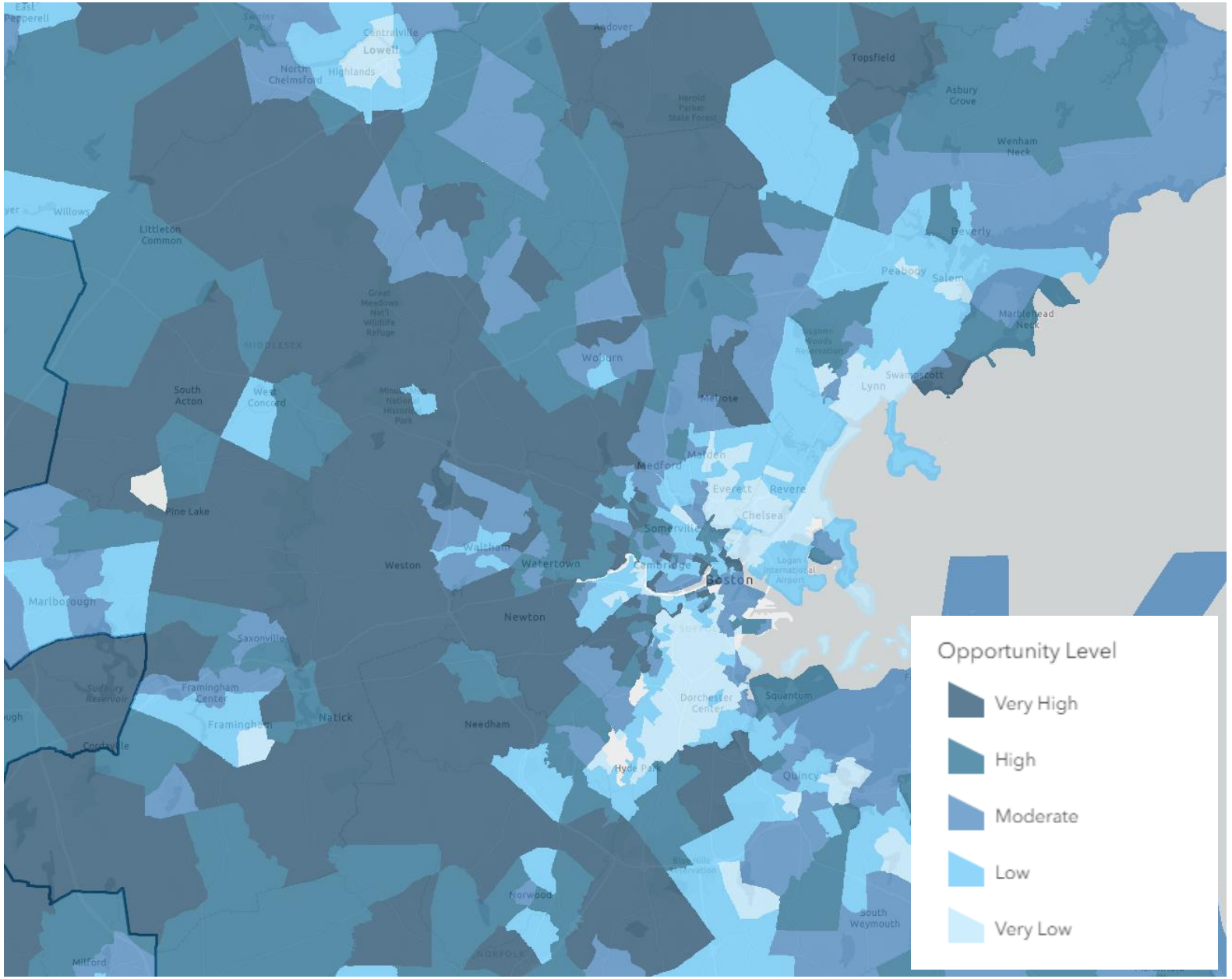
BOSTON-CAMBRIDGE-NEWTON METRO AREA

Child Opportunity Levels

Metro normed



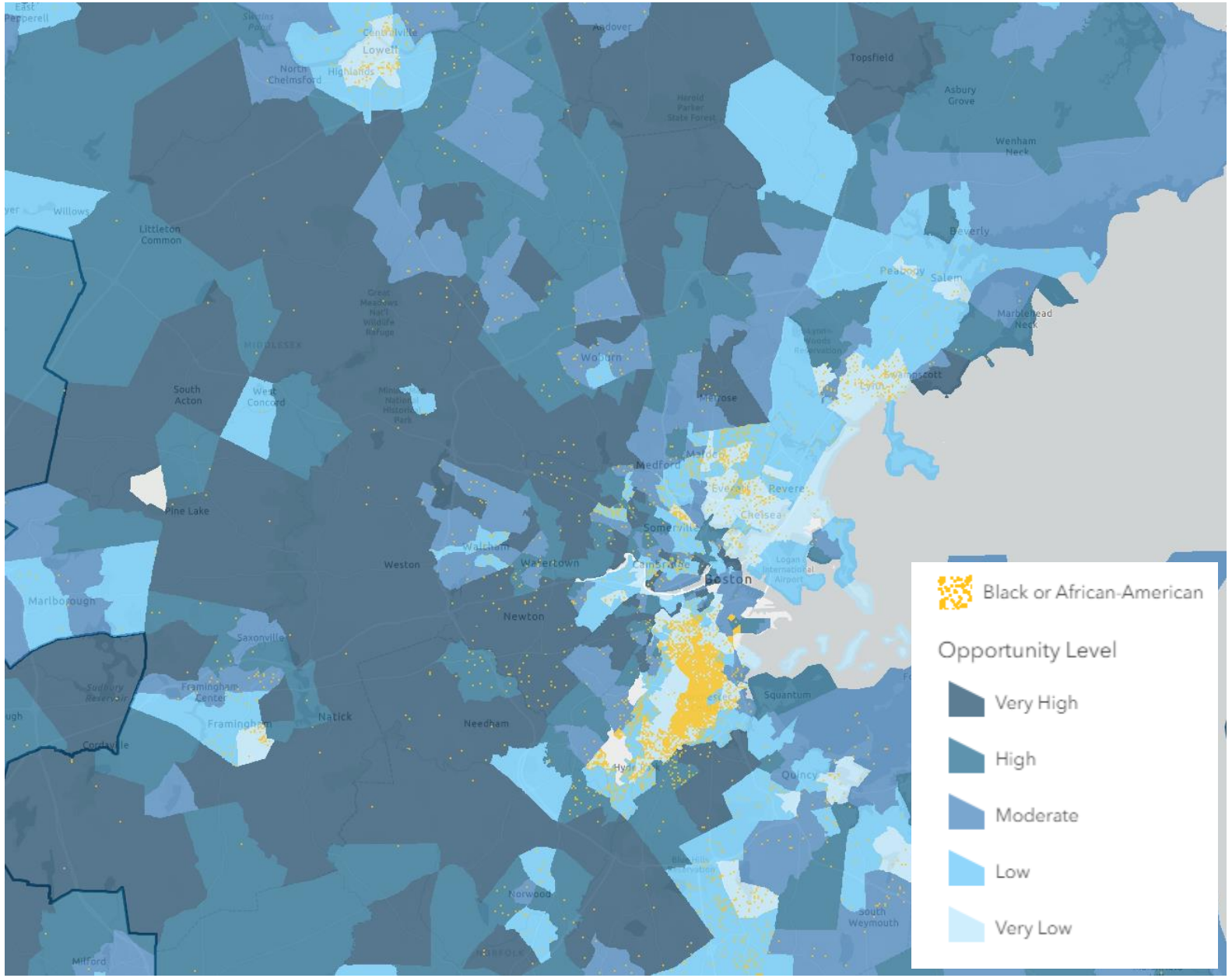
Source: diversitydatakids.org. Child Opportunity Index 2.0 Database.

BOSTON-CAMBRIDGE-NEWTON METRO AREA

Black children's access to neighbor-hood opportunity

Child Opportunity Levels (metro normed)

1 Dot = 20 children aged 0-17 years



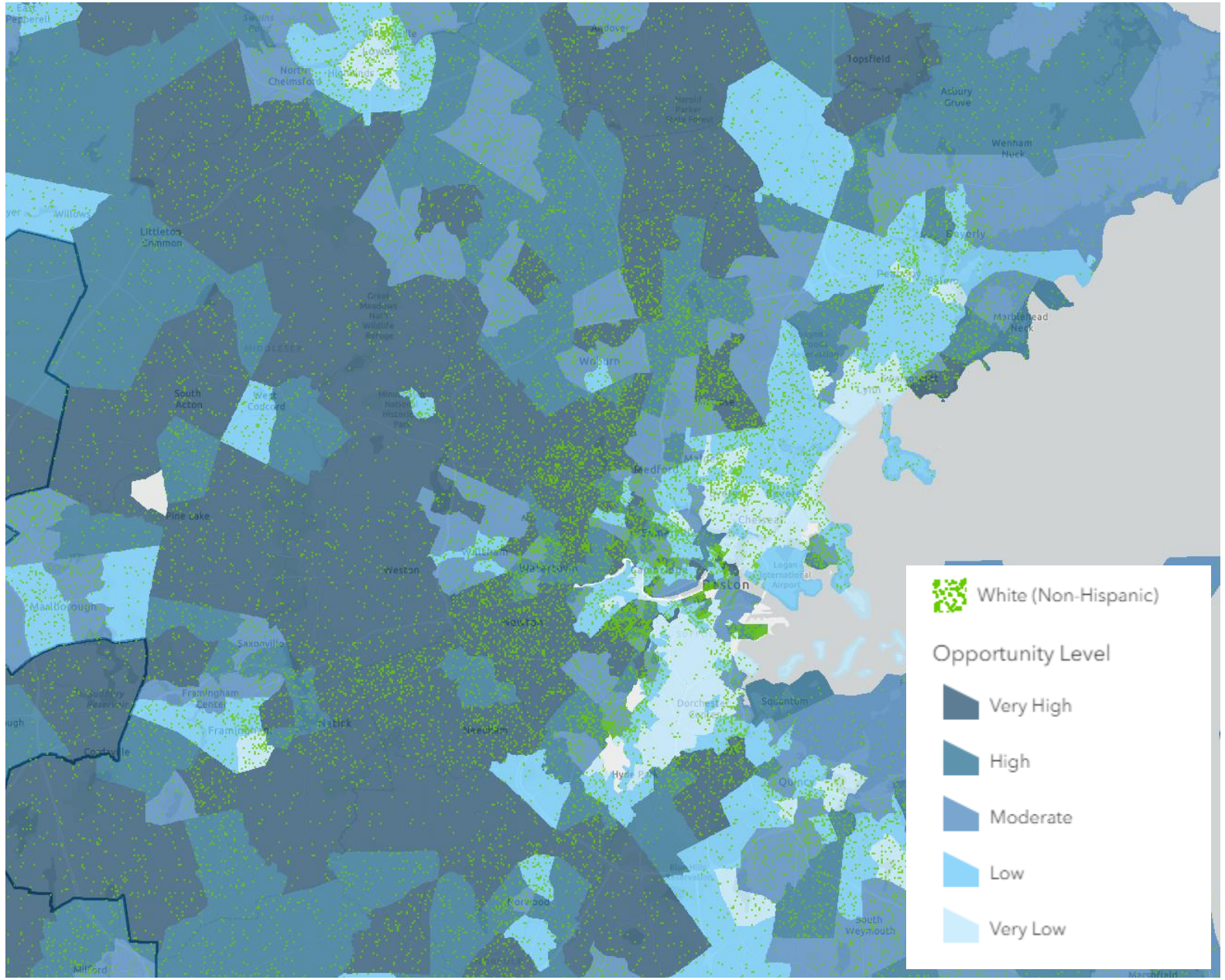
Source: diversitydatakids.org. Child Opportunity Index 2.0 Database. Population data from American Community Survey 5-Year Summary Files.

