

# ComEd Helping Close Chicago's Digital Divide

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Contact

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FOR IMMEDIATE RELEASE

# ComEd Awarded Nearly \$15 Million Federal Infrastructure Grant to Enhance Grid Reliability, Help Close Digital Divide on Chicago's South, West Sides

*Infrastructure Investment and Jobs Act Funding to leverage existing ComEd infrastructure to help increase access to high-speed broadband for 440,000 unserved or underserved households in Chicago*

**CHICAGO (June 20, 2023) –** ComEd today announced that it was awarded a \$14.5 million [Middle Mile Grant by the U.S. Department of Commerce's National Telecommunications and Information Administration \(NTIA\)](#) that will enhance electric grid reliability and resiliency while also helping to increase broadband connectivity in communities on the south and west sides of Chicago that lack equitable access to affordable broadband.

(ComEd Media Relations, 2023)



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# Original Inquiry

- What is the current state of Chicago's digital divide?
- How can the Middle Mile infrastructure grant awarded to ComEd help close Chicago's digital divide?



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# Presentation Outline

- Introduction
- Conceptual Framework
- Methods
- Results
- Discussion



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# Presentation Outline: Introduction

- Introduction
  - What is the digital divide?
  - Why does the digital divide matter?
  - What is the Middle Mile?
- Conceptual Framework
- Methods
- Results
- Discussion



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# What is the digital divide?

- a divide between people who have and do not have access to and use certain degrees of digital or information and communication media

(van Dijk, 2013; 2020)



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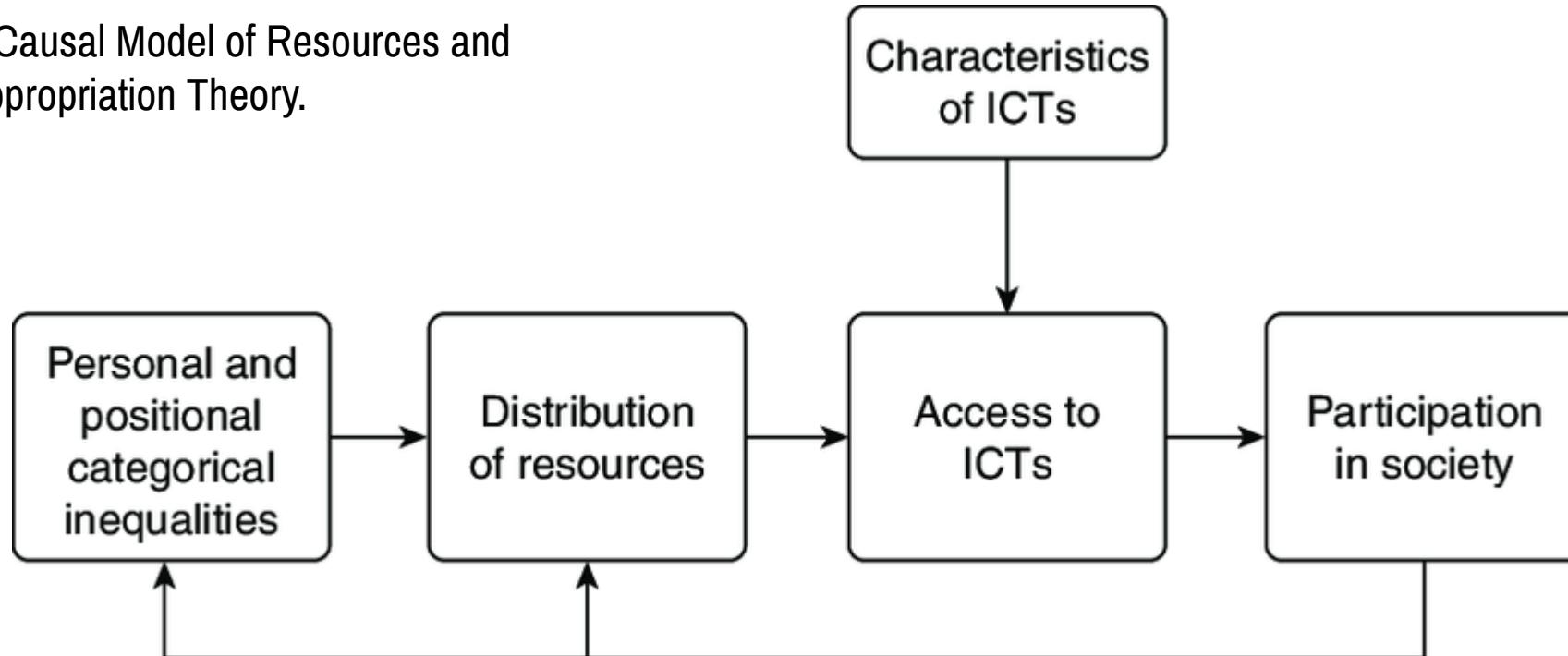
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# Why does the digital divide matter?

A Causal Model of Resources and Appropriation Theory.



