

Equity Index Indicators

Economy

Poverty

- There is a negative relationship between a neighborhood's poverty rate & it's physical and mental health.
 - Browning, C. R., & Cagney, K. A. (2003). Moving beyond poverty: Neighborhood structure, social process, and health. *Journal of health and social behavior*, 44(4), 552-571.
 - Orr, L., Feins, J., Jacob, R., Beecroft, E., Sanbonmatsu, L., Katz, L. F., Liedbman, J.B. & Kling, J. R. (2003). *Moving to opportunity: Interim impacts evaluation*. U.S. Department of Housing and Urban Development Office of Policy Development and Research.
- Additionally, higher rates of poverty negatively affect student graduation rates and the future earnings of children who grow up in higher poverty neighborhoods
 - Galster, G., Marcotte, D. E., Mandell, M., Wolman, H., & Augustine, N. (2007). The influence of neighborhood poverty during childhood on fertility, education, and earnings outcomes. *Housing Studies*, 22(5), 723-751.
 - Turner, M. A., & Acevedo-Garcia, D. (2005). The Benefits of Housing Mobility: A Review of the Research Evidence. In *Keeping the Promise: Preserving and Enhancing Housing Mobility in the Section 8 Housing Choice Voucher Program* (p. 8).
- There is a dynamic and adaptive relationship between special context, race, and poverty when it comes to health inequity
 - Tung, E.L., Cagney, K.A., Peek, M.E. *et al.* Spatial Context and Health Inequity: Reconfiguring Race, Place, and Poverty. *J Urban Health* 94, 757–763 (2017).

Job Density

- Minority women have poorer spatial access to jobs than white women, as indicated by their longer commuting times and less-localized labor markets
 - McLafferty, S. & Preston, V. (1992) Spatial Mismatch and Labor Market Segmentation for African-American and Latina Women. *Economic Geography*, 68(4), 406-431.
- Black, Asian, and Hispanic women and men are concentrated in jobs that have long commutes and low wages, expanding disadvantage because those with long commutes are not compensated by well-paid employment
 - McLafferty, S. & Preston, V. (2019) Who has long commutes to low-wage jobs? Gender, race, and access to work in the New York region. *Urban Geography*, 40(9), 1270-1290.
- Minority women still commute long times on slow public transit in New York- highlighting the racial and gender disparities in geographical access to employment within the metropolitan region

- Preston, V. & McLafferty, S. (2016) Revisiting Gender, Race, and Commuting in New York. *Annals of the American Association of Geographers*, 106:2, 300-310.

Educational Attainment

- A postsecondary education holds the promise of higher lifetime earnings and social mobility, but too many low-income students never complete their degrees.
 - Strumbos, D., Linderman, D., & Hicks, C. C. (2018). Postsecondary pathways out of poverty: City University of New York Accelerated Study in Associate Programs and the case for national policy. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 4(3), 100–117.
- Among students who started in four-year public institutions, black students had the lowest six-year completion rate (45.9 percent). The completion rate of Hispanic students was almost 10 percentage points higher than that of black students (55.0 percent). Over two-thirds of white and Asian students completed a degree within the same period (67.2 percent and 71.7 percent, respectively). Nationally, 62.4 percent of students finished a degree or certificate within six years
 - Shapiro, D., Dundar, A., Huie, F., Wakhungu, P., Yuan, X., Nathan, A & Hwang, Y., A. (2017, April). A National View of Student Attainment Rates by Race and Ethnicity – Fall 2010 Cohort (Signature Report No. 12b). Herndon, VA: National Student Clearinghouse Research Center.
- Experiencing concentrated poverty in adolescence strongly reduces the odds of graduating from college, neighborhood economic opportunity and resource deprivation are key aspects of poverty-saturated neighborhoods that influence college graduation odds
 - Levy, B.L., Heterogeneous Impacts of Concentrated Poverty During Adolescence on College Outcomes. *Social Forces*, Volume 98, Issue 1, September 2019, Pages 147–182.