BOSTON-CAMBRIDGE-NEWTON METRO AREA

White children's access to neighbor-hood opportunity

Child Opportunity Levels (metro normed)

1 Dot = 20 children aged 0-17 years



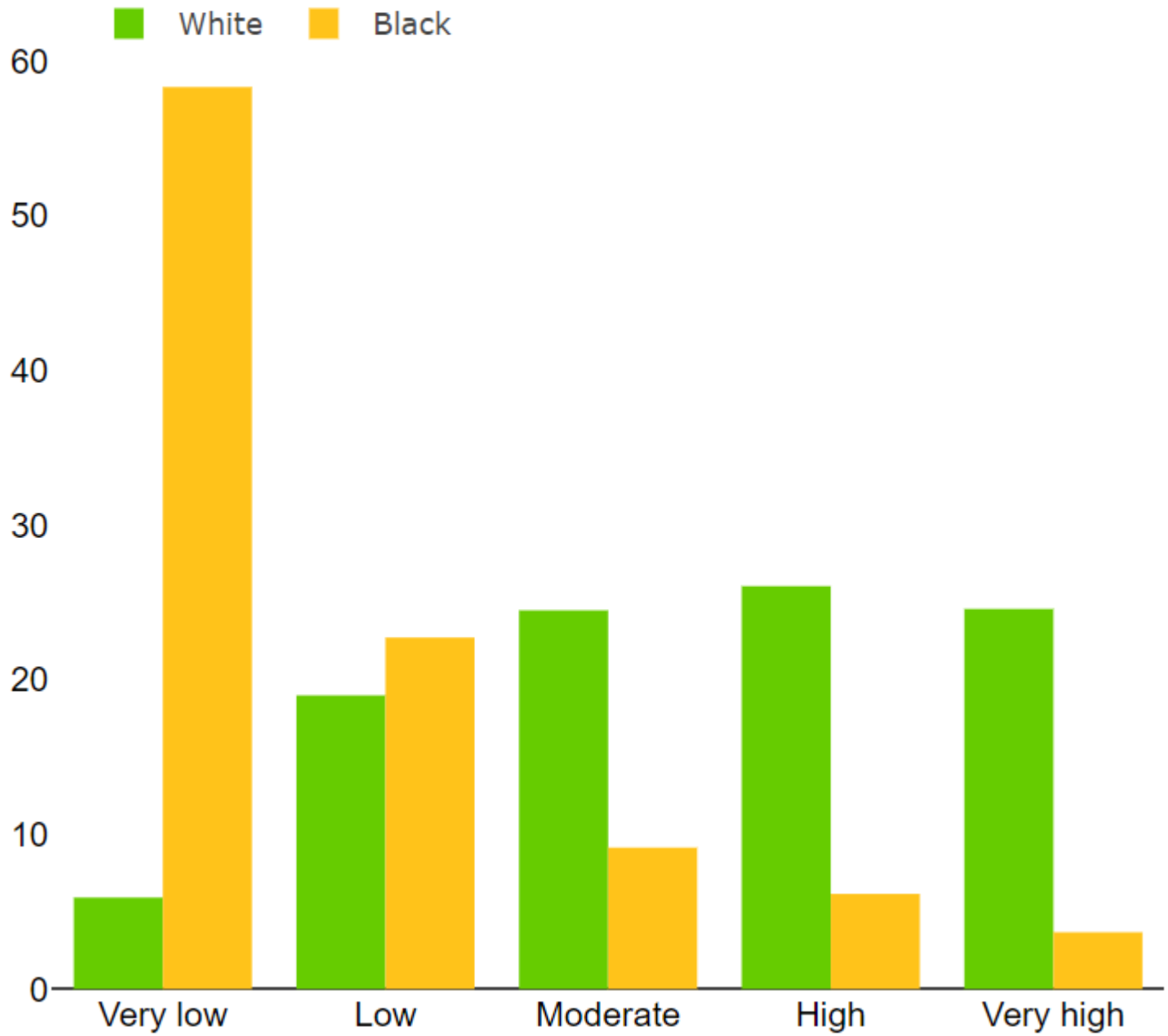
Source: diversitydatakids.org. Child Opportunity Index 2.0 Database. Population data from American Community Survey 5-Year Summary Files.

BOSTON-CAMBRIDGE-NEWTON METRO AREA

Percent of children by Child Opportunity Level

Child Opportunity Levels (metro normed)

Children aged 0-17 years



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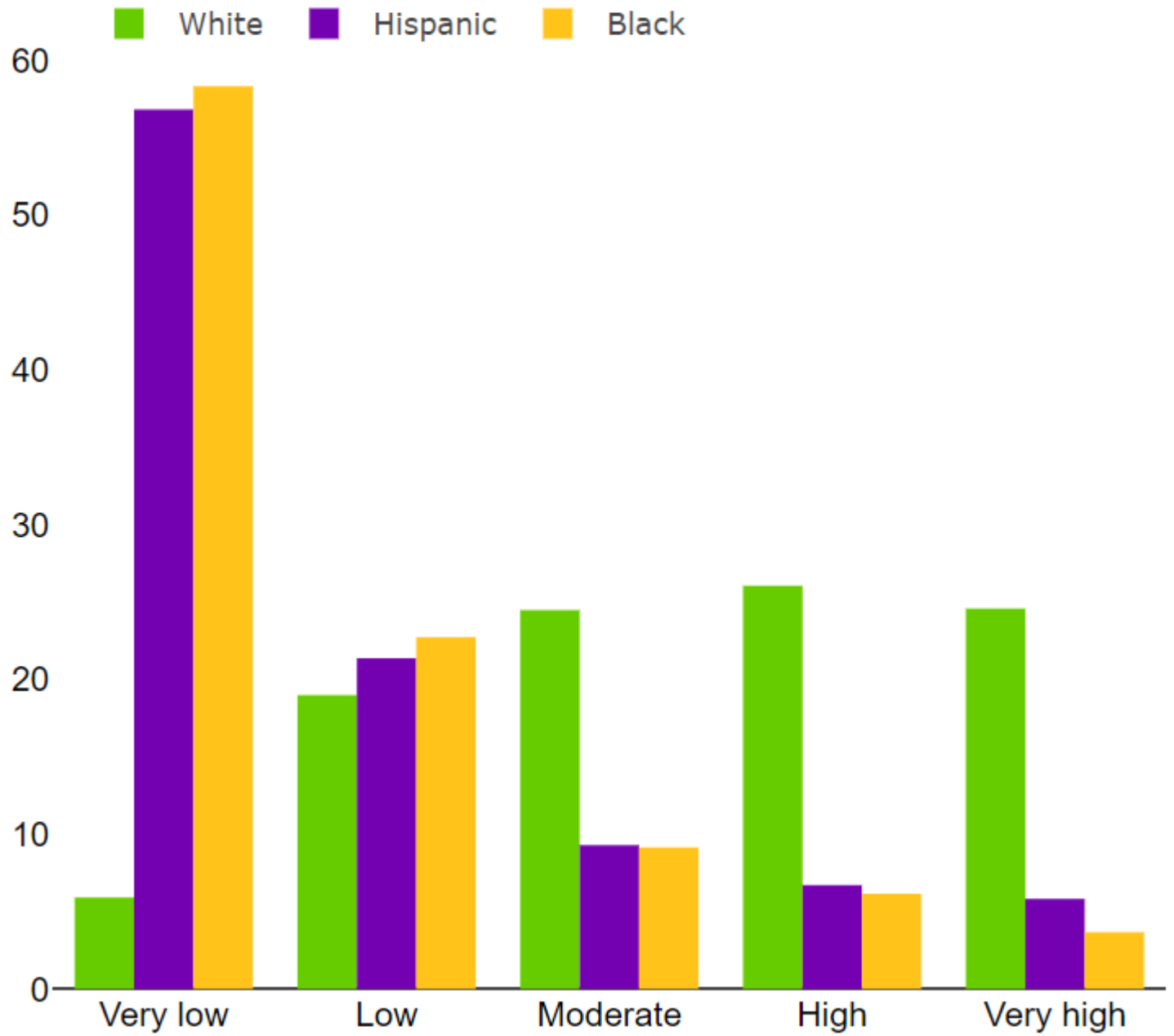

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BOSTON-CAMBRIDGE-NEWTON METRO AREA

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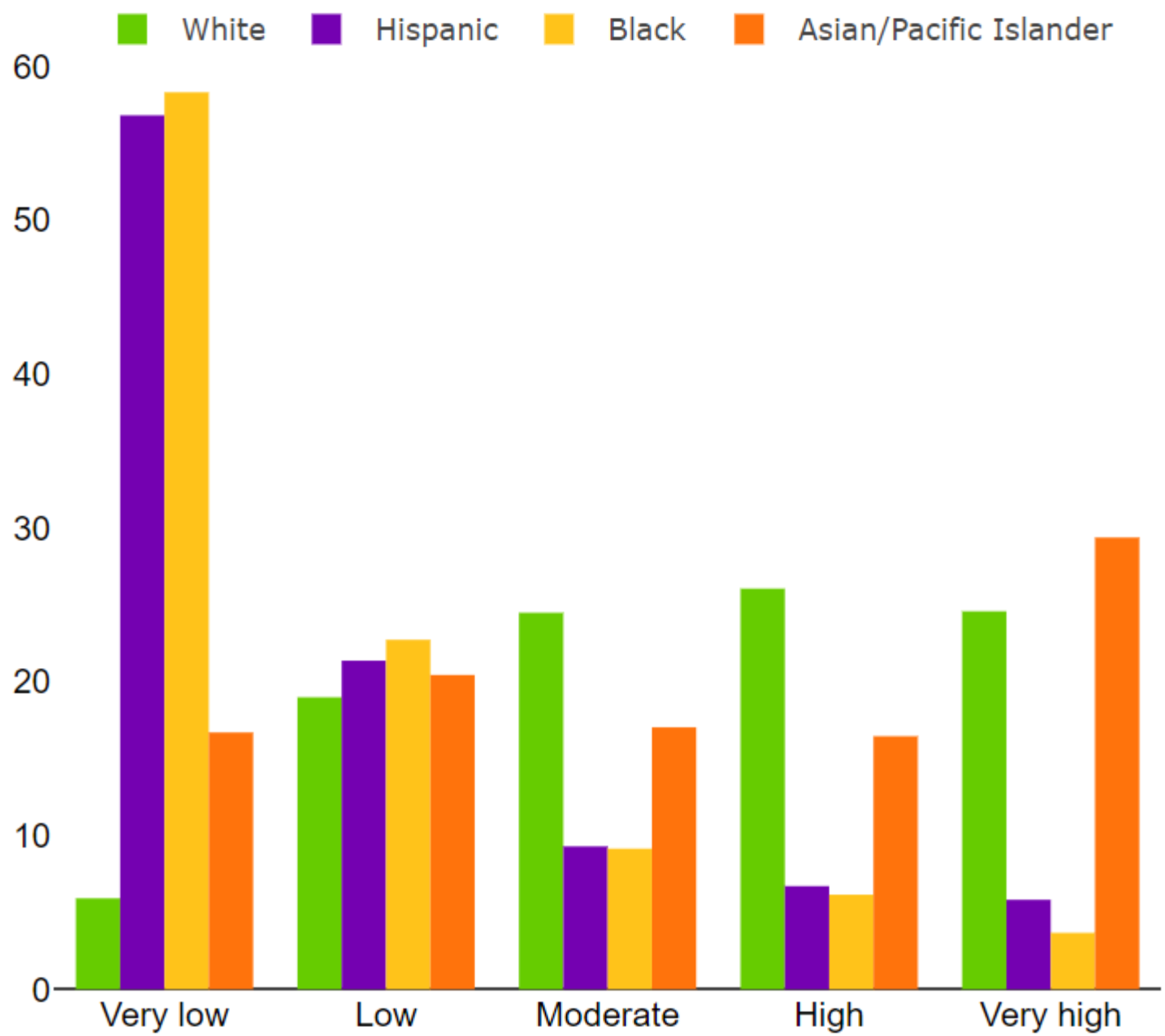


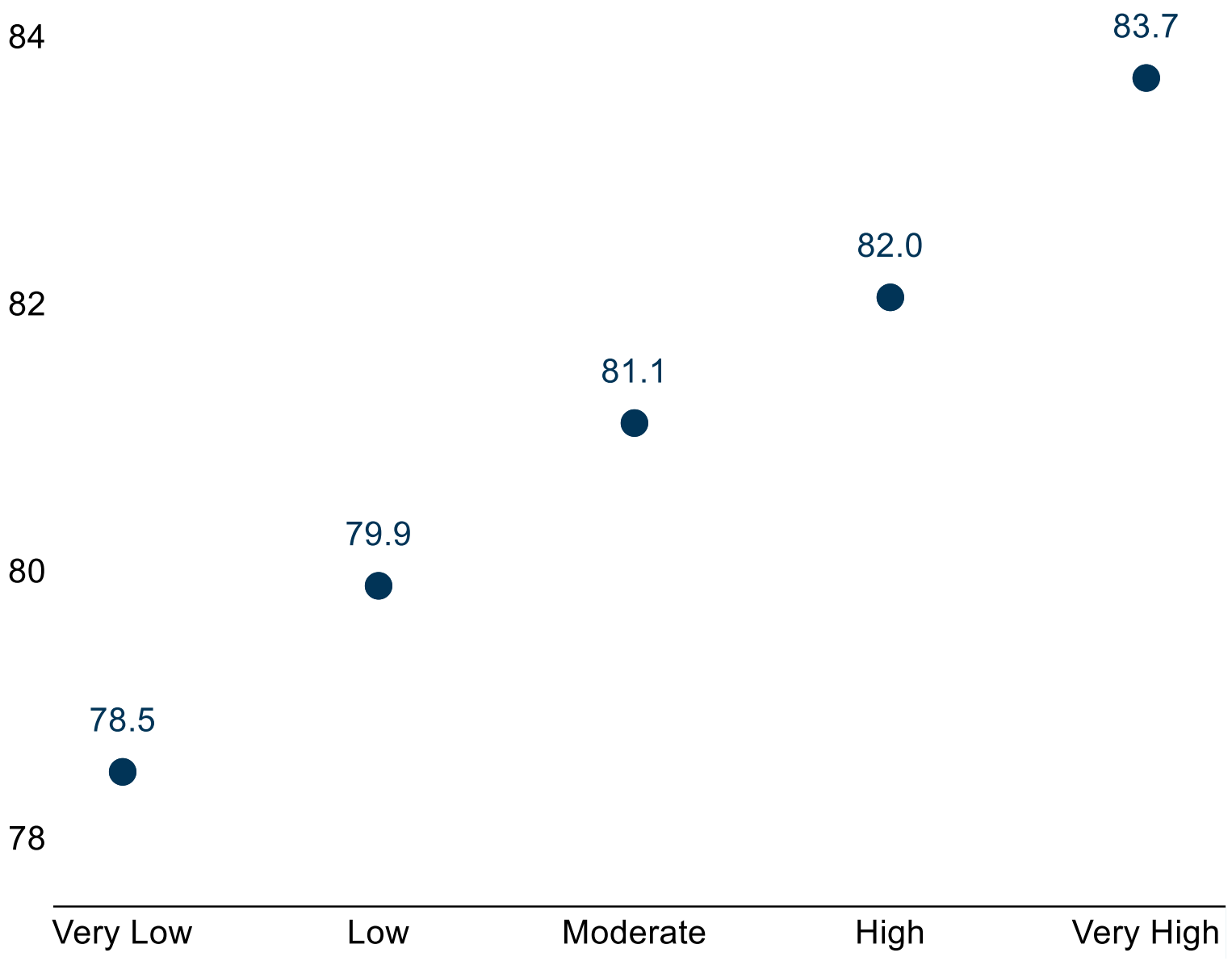
Source: diversitydatakids.org. Child Opportunity Index 2.0 Database. Population data from American Community Survey 5-Year Summary Files.

