

# Chicago Segregation Analysis

Using the Index of Concentration at the Extremes (ICE)

*Methodology and Technical Documentation*

Generated: July 2025

Data Source: U.S. Census Bureau  
American Community Survey 5-Year Estimates (2018-2022)



# 1. Introduction

The Index of Concentration at the Extremes (ICE) is a measure of spatial social polarization that quantifies the extent to which a geographic area's residents are concentrated into extremes of deprivation and privilege. Originally developed by Douglas Massey and subsequently refined by Nancy Krieger and colleagues for public health applications, ICE provides a single metric that captures both the concentration of disadvantage and advantage within a given area. Key Advantages of ICE: • Captures both ends of the social spectrum (privilege and deprivation) • Ranges from -1 to +1 for intuitive interpretation • Can be calculated for multiple domains (race, income, or their intersection) • More sensitive to extremes than traditional dissimilarity indices • Directly relevant for understanding health and social inequities This analysis applies ICE to Chicago's 1,332 census tracts to examine patterns of: 1. Racial segregation (White non-Hispanic vs Black non-Hispanic) 2. Economic segregation (High income vs Low income) 3. Racialized economic segregation (intersection of race and income) The goal is to identify areas of concentrated deprivation that may benefit from targeted interventions and to understand the spatial distribution of privilege and disadvantage across Chicago's neighborhoods.

## 2. ICE Calculation Methodology

### ICE for Racial Segregation:

$$ICE_{race} = \frac{P_{white, NH} - P_{black, NH}}{P_{total}}$$

Where:

- $P_{white, NH}$  = Count of White non-Hispanic residents
- $P_{black, NH}$  = Count of Black non-Hispanic residents
- $P_{total}$  = Total population of the census tract

### ICE for Economic Segregation:

$$ICE_{income} = \frac{HH_{high} - HH_{low}}{HH_{total}}$$

Where:

- $HH_{high}$  = Households with income  $\geq$  \$100,000/year
- $HH_{low}$  = Households with income  $<$  \$25,000/year
- $HH_{total}$  = Total households in the census tract

### ICE for Racialized Economic Segregation:

$$ICE_{race - income} = \frac{HH_{white, high} - HH_{black, low}}{HH_{race - income}}$$

Where:

- $HH_{white, high}$  = White non-Hispanic households with income  $\geq$  \$100,000
- $HH_{black, low}$  = Black non-Hispanic households with income  $<$  \$25,000
- $HH_{race-income}$  = Total households with race and income data

### Interpretation:

- ICE = -1: Complete concentration of the deprived group
- ICE = 0: Equal representation of both groups
- ICE = +1: Complete concentration of the privileged group
- ICE  $<$  -0.4: Extreme deprivation (priority areas for intervention)

# 3. Data Sources and Processing

## Data Source:

U.S. Census Bureau, American Community Survey (ACS)  
5-Year Estimates, 2018-2022  
Geographic Level: Census Tracts

## Key ACS Tables Used:

- B03002: Hispanic or Latino Origin by Race
- B19001: Household Income in the Past 12 Months
- B19001A-I: Household Income by Race/Ethnicity
- B01003: Total Population

## Geographic Coverage:

- Chicago city limits
- 1,332 census tracts
- 77 community areas
- Cook County, Illinois

## Data Quality Controls:

- Excluded tracts with population < 100
- Checked for missing or suppressed values
- Validated against published ACS margins of error
- Cross-referenced with Chicago Data Portal

## Processing Steps:

1. Downloaded raw ACS data via Census API
2. Calculated ICE measures for each tract
3. Assigned census tracts to community areas
4. Generated summary statistics
5. Created geographic visualizations

## 4. Key Findings

### Summary Statistics:

Measure	Mean	Min	Max	Priority Areas
ICE Race	0.113	-1.000	0.927	330 (24.8%)
ICE Income	0.188	-0.771	0.848	47 (3.5%)
ICE Race-Income	0.188	-0.771	0.848	47 (3.5%)

### Key Patterns Identified:

1. Racial Segregation (ICE Race)
  - Highest level of segregation among the three measures
  - 330 census tracts (24.8%) fall below the -0.4 threshold
  - Strong geographic clustering on Chicago's South and West sides
2. Economic Segregation (ICE Income)
  - More evenly distributed than racial segregation
  - Only 47 tracts (3.5%) in extreme deprivation
  - High-income concentration in North Side neighborhoods
3. Racialized Economic Segregation (ICE Race-Income)
  - Captures intersection of race and class
  - Pattern similar to economic segregation alone
  - Highlights areas of compounded disadvantage
4. Geographic Patterns
  - Clear North-South divide in all measures
  - West Side shows concentrated deprivation
  - Lakefront areas show concentrated privilege
  - Community areas vary internally in segregation levels

# 5. Implications and Recommendations

## Policy Implications:

1. Targeted Intervention Areas
  - 330 census tracts identified as priority areas based on racial ICE
  - These areas represent nearly 25% of Chicago's census tracts
  - Concentrated primarily in historically disinvested communities
2. Health Equity Considerations
  - Areas with low ICE values correlate with poor health outcomes
  - Need for increased healthcare resources in priority areas
  - Address social determinants of health through place-based interventions
3. Economic Development
  - Focus economic development in areas with low economic ICE
  - Support wealth-building initiatives in segregated communities
  - Address employment access and wage disparities

## Recommendations:

1. Data-Driven Resource Allocation
  - Use ICE values to guide funding decisions
  - Prioritize areas with ICE < -0.4 for interventions
  - Monitor changes in ICE over time to assess impact
2. Cross-Sector Collaboration
  - Coordinate housing, health, education, and economic policies
  - Engage community organizations in priority areas
  - Build coalitions across neighborhood boundaries
3. Continuous Monitoring
  - Update ICE calculations with each ACS release
  - Track progress toward integration goals
  - Develop dashboard for real-time monitoring
4. Community Engagement
  - Share findings with affected communities
  - Incorporate resident perspectives in solutions
  - Build community capacity for data use

## Limitations:

- ICE measures relative concentration, not absolute numbers
- Census tract boundaries may not align with neighborhood identity
- 5-year ACS estimates may mask recent changes
- Does not capture within-tract variation

# 6. References

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