Median household income

- Economic and racial segregation are commonplace in America and scholars argue that income determines where we are able to live. Because of exclusionary zoning tactics, low income households are relegated to neighborhoods with lower median incomes, which decrease as poverty become concentrated.
 - Briggs, X. D. (2005). *The geography of opportunity: Race and housing choice in metropolitan America*. Washington (DC): Brookings Institution.
 - Dreier, P., Mollenkopf, J. H., & Swanstrom, T. (2014). *Place matters: Metropolitcs for the twenty-first century*. Lawrence, Kan.: Univ. Press of Kansas.
 - Rothstein, R. (2018). *The color of law: A forgotten history of how our government segregated America*. New York: Liveright Publishing Corporation, a division of W. W. Norton & Company.

Unemployment rate

- Unemployment can affect both physical and mental health. Those with lower educational attainment suffer greater than those with higher educational attainment. The consequences of job loss are magnified in region's experiencing a higher unemployment rate.
 - Turner, J. B. (1995). Economic context and the health effects of unemployment. *Journal of Health and Social Behavior*, 213-229.
- Major economic setbacks, like the loss of a job, significantly increases the likelihood of marital dissolution, causing emotional turmoil for family members.
 - Yeung, W. J., & Hofferth, S. L. (1998). Family adaptations to income and job loss. *US. Journal of Family and Economic Issues*, 19(3), 255-283.
- Parental job loss can have persistent negative effects on children throughout their development and future, such as lower rates of college attendance or lower earning potential.
 - Coelli, M. B. (2011). Parental job loss and the education enrollment of youth. *Journal of Labour Economics*, 18(1), 25-35.
 - Oreopoulos, P., Page, M., & Stevens, A. H. (2008). The intergenerational effects of worker displacement. *Journal of Labor Economics*, 26(3), 455-483.

Livability

Home ownership rate

- Homeownership is the largest contributor to family wealth and economic security. Adults whose mothers owned homes in 1994 were over 1.5 times more likely to own a home, attained higher education, and were moderately less likely to receive public assistance in 2014 as compared to adults with mothers who did not own homes
 - Rostad, W.L., Ports, K.A., & Tang, S. (2018). Mothers' homeownership and children's economic success 20 years later among a sample of US citizens. *Children and Youth Services Review*, 99(1), 355-359.
- Homeownership represents social status, allows for the building of wealth, and presents the promise of moving into a nice home for African American and Latino populations
 - McCabe, B.J. (2018). Why Buy a Home? Race, Ethnicity, and Homeownership Preferences in the United States. *Sociology of Race and Ethnicity*. 4(4):452-472.
- For most Americans, home equity represents the largest reservoir of wealth. A typical white family's wealth is more than \$73,000 greater than the typical black family's
 - Shapiro, T.M. (2006). Race, Homeownership, and Wealth. *Washington University Journal of Law & Policy*, 20(1).

Housing burden

- Housing burden is an important risk factor for mental health, the pressure on household finances that unaffordable housing imposes can adversely impact the mental health of adults and children

- Matthew, D.B., (2018) Equitable Community Development for Good Mental Health: A Discussion of Economic and Racial Equity in Housing (November 29, 2018). Community Development Innovation Review, Federal Reserve Bank of San Francisco, 13(1)
- Single households, poor households (i.e., income less than two times the poverty level), less educated households, black 40 households, Hispanic households, and foreign born non-citizen households all experience more severe levels of housing insecurity
 - Cox, R. and Rodnyansky, S., Henwood, B., & Wenzel, S. (2017). Measuring Population Estimates of Housing Insecurity in the United States: A Comprehensive Approach. CESR-Schaeffer Working Paper No. 2017-012.
- Most poor renting families in America now devote at least half of their income to covering housing costs, and eviction has become common
 - Desmond, M. (2018), Heavy is the House: Rent Burden among the American Urban Poor. *Int. J. Urban Reg. Res.*, 42: 160-170.