BOSTON-CAMBRIDGE-NEWTON METRO AREA

Life expectancy by Child Opportunity Level

The average number of years a person can be expected to live at birth

Child Opportunity Levels (metro normed)



Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database; National Center for Health Statistics, United States Small-area Life Expectancy Estimates Project (USALEEP).

BOSTON-CAMBRIDGE-NEWTON METRO AREA

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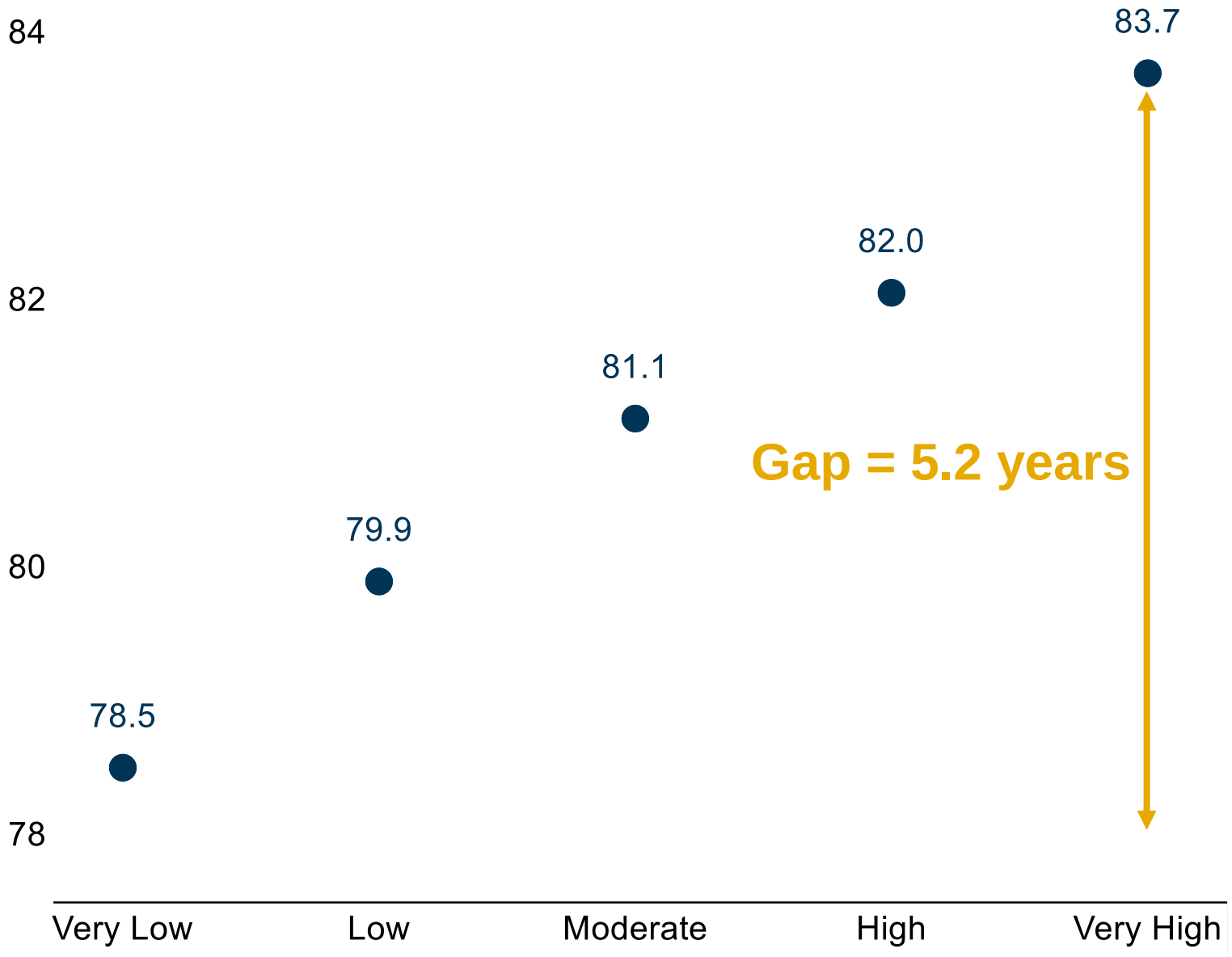


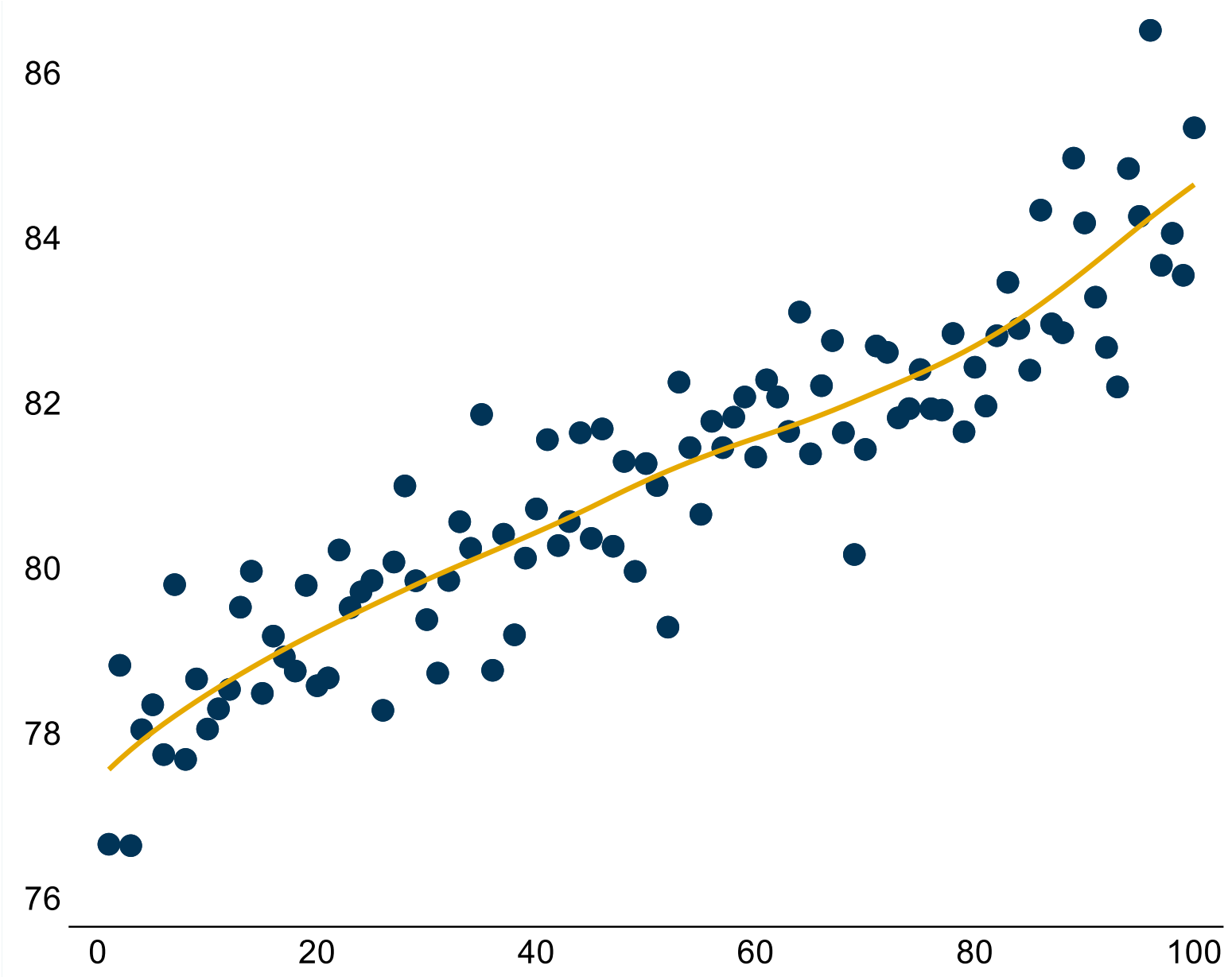
Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database; National Center for Health Statistics, United States Small-area Life Expectancy Estimates Project (USALEEP).

BOSTON-CAMBRIDGE-NEWTON METRO AREA

Life expectancy by Child Opportunity Score

The average number of years a person can be expected to live at birth

Child Opportunity Scores (metro-normed)



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BOSTON-CAMBRIDGE-NEWTON METRO AREA

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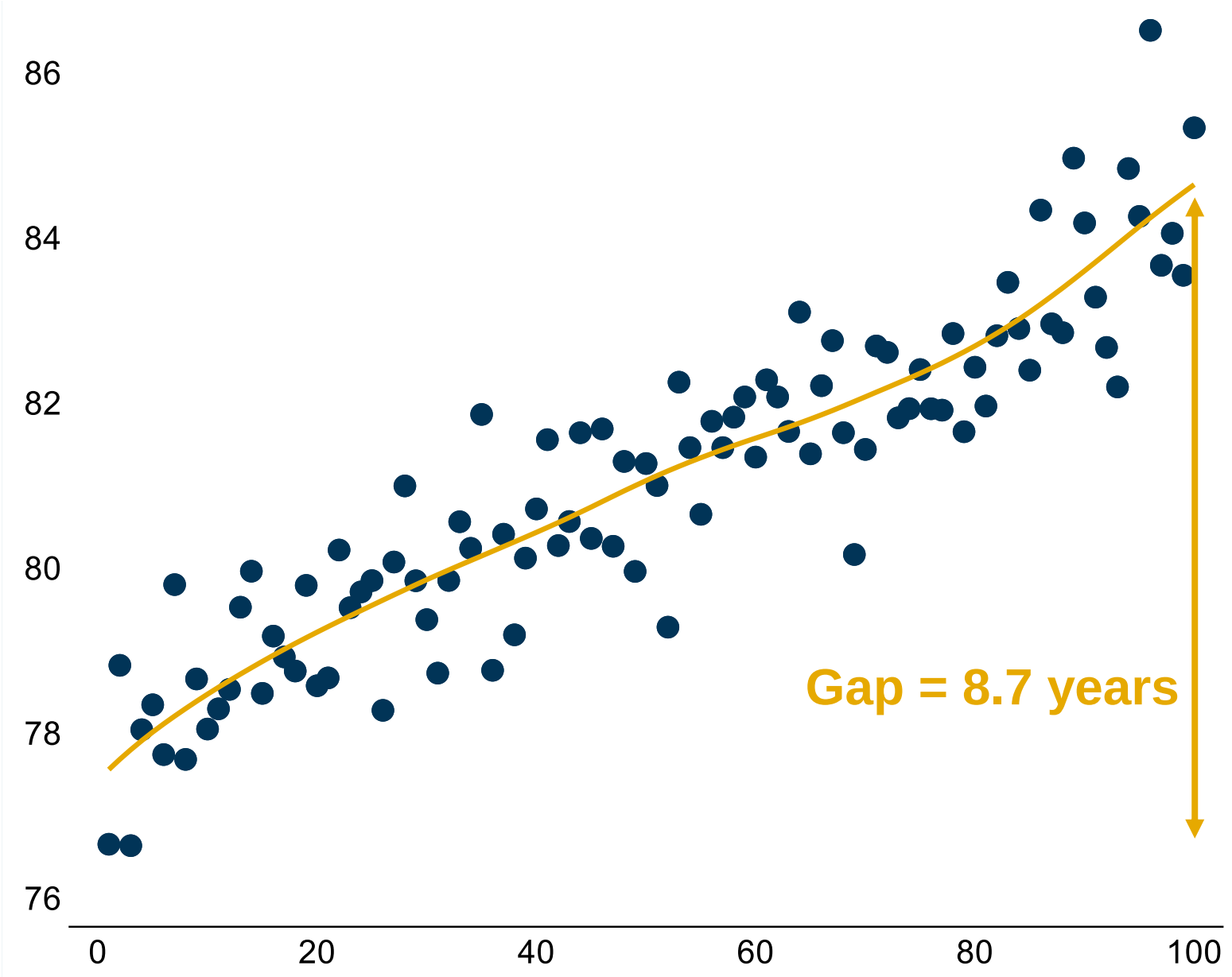