(van Dijk & van Deursen, 2014; van Dijk, 2013; 2020)



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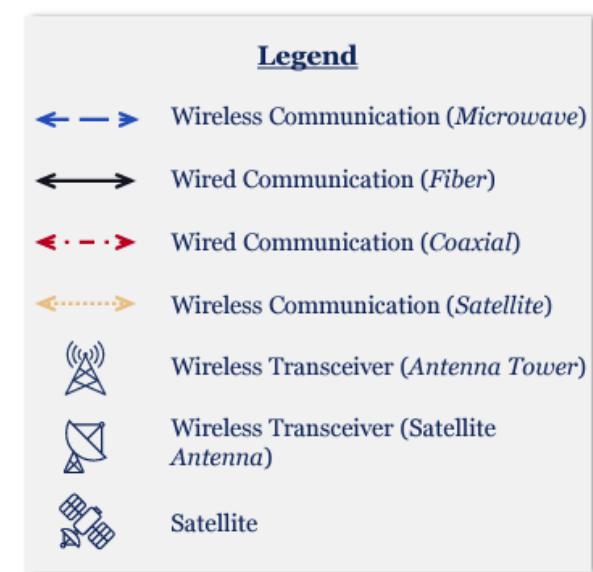
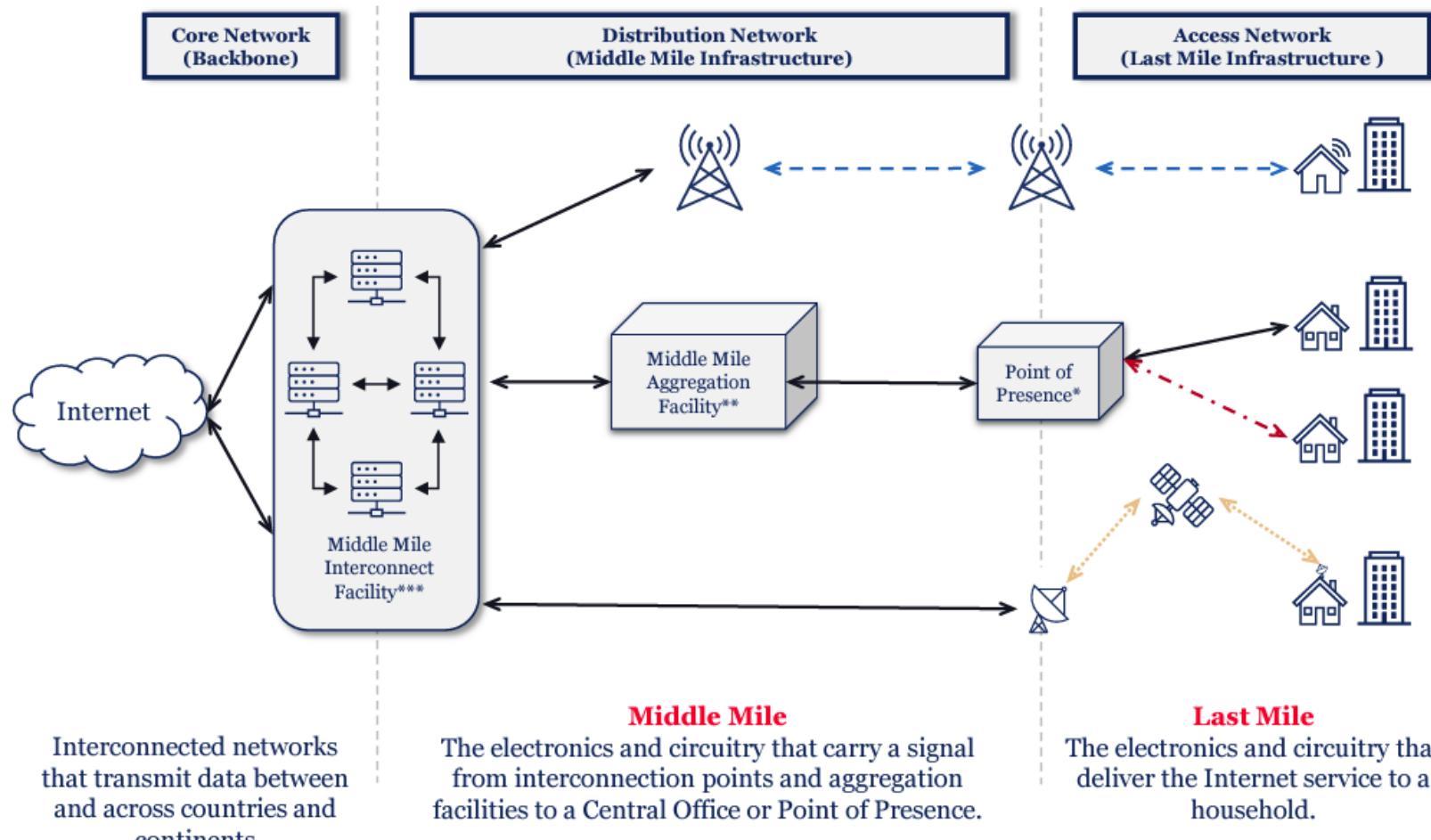
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# Middle Mile & Last Mile

INTERNET  
FOR ALL



**\*Point of Presence(POP):** Demarcation point, access point, or physical location at which two or more networks or communication devices share a connection.

**\*\*Example of Middle Mile Aggregation Facility** is An **Internet Exchange Point (IXP)**, which is a physical location through which Internet infrastructure companies such as ISPs connect with each other.

**\*\*\*Example of