Transit Access and Access to Jobs by Transit

- Residents of low-income neighborhoods in major metropolitan areas have access to many more jobs by car than by transit
 - Boarnet, M.G., Giuliano, G., Hou, Y., & Shin, E.J. (2017) First/last mile transit access as an equity planning issue. *Transportation Research Part A: Policy and Practice*, 103: 296-310.
- Public transit is important for low-income households, and improving access to bus transportation may assist in changing the spatial distribution of poverty and creating more equitable and inclusive cities
 - Pathak, R., Wyczalkowski, C.K., & Huang, X. (2017). Public transit access and the changing spatial distribution of poverty. *Regional Science and Urban Economics*, 66:198-212.
- Poverty and vehicle access are related to significant differences in primary medication non-adherence
 - Hensley, C., Heaton, P.C., Kahn, R.S., Luder, H.R., Frede, S.M., & Beck, A.F. (2018). Poverty, Transportation Access, and Medication Nonadherence. *Pediatrics*, 141(4).

Internet Access

- Broadband internet access is a social determinant of health, this has been demonstrated by COVID-19 which showed that lack of internet influences each of the six social determinants of health (economic stability, neighborhood and physical environment, education, food, community and social context, healthcare system) domain defined by the American Medical Association, and it affects access to credible information
 - Benda, N.C., Veinot, T.C., Sieck, C.J., & Ancker, J.S. (2020). Broadband Internet Access Is a Social Determinant of Health! *American Journal of Public Health*, 110:1123-1125

- 10.1% of children participating in online learning nationally did not have adequate access to the internet and a computer, more specifically 35.5% of children of black parents with less than high school education did not have adequate access
 - Friedman, J., York, H., Mokdad, A.H., & Gakidou, E. (2021). U.S. Children ‘Learning Online’ during COVID-19 without the Internet or a Computer: Visualizing the Gradient by Race/Ethnicity and Parental Educational Attainment. *Socius: Sociological Research for a Dynamic World*.
- Likely that digital technologies will increase health inequities associated with increased age, lower level of educational attainment, and lower socio-economic status- programs to enhance literacy and access are important for reducing these inequities
 - Azzopardi-Muscat, N. & Sørensen, K. (2019) Towards an equitable digital public health era: promoting equity through a health literacy perspective. *European Journal of Public Health*, 29(3): 13–17.

Crime

- Racial disparities in violent crime are attributable in large part to the persistent structural disadvantages that are disproportionately concentrated in African American communities
 - Sampson, R.J., Wilson, W., & Katz, H. (2018). Reassessing “Toward a Theory of Race, Crime, and Urban Inequality. *Political Science*.
- There is a correlation between crime rate and transit connectivity, disparities exist with access to public transit infrastructure for Baltimore’s minority, low income, elderly, and youth populations have limited access to transit facilities compared to others
 - Banerjee, S. & Bhuyan, I. (2019). Correlation of Crime Rate with Transit Connectivity and Transit Demand at Census Block Group Level. *International Conference on Transportation and Development*.
- Perceived lack of safety from crimes constrains personal activity behavior affecting public health
 - Rees-Punia, E., Hathaway, E.D., & Gay, J.L. (2018). Crime, perceived safety, and physical activity: A meta-analysis. *Preventive Medicine*, 111: 307-313.

Life Expectancy

- In the USA, a 14 year gap in life expectancy has been reported between the richest 1% of the population and poorest 1%
 - Canudas-Romo, V. (2018). Life expectancy and poverty. *The Lancet Global Health*, 6(8): e812-e813.
- In the USA between 2001 and 2014, deindustrialization and incarceration subtracted roughly 2.5 years from the lifespan of the poor
 - Nosrati, E., Ash, M., Marmot, M., McKee, M., & King, L.P. (2018). The association between income and life expectancy revisited: deindustrialization, incarceration and the widening health gap. *International Journal of Epidemiology*, 47(3):720–730.
- Life expectancy disparities in the U.S mean that black Americans experience the deaths of more friends and family members than do White Americans from childhood through later life

- Umberson, D. (2017). Black Deaths Matter: Race, Relationship Loss, and Effects on Survivors. *Journal of Health and Social Behavior*, 58(4): 405-420.