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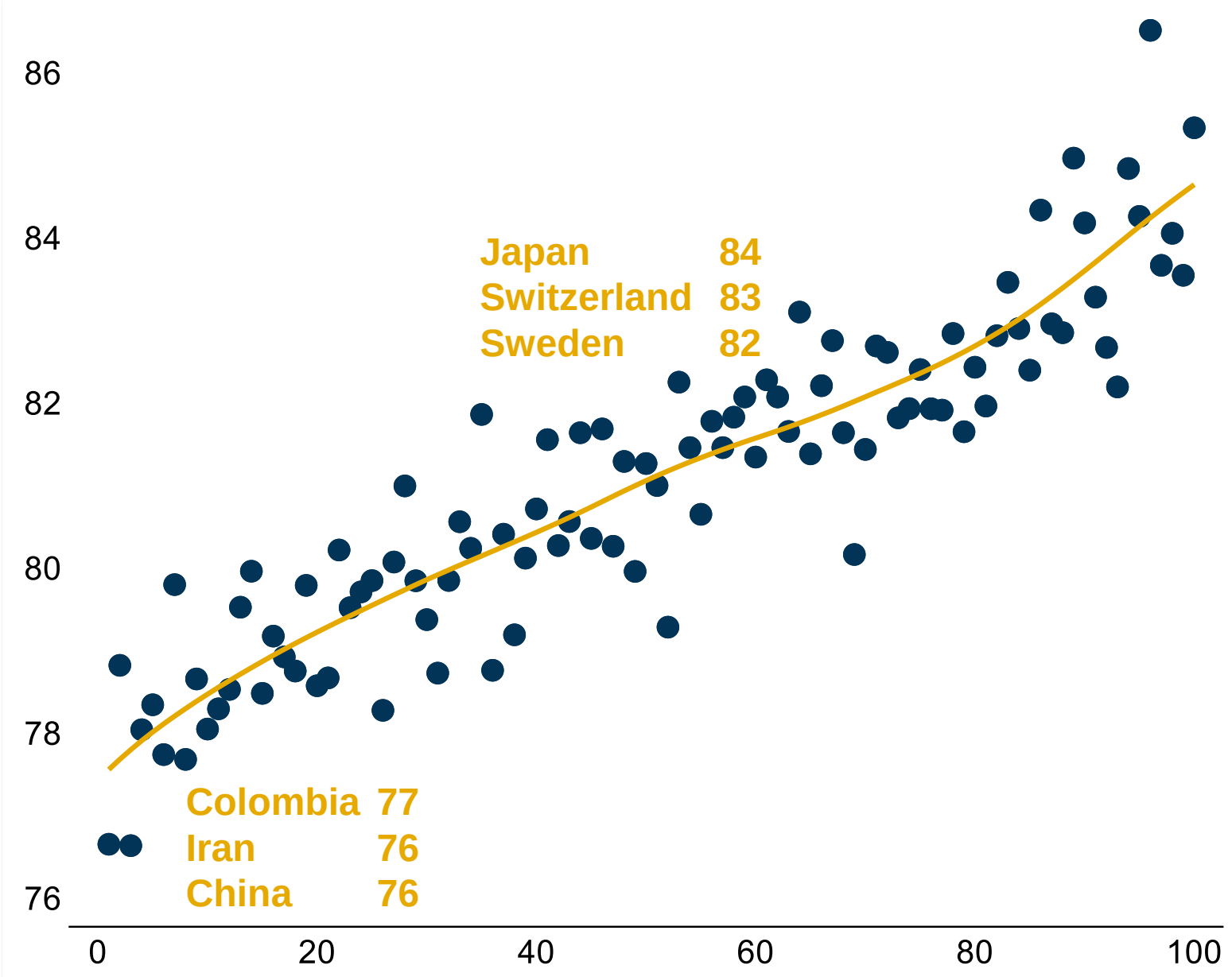
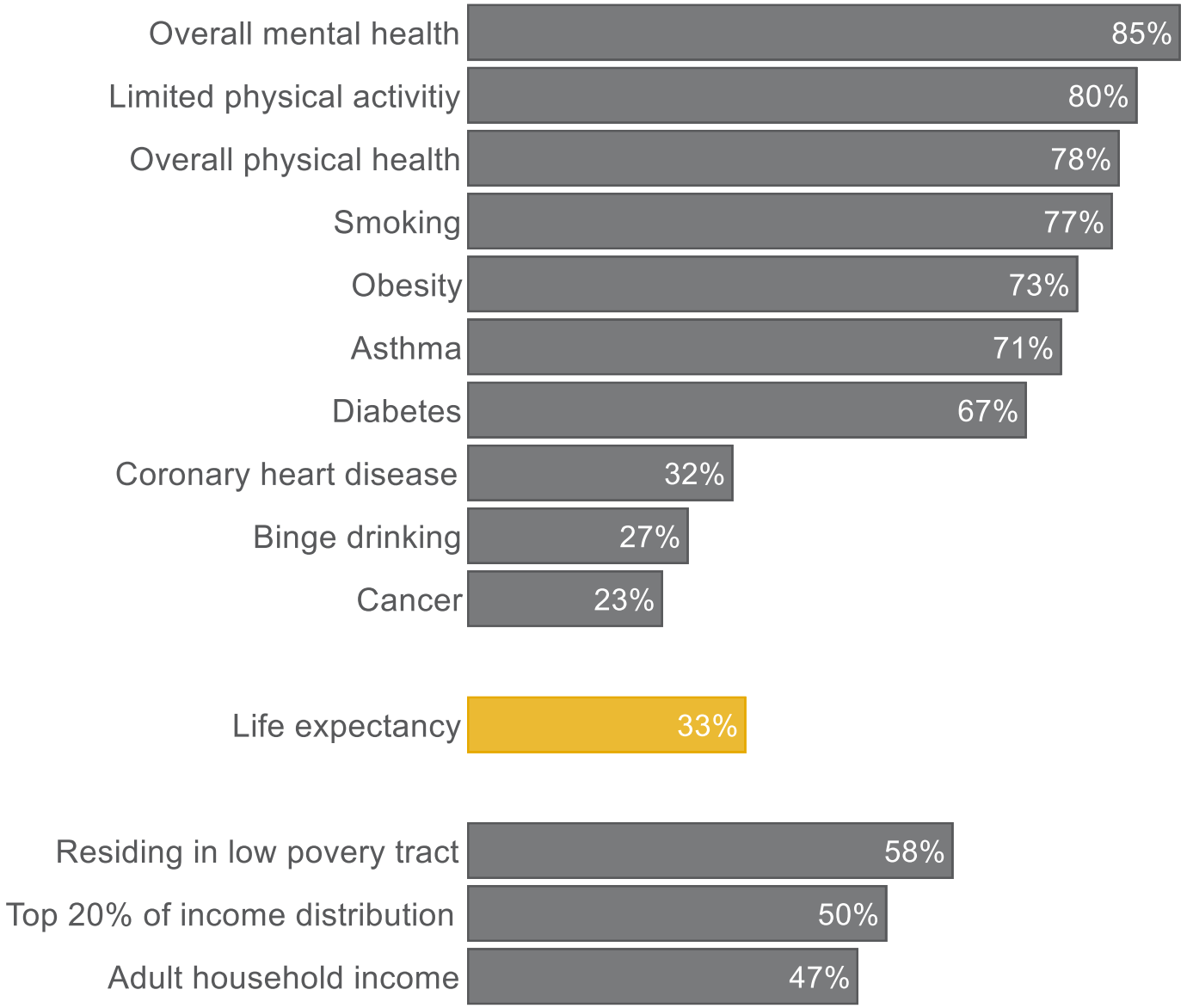


Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database; National Center for Health Statistics, United States Small-area Life Expectancy Estimates Project (USALEEP), World Bank.

BOSTON-CAMBRIDGE-NEWTON METRO AREA

Percent variance explained across adult outcomes

R^2 statistics from regressions of 14 health and socio-economic adult outcomes on COI 2.0 overall average z-score



Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database. Chetty et al., Opportunity Atlas. NCHS, 500 Cities and USALEEP.

COI 2.0: Actionable neighborhood data

- Multi-sectoral, child-focused, granular, contemporary
- Data for all US neighborhoods
- Strongly correlated with adult outcomes
- Clear and compelling visualization of spatial and racial/ethnic inequities in access to opportunity
- Users from academia, media, health, housing, and early childhood education sectors

Thank you!

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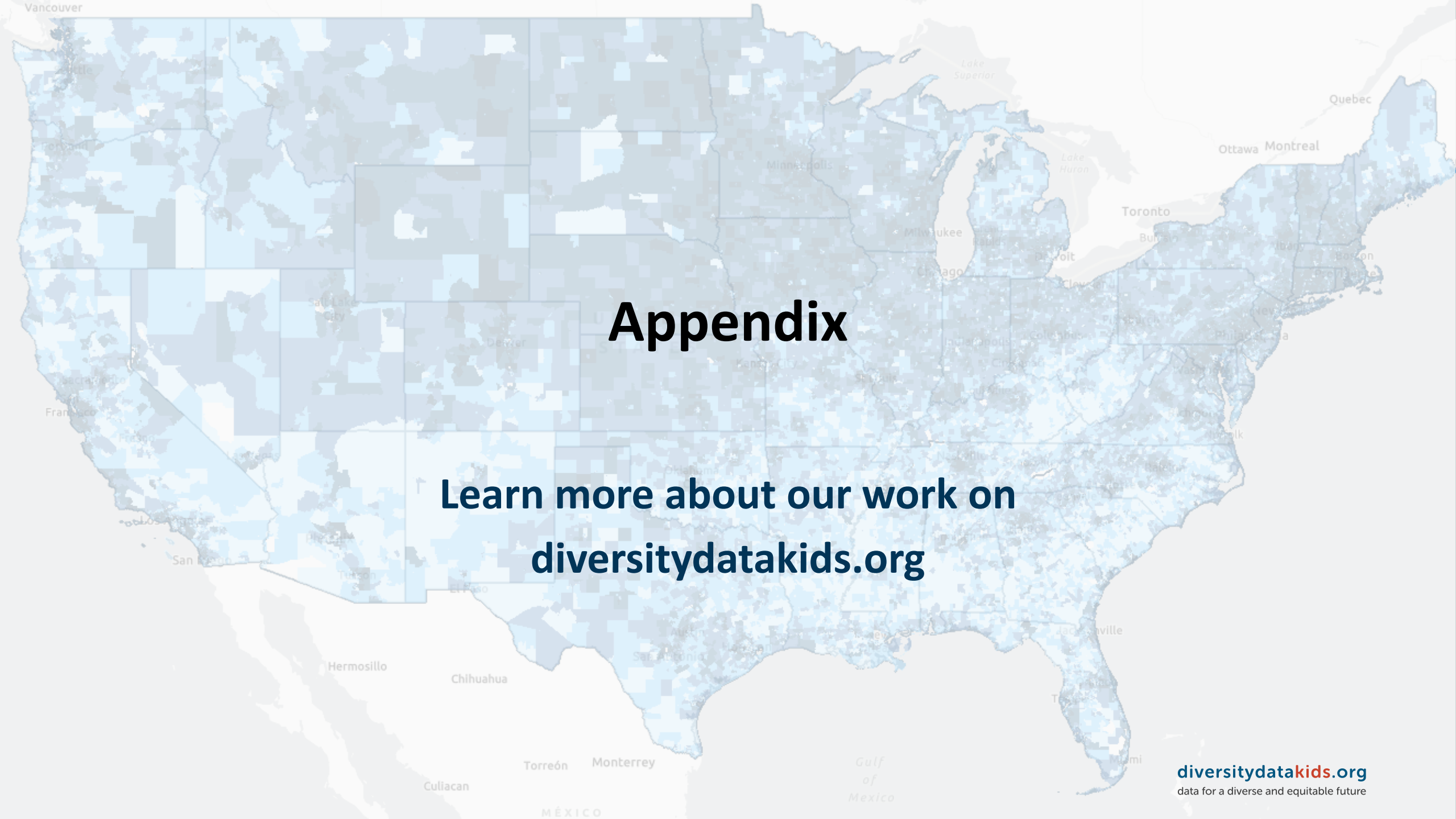