High School Graduation Rate

- There is an overrepresentation of racialized students among those suspended and suspensions significantly lower math achievement in high school
 - Ibrahim, H. & Johnson, O. (2020) School Discipline, Race–Gender and STEM Readiness: A Hierarchical Analysis of the Impact of School Discipline on Math Achievement in High School. *Urban Rev*, 52:75–99.
- 10% of students that have been suspended drop out of high school, there is a problem with the hyper-disciplining of vulnerable populations
 - Jabbari, J., & Johnson, Jr., O. (2020). The collateral damage of in-school suspensions: A counterfactual analysis of high-suspension schools, math achievement and college attendance.
- Students with disabilities and Black students, especially males are suspended nearly 3 times as often as white males, again suspension leads to dropping out of high school
 - Losen, D. (2011). *Discipline policies, successful schools, and racial justice*. Boulder, CO: National Education Policy Center.

Accessibility

Proximity to parks/open space

- Inequitable access to green space can relate to health disparities or inequalities. Initiatives that have integrated green spaces in projects may promote health equity
 - Jennings, V., Baptiste, A.K., Osborne Jelks, N., & Skeete, R. (2017) Urban Green Space and the Pursuit of Health Equity in Parts of the United States. *Int. J. Environ. Res. Public Health*, 14: 1432.
- Green space shows stronger associations with physical health for groups with low socioeconomic status, than for those with higher socioeconomic status. Disadvantaged groups have stronger protective effects from green space. Green space could be a tool to advance health equity
 - Rigolon, A., Browning, M.H.E.M., McAnirlin, O., & Yoon, H. (2021) Green Space and Health Equity: A Systematic Review on the Potential of Green Space to Reduce Health Disparities. *Int. J. Environ. Res. Public Health*, 18: 2563.
- Inequitable access to urban greenspaces often overlaps race/ethnicity and results in reduced access to ecosystem services from green spaces and increased health disparities
 - Jennings V., Browning M.H.E.M., & Rigolon A. (2019) Urban Green Space at the Nexus of Environmental Justice and Health Equity. *Urban Green Spaces. SpringerBriefs in Geography*. Springer, Cham.

Pedestrian and Bike Facilities

- Sidewalks can serve as indicators of racial inequities in southern metropolitan cities
 - BISE, R., RODGERS, J., MAGUIGAN, M., BEAULIEU, B., KEITH, W., & MAGUIGAN, C. (2018). Sidewalks as Measures of Infrastructure Inequities. *Southeastern Geographer*, 58(1), 39-57.
- Transportation infrastructure can exacerbate existing social inequities, through providing infrastructure that ignores the needs of vulnerable communities
 - Thomas, R. (2020). Social equity and disadvantage. *Handbook of Sustainable Transport*. Cheltenham, UK: Edward Elgar Publishing.
- Poverty, as well as health care, family, and community factors (like the presence of sidewalks) are associated with mental, behavioral, and development disorders in children
 - Cree, R. A., Bitsko, R. H., Robinson, L. R., Holbrook, J. R., Danielson, M. L., Smith, C., Kaminski, J. W., Kenney, M. K., & Peacock, G. (2018). Health Care, Family, and Community Factors Associated with Mental, Behavioral, and Developmental Disorders and Poverty Among Children Aged 2-8 Years - United States, 2016. *MMWR. Morbidity and mortality weekly report*, 67(50), 1377–1383.