Appendix

Learn more about our work on diversitydatakids.org

Current focus of our work

Better understand COI users and uses

Better understand what helps COI users achieve impacts

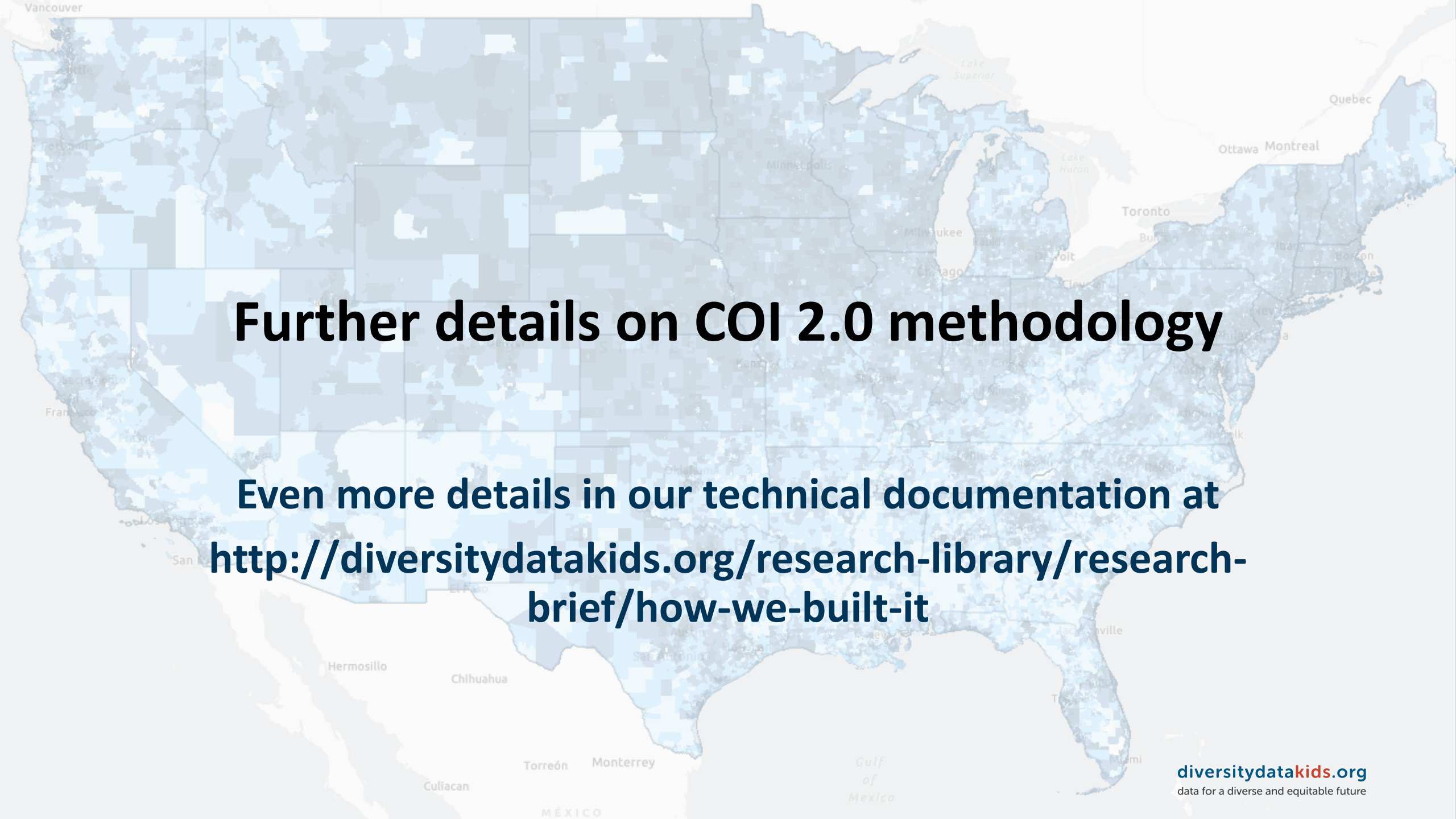
Facilitate more impactful uses

Develop and disseminate exemplary stories

Focus on health, early childhood education, and housing sectors

Questions? diversitydatakids.org/contact-us

Email us info@diversitydatakids.org



Further details on COI 2.0 methodology

Even more details in our technical documentation at http://diversitydatakids.org/research-library/research-brief/how-we-built-it

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data for a diverse and equitable future

Outcomes used for constructing weights

Socio-economic outcomes from Opportunity Atlas (Chetty et al.)

- Mean household income rank in adulthood (parents at median of parent income distribution)
- Probability of living in a low poverty census tract in adulthood (parents at median of parent income distribution)

Summary health outcomes from 500 Cities Project (CDC, RWJF)

- Mental health not good for 14 or more days among adults
- Physical health not good for 14 or more days among adults

Combining empirical and constant weights

Empirical weights reflect how well indicators predict outcomes

Need: Average causal effect for all indicators

Have: Estimated (conditional/unconditional) association between each indicator and tract-level SES and health outcomes in representative/recent data

Constant weights: Each indicator counts equally

Least worst solution in the absence of any information on what weights should be

For COI 2.0, we combined both approaches

We average empirical and constant weights to guard against bias in the empirical weights

Averaging empirical and constant weights shrinks large empirical weights and inflates small empirical weights towards a domain specific constant

Combining empirical and constant weights

How we calculate weights

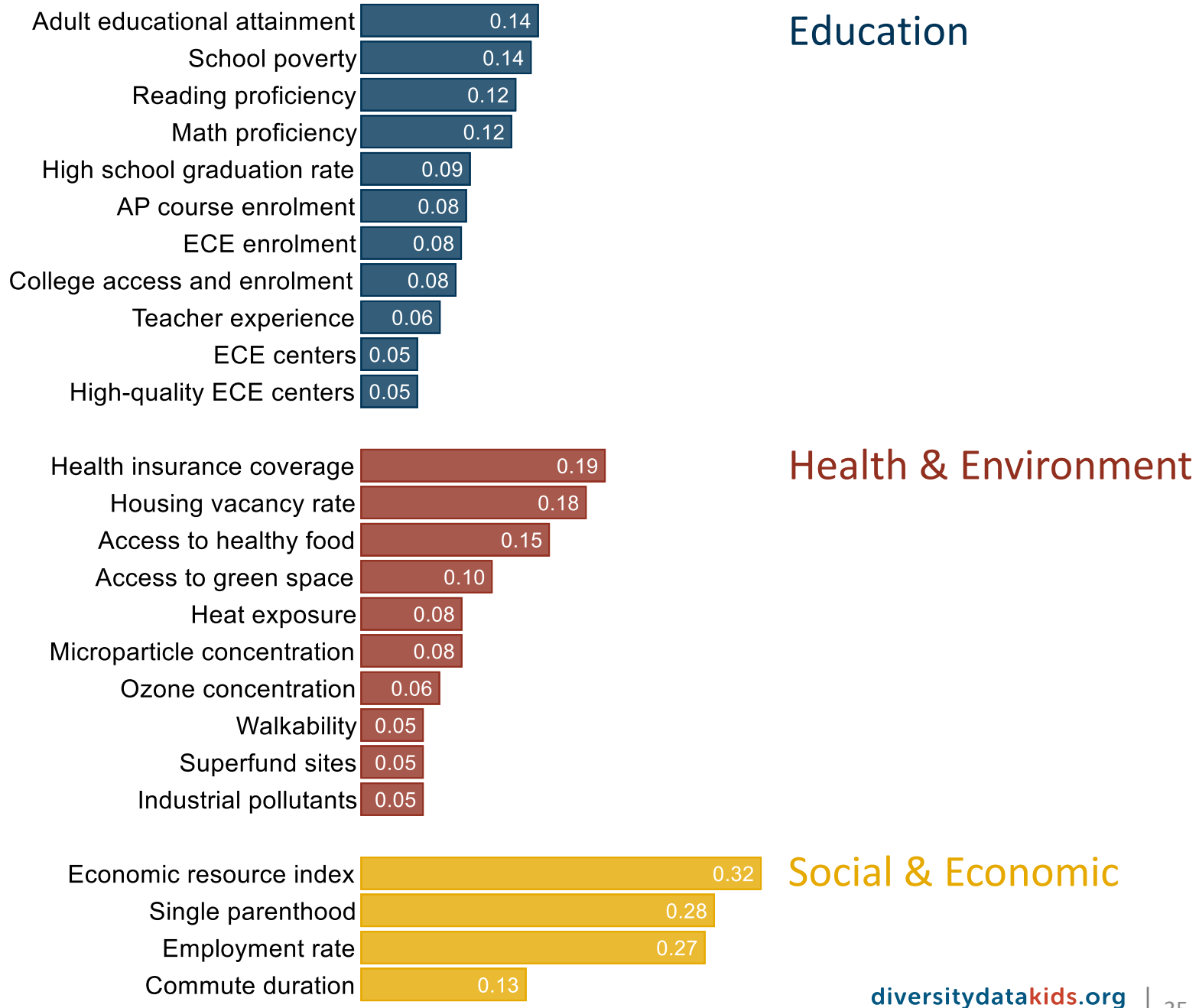
- Estimate bivariate correlation (Pearson's rho) between indicator z-scores (2010) and each of the four outcomes
- Average rho's for each indicator j across outcomes (= rho_j)
- Rescale rho_j to sum up to number of indicators in each domain
- Calculate weight for indicator j as $w_j = (rho_j + 1) / 2$
- Rescale w_j to sum up to one in each domain

Sensitivity analyses

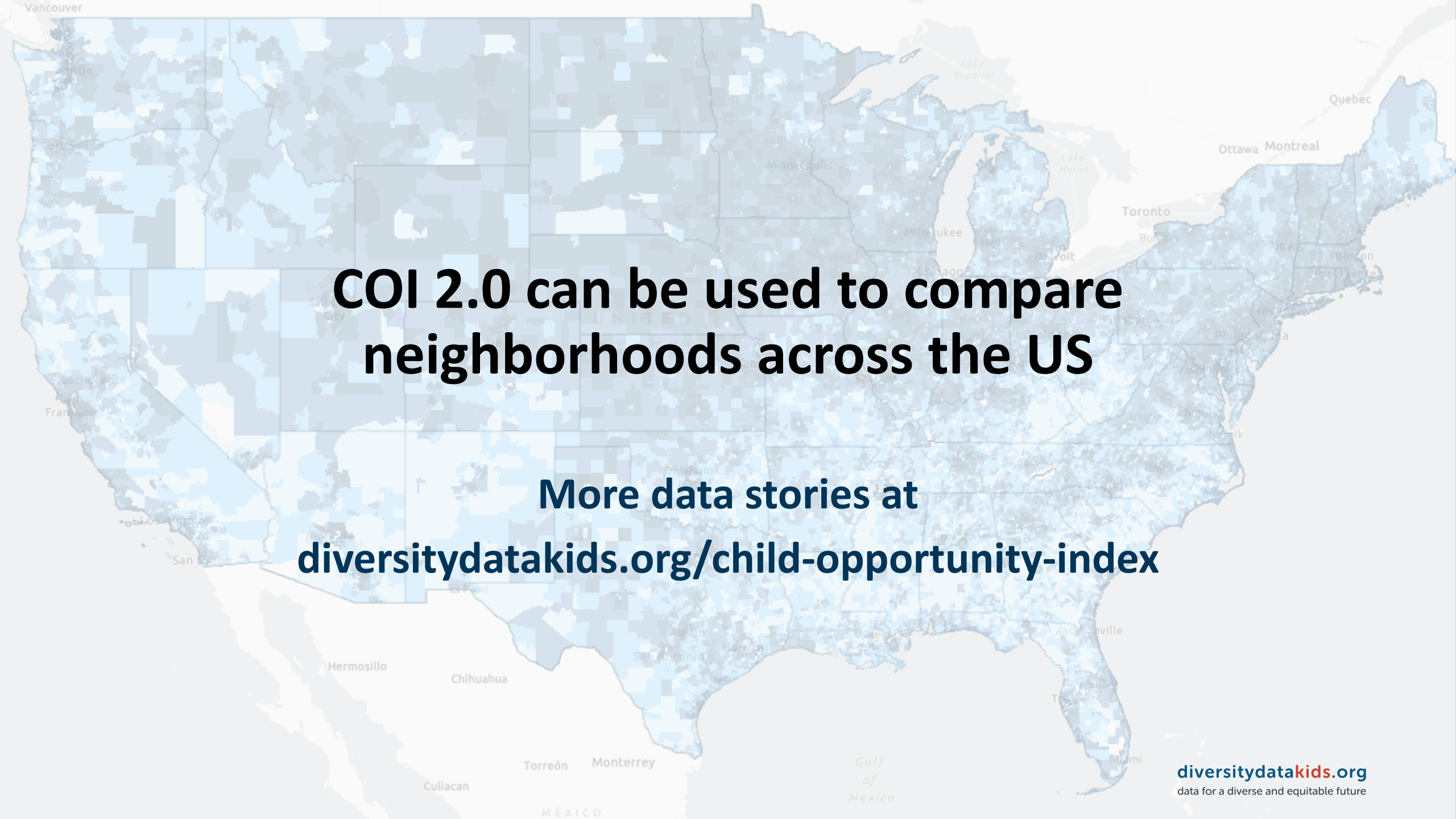
- Re-estimate correlations with county fixed effects and controlling for economic resources and population density