Civic engagement (Voter Participation)

- In the U.S, a “civic engagement gap” persists between low-income youth and their high-income counterparts
 - Astuto, J. & Ruck, M. (2017). Growing up in poverty and civic engagement: The role of kindergarten executive function and play predicting participation in 8th grade extracurricular activities. *Applied Developmental Science*, 21(4): 301-318.
- There is an income-participation gap- the rich participate in politics more than the poor, which can be attributed to current economic status and childhood economic history
 - Ojeda, C. (2018) The Two Income-Participation Gaps. *American Journal of Political Science*.
- Community-level income inequality affects political participation. Local experiences of inequality increase awareness of the unequal distribution of income in the US, provoking political activity specifically among those with more resources. This could lead to elected officials to be even less responsive to the preferences and needs of the less affluent
 - Szewczyk, J., & Crowder-Meyer, M. (2020). Community Income Inequality and the Economic Gap in Participation. *Polit Behav*.

Access to Healthy Foods

- Lack of access to retail venues within the neighborhood that have healthy food options like full-service grocery stores, has been associated with an increased risk for obesity and a poorer diet. Studies suggest that having a greater access to convenience stores and fast food, where healthier options cost more or may not be accessible, also has been associated with lower dietary quality and higher rates of obesity.

- Lovasi, G. S., Hutson, M. A., Guerra, M., & Neckerman, K. M. (2009). Built environments and obesity in disadvantaged populations. *Epidemiologic reviews*, 31(1): 7-20.
- Hoyt, L. T., Kushi, L. H., Leung, C. W., Nickleach, D. C., Adler, N., Laraia, B. A., ... & Yen, I. H. (2014). Neighborhood influences on girls' obesity risk across the transition to adolescence. *Pediatrics*, 134(5): 942-949.
- Research shows that neighborhoods with predominantly African American residents have less access to grocery stores compared to white communities.
 - Morland, K., Wing, S., Roux, A. D., & Poole, C. (2002). Neighborhood characteristics associated with the location of food stores and food service places. *American journal of preventive medicine*, 22(1): 23-29.
- In racially segregated regions, African Americans pay more for food that is lower quality than white residents.
 - Williams, D. R., & Collins, C. (2001). Racial residential segregation: a fundamental cause of racial disparities in health. *Public health reports*, 116(5): 404.

Environment

Particulate Matter 2.5

- Long term exposure to PM_{2.5} and ozone has been associated with the development and progression of cardiovascular disease, and for PM_{2.5}, higher cardiovascular mortality
 - Malik, A.O., Jones, P.G., Chan, P.S., Peri-Okonny, P.A., Hejjaji, V., & Spertus, J.A. (2019). Association of Long-Term Exposure to Particulate Matter and Ozone with Health Status and Mortality in Patients After Myocardial Infarction. *Circulation: Cardiovascular Quality and Outcomes*. 12.
- Subgroups living in poverty experience the greatest absolute burdens from coal-fired electricity-generating units that emit PM_{2.5}
 - Richmond-Bryant, J., Mikati, I., Benson, A.F., Luben, T.J., & Sacks, J.D. (2020). Disparities in Distribution of Particulate Matter Emissions from US Coal-Fired Power Plants by Race and Poverty Status after Accounting for Reductions in Operations between 2015 and 2017. *American Journal of Public Health*, 111:655-661.
- Disparities in burden from PM_{2.5} emitting facilities exists at multiple geographic scales, those in poverty have a 1.35 times higher burden than did the overall population and non-whites had 1.28 times higher burden, Black people specifically had 1.54 times higher burden than the whole population
 - Mikati, I., Benson, A.F., Luben, T.J., Sacks, J.D., Richmond-Bryant, J. (2017) Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status. *American Journal of Public Health*. 108:480-485.
 - Tessum, C.W., Paoella, D.A., Chambliss, S.E., Apte, J.S., Hill, J.D., & Marshall, J.D. (2021) PM_{2.5} pollutant disproportionately and systemically affect people of color in the United States. *Science Advances*. 7(18).