Indicator weights by domain

Weights sum to one in each domain



Sources: diversitydatakids.org

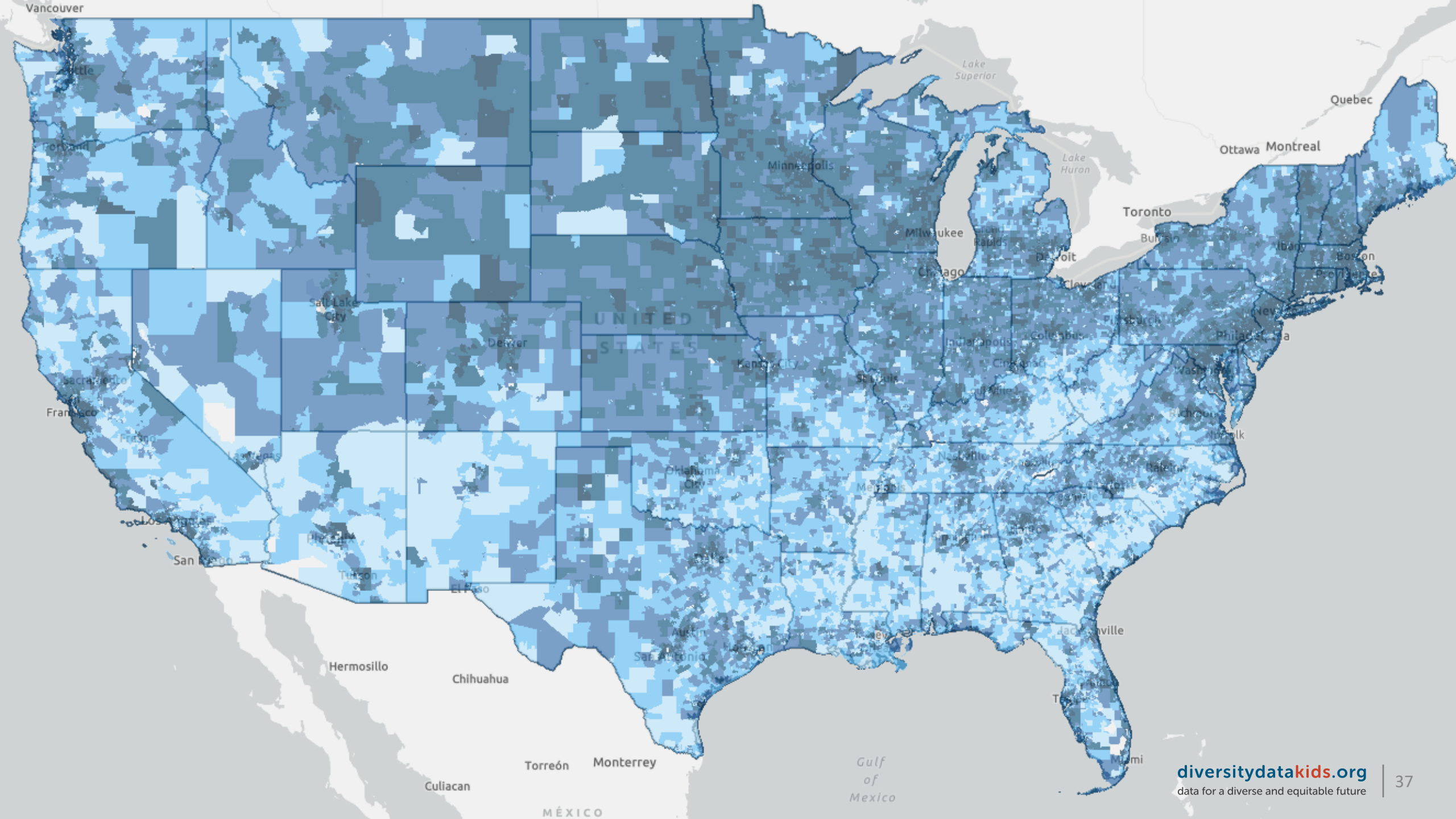


COI 2.0 can be used to compare neighborhoods across the US

More data stories at

diversitydatakids.org/child-opportunity-index

diversitydatakids.org
data for a diverse and equitable future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Nashville
Memphis
Hermosillo
Chihuahua
Torreón
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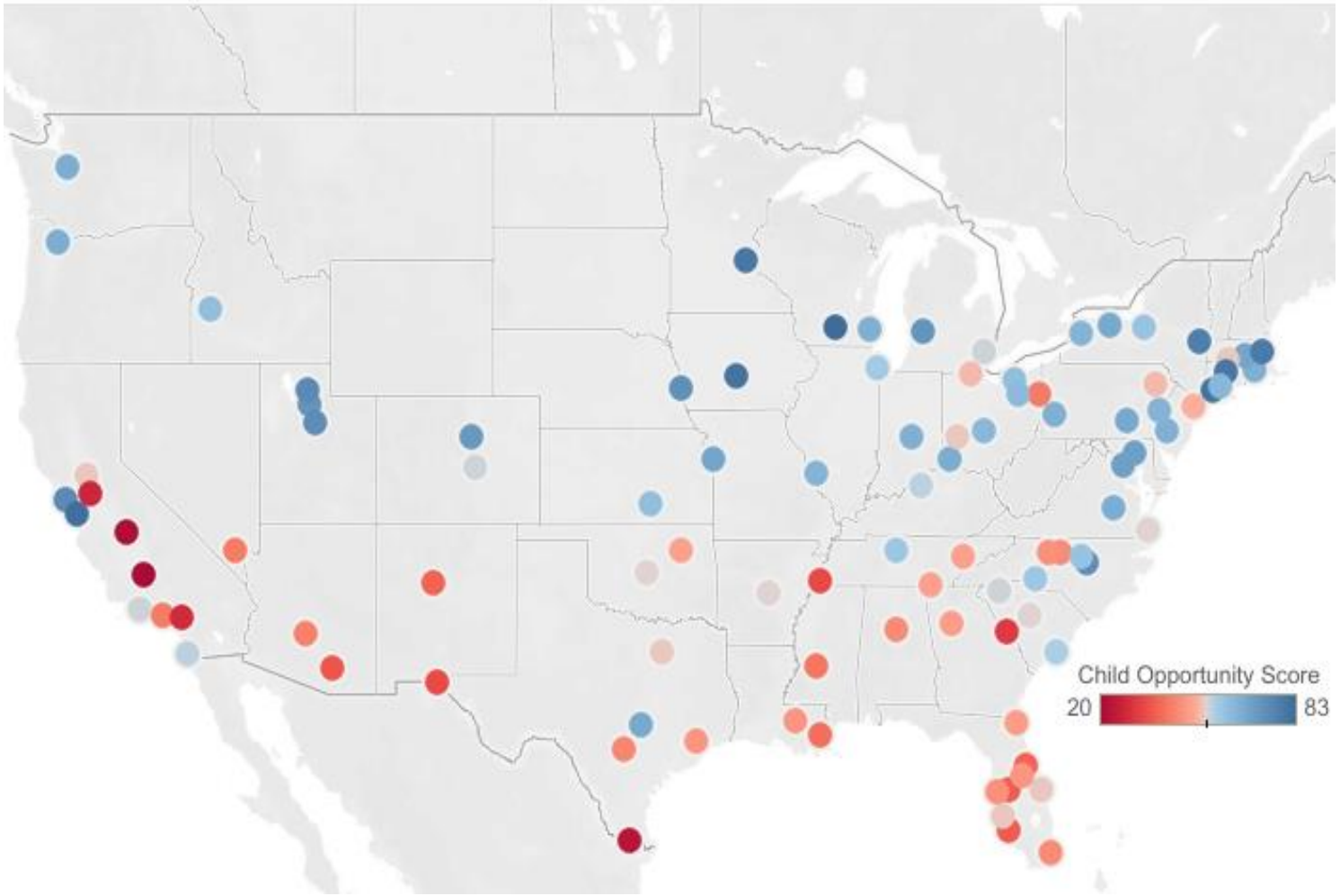
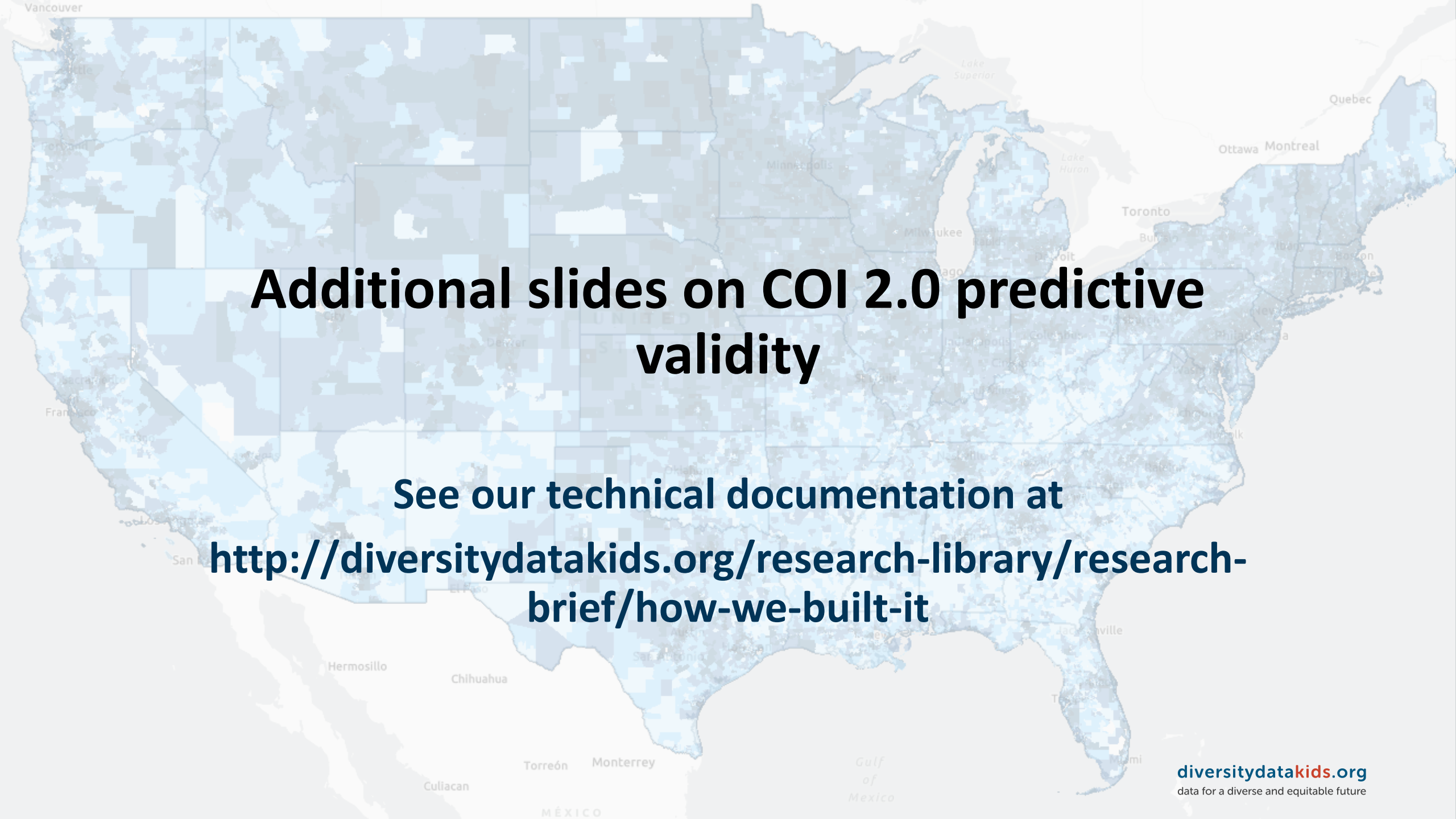
Culiacan
MÉXICO
Gulf of Mexico

Child Opportunity Scores

Median child opportunity scores (nationally-normed) for the 100 largest metro areas



Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database.



Additional slides on COI 2.0 predictive validity

See our technical documentation at

http://diversitydatakids.org/research-library/research-brief/how-we-built-it

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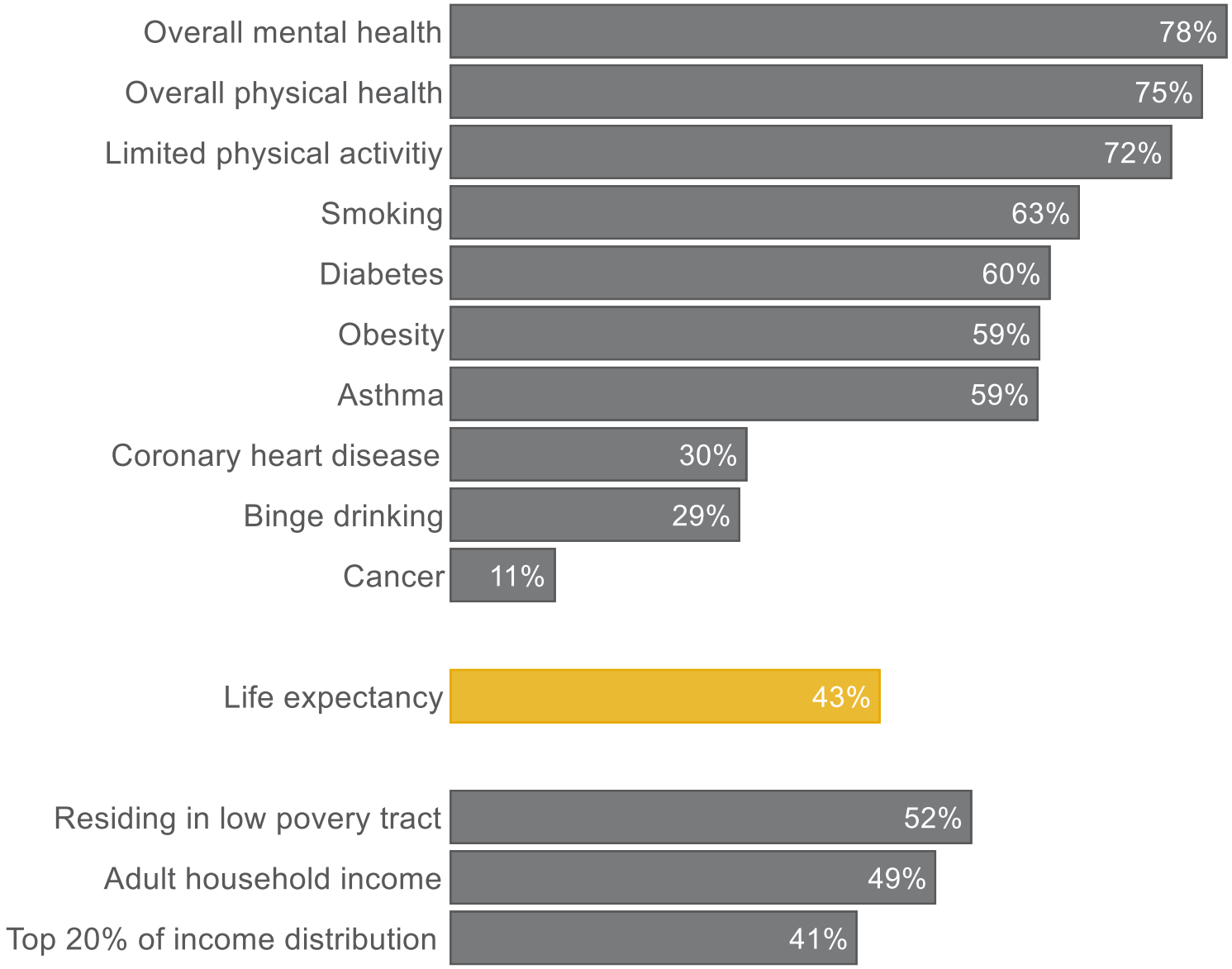
Percent variance explained across different outcomes

R^2 statistics from regressions of 14 health and socio-economic adult outcomes on COI 2.0 overall average z-score

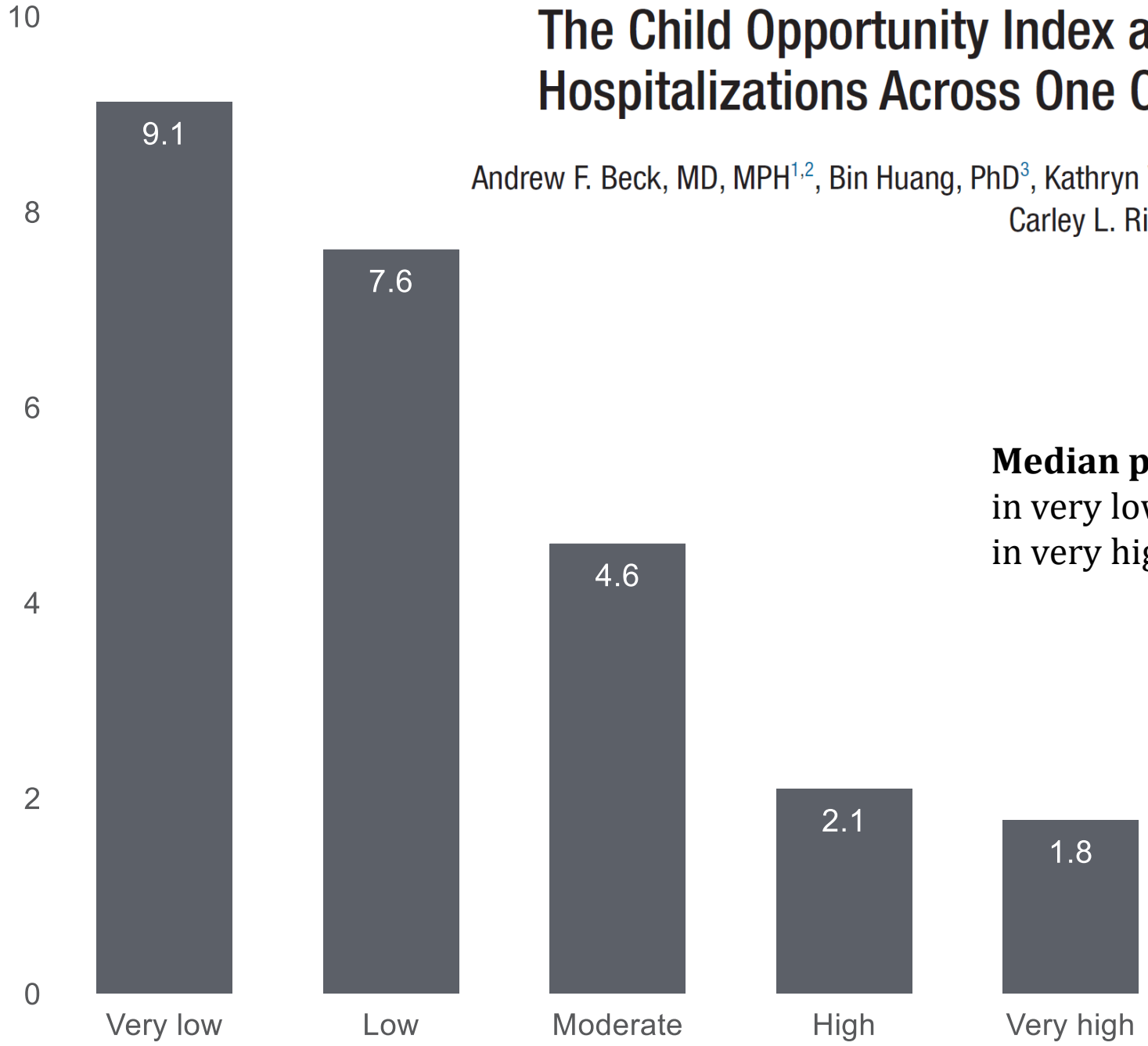
Data for all US census tracts



Sources: diversitydatakids.org, Child Opportunity Index 2.0 Database. Chetty et al., Opportunity Atlas. NCHS, 500 Cities and USALEEP.

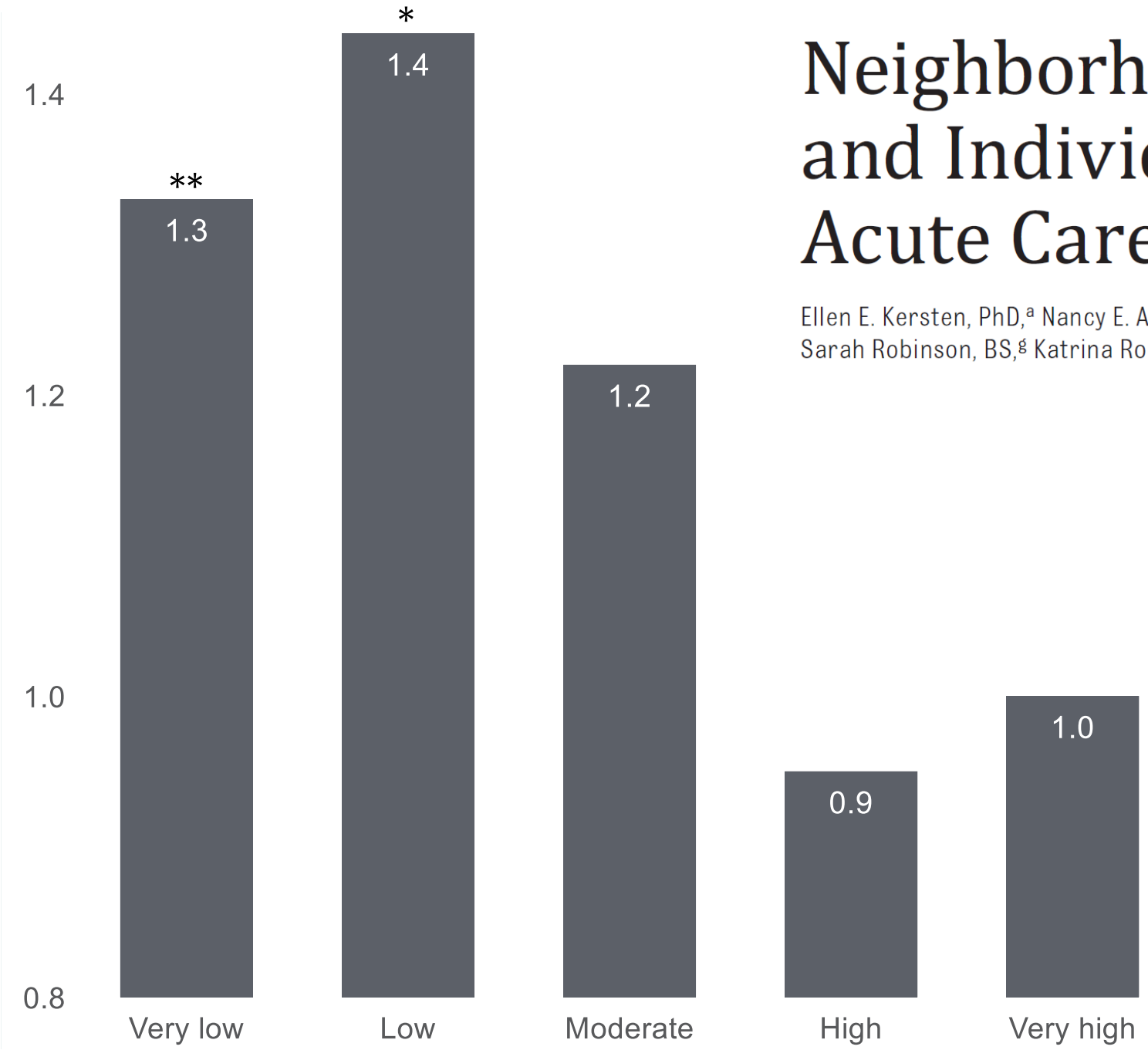
The Child Opportunity Index and Disparities in Pediatric Asthma Hospitalizations Across One Ohio Metropolitan Area, 2011-2013

Andrew F. Beck, MD, MPH[1,2], Bin Huang, PhD[3], Kathryn Wheeler[4], Nikki R. Lawson, BS[5], Robert S. Kahn, MD, MPH[1], and Carley L. Riley, MD, MPP, MHS[6]



Median pediatric asthma hospitalizations
in very low opportunity tracts = 9.1 per 1000 children
in very high opportunity tracts = 1.8 per 1000 children

Journal of Pediatrics 2017, 190:200-6



Neighborhood Child Opportunity and Individual-Level Pediatric Acute Care Use and Diagnoses

Ellen E. Kersten, PhD,[a] Nancy E. Adler, PhD,[a,b,c] Laura Gottlieb, MD, MPH,[c,d] Douglas P. Jutte, MD, MPH,[e,f] Sarah Robinson, BS,[g] Katrina Roundfield, PhD,[a] Kaja Z. LeWinn, ScD[a,c]