Traffic Density

- Areas with majority African-American populations had significantly higher exposure to both air pollutants and higher prevalence of disease. In considering health outcomes in connection with pollution exposure infrastructure, demographics remain the most significant explanatory variable.
 - Servadio, J.L., Lawal, A.S., Davis, T. *et al.* (2019) Demographic Inequities in Health Outcomes and Air Pollution Exposure in the Atlanta Area and its Relationship to Urban Infrastructure. *J Urban Health* 96: 219–234
- Minority and lower socioeconomic status are systematically linked to higher exposure to traffic
 - Rosenlieb, E.G., McAndrews, C., Marshall, W.E., & Troy, A. (2018) Urban development patterns and exposure to hazardous and protective traffic environments. *Journal of Transport Geography*. 66: 125-134.
- Children with significant neighborhood traffic had higher odds of having asthma/asthma-like symptoms than children without neighborhood traffic, and there are significant racial/ethnic disparities that exist
 - Commodore, S., Ferguson, P.L., Neelon, B., Newman, R., Grobman, W., Tita, A., Pearce, J., Bloom, M.S., Svendsen, E., Roberts, J., Skupski, D.; Sciscione, A., Palomares, K., Miller, R., Wapner, R., Vena, J.E., & Hunt, K.J. (2021) Reported Neighborhood Traffic and the Odds of Asthma/Asthma-Like Symptoms: A Cross-Sectional Analysis of a Multi-Racial Cohort of Children. *Int. J. Environ. Res. Public Health*. 18: 243.

Diesel Emissions

- Low income and minority populations have the greatest health risks from the air quality impacts of transportation (vehicle-related emissions)
 - Poorfakhraei, A., Tayarani, M., & Rowangould, G. (2017) Evaluating health outcomes from vehicle emissions exposure in the long range regional transportation planning process, *Journal of Transport & Health*. 6: 501-515.
- Elevated early life exposure to near-roadway air pollution (including diesel emissions) contribute to increased obesity risk in children
 - Kim, J.S., Alderete, T.L., Chen, Z. *et al.* (2018) Longitudinal associations of *in utero* and early life near-roadway air pollution with trajectories of childhood body mass index. *Environ Health* 17: 64.
- Children – from infancy to the age of 14 – are especially susceptible to the health effects of traffic emissions due to their rapidly developing immune, neurologic, and lung systems and high ventilation rates. Children in disadvantage neighborhoods are disproportionately exposed to traffic emissions due to proximity to highways and other high-volume roadways
 - Boothe, V.L. & Baldauf, R.W. (2020) Chapter Seven – Traffic emission impacts on child health and wellbeing. *Transport and Children’s Wellbeing*. 119-142.

Toxic Release from Facilities

- Racial/ethnic disparities in chronic diseases in the US may be because of chemical exposure

- Attina, T.M., Malits, j., Naidu, M., & Trasande, L. (2019) Racial/ethnic disparities in disease burden and costs related to exposure to endocrine-disrupting chemicals in the United States: an exploratory analysis. *Journal of Clinical Epidemiology*. 108: 34-43.
- Renters with African American or Hispanic/LatinX names are 41% less likely than renters with White names to receive responses for properties in low-exposure locations. Relative access to housing choices increases where there is higher exposure risk to toxic pollution
 - Christensen, P., Sarmiento-Barbieri, I., & Timmins, C. (2020) Housing Discrimination and the Toxics Exposure Gap in the United States: Evidence from the Rental Market. *The Review of Economics and Statistics*. 1(37).
- Current efforts in the U.S. to reduce toxic chemical releases from facilities rely on information disclosure which tends to help local communities take information-based action and generate pressure on facilities to reduce emissions. However, depending on residents' political resources for collective action and their education level community pressure can vary and it is usually weak in poor, minority, and less educated communities. This leads to high exposure of residents to toxic chemicals in disadvantaged communities
 - Wang, X. (2019) Location choice and environmental performance of toxic-releasing facilities in the United States. [Unpublished Ph.D. Dissertation]. University of Illinois at Urbana-Champaign.