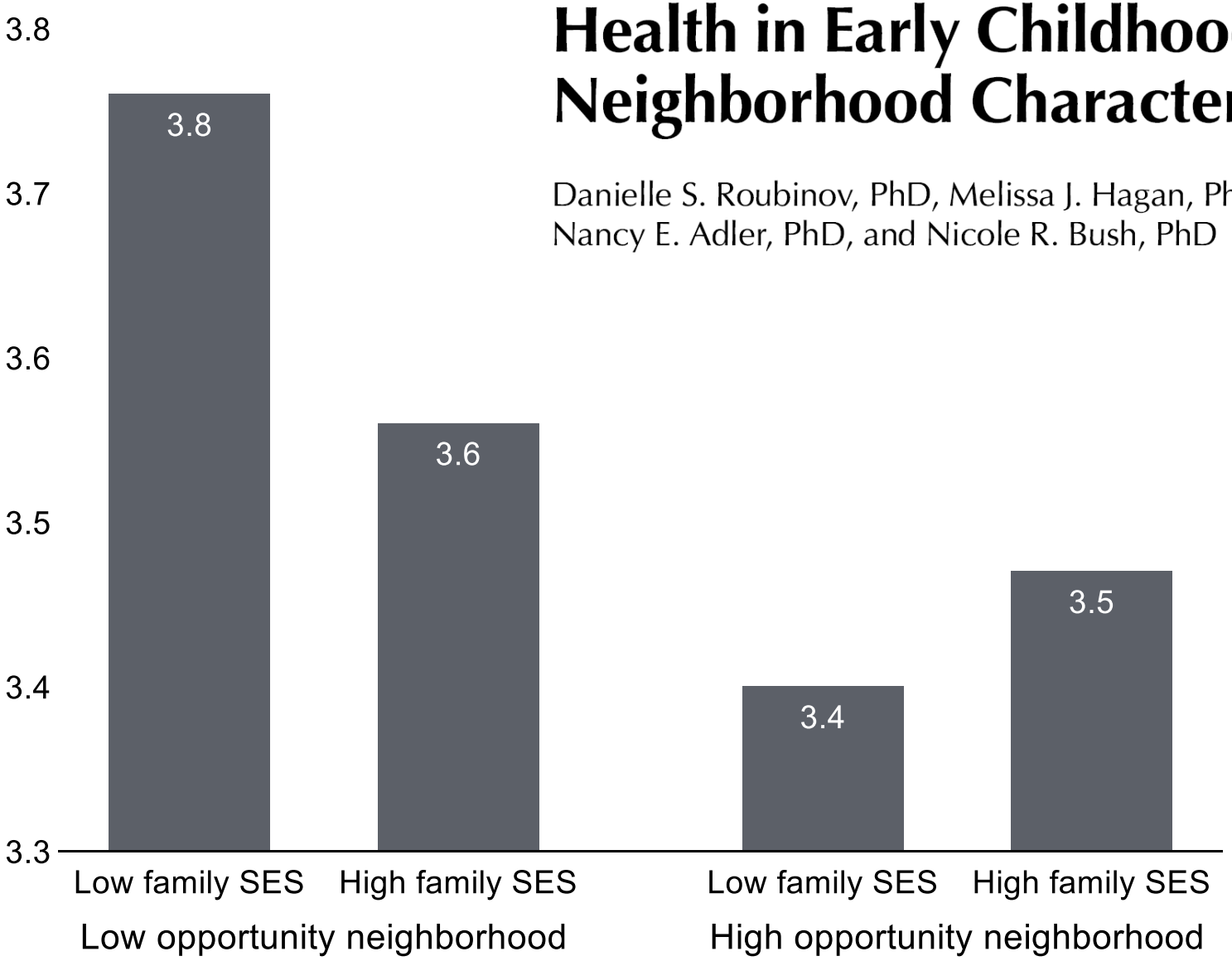
Adjusted odd ratios of having 4 or more acute care visits within one year, relative to children in very high opportunity neighborhoods

Children in low (very low) opportunity neighborhoods had 40% (30%) greater odds of acute care admissions than children in very high opportunity neighborhoods

Pediatrics. 2018, 141(5):e20172309

Family Socioeconomic Status, Cortisol, and Physical Health in Early Childhood: The Role of Advantageous Neighborhood Characteristics

Danielle S. Roubinov, PhD, Melissa J. Hagan, PhD, MPH, W. Thomas Boyce, MD,
Nancy E. Adler, PhD, and Nicole R. Bush, PhD



Children's cortisol levels (AUC_g)
Lower family SES was associated with higher daily cortisol output only at lower levels but not at higher levels of neighborhood opportunity.

Psychosomatic Medicine, 2018: 80:492-501

Child Opportunity Index (COI) vs. Opportunity Atlas

Child Opportunity Index

Composite index based on 29 indicators covering three domains

Focus on contemporary features of neighborhoods linked to healthy child development by previous research

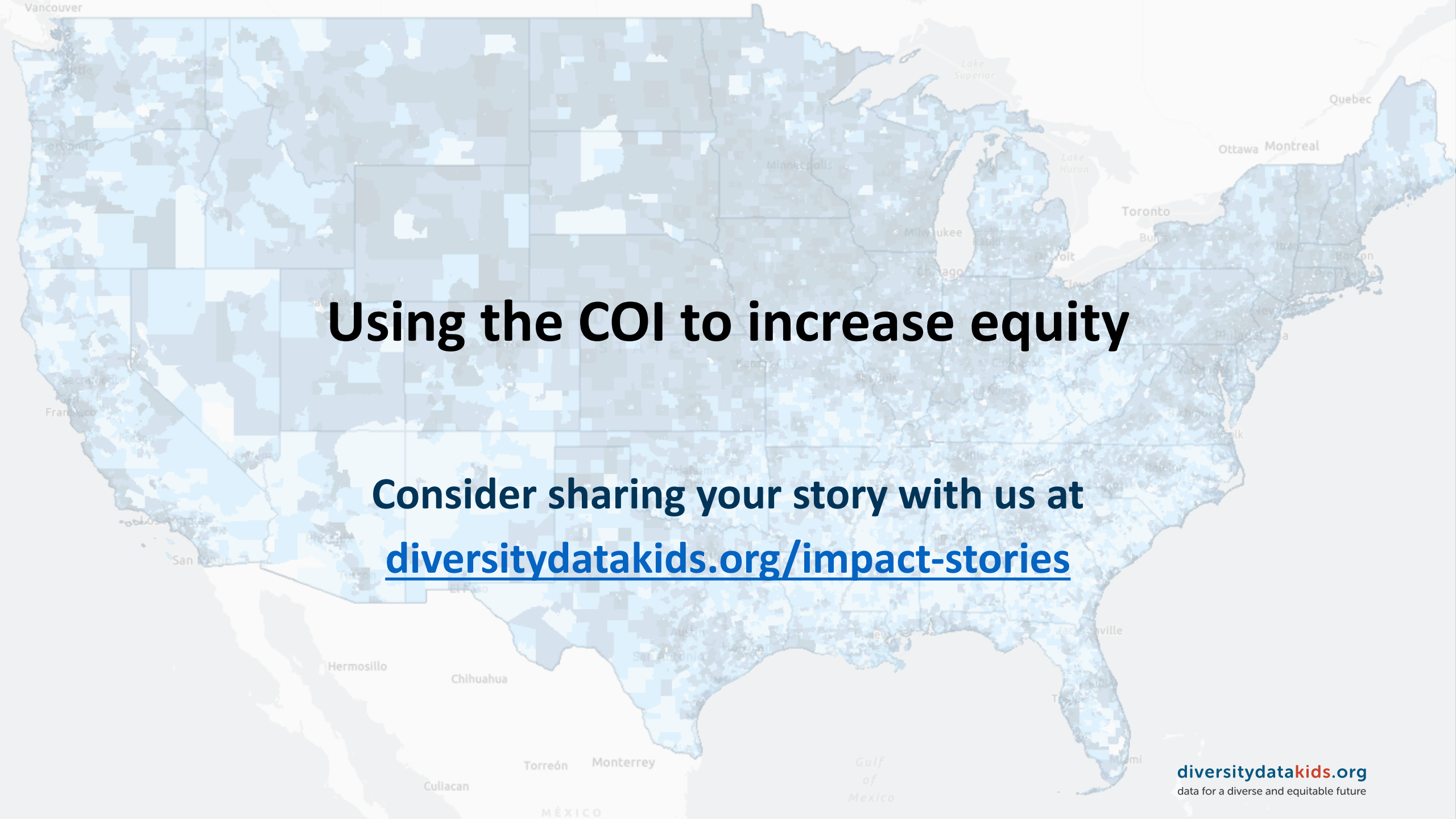
Incorporates OA (and 500 Cities data) to improve predictive validity

Opportunity Atlas (Chetty et al. 2018)

Estimates of long-term effects of growing up in different neighborhoods on, e.g., household income rank, marital status, and incarceration in adulthood

Effects of neighborhoods as they were 15-20 years ago

No information about features of neighborhoods generating these effects



Using the COI to increase equity

Consider sharing your story with us at

diversitydatakids.org/impact-stories

npr

NATIONAL

In Nearly Every U.S. Metro Area, New Data Show Opportunity Lags For Kids Of Color

December 18, 2019 · 3:18 PM ET

CNN health

How healthy is your neighborhood for your child? Take a look

by Sandee LaMotte, CNN

Heller School · News

Opportunity Knocks Across the Nation

California cities rank among country's best and worst places to raise kids, study says

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Riverside is one of the worst places in the United States to raise children, while San Jose ranks among the best, according to a new Brandeis study.

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INEQUALITY

DATA

We Tried to Find the Most Equal Place in America. It Got Complicated

The Washington Post

Democracy Dies in Darkness

Economy

What shapes a kid's opportunities? Researchers say look to the neighborhood.

A Brandeis University study finds stark divides along racial and ethnic lines, and glaring 'opportunity gaps'

U.S.News & WORLD REPORT NEWS

Childhood Opportunity Varies Dramatically by Neighborhood

A new report shows stark inequities in neighborhood conditions for children across the country, holding serious implications for later in life.

AXIOS

Jan 22, 2020

America's hardest places to grow up

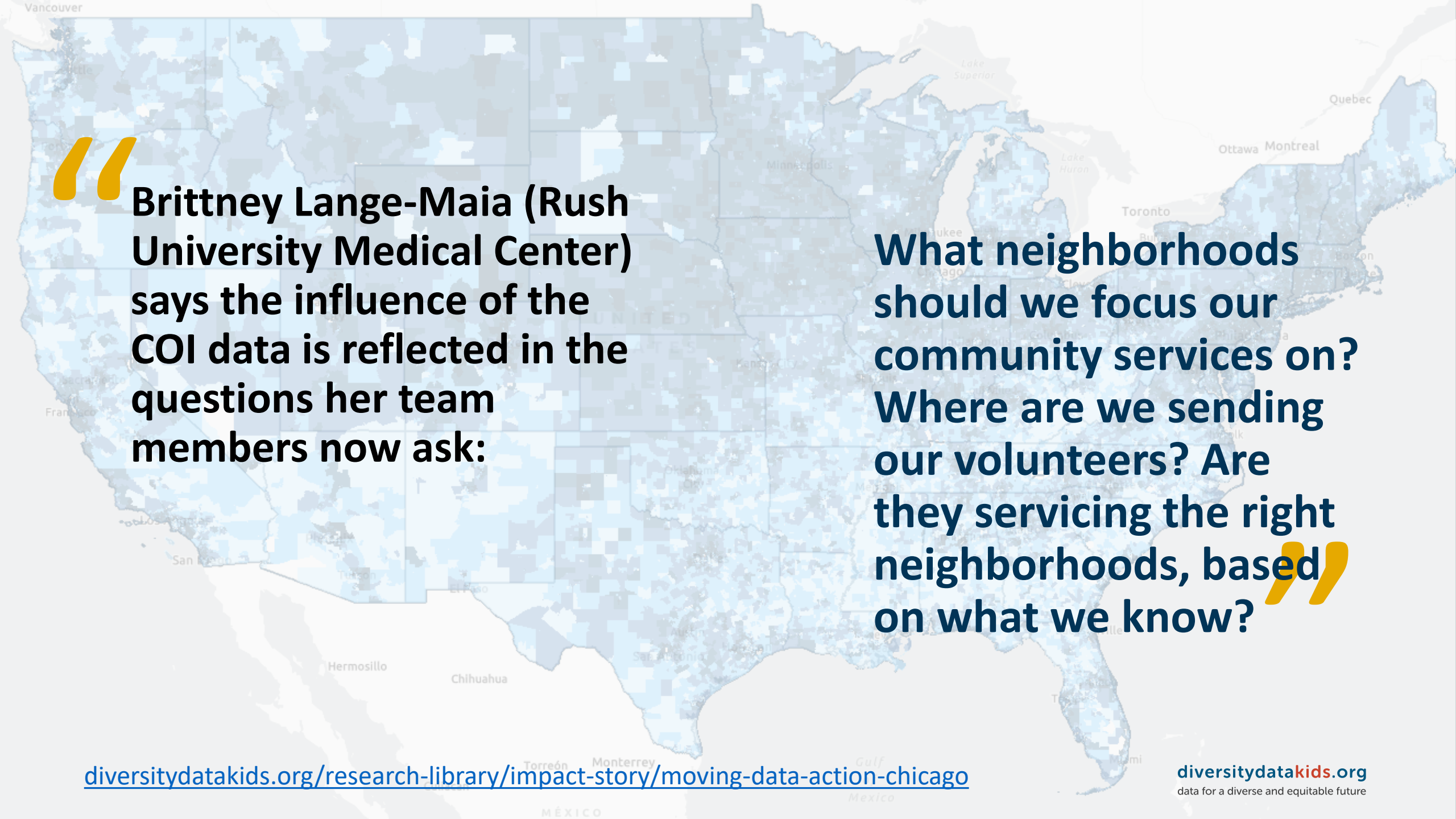
Moving Data to Action in Chicago

Department of Public Health published community health improvement plan in 2015

Subsequent collaboration around and uses of the COI

- "Hyper-local" view of neighborhood context and inequality
- Award of community seed grants
- Targeting for place-based interventions
- Community health needs assessments

diversitydatakids.org/research-library/impact-story/moving-data-action-chicago



"Brittney Lange-Maia (Rush University Medical Center) says the influence of the COI data is reflected in the questions her team members now ask:

What neighborhoods should we focus our community services on? Where are we sending our volunteers? Are they servicing the right neighborhoods, based on what we know?"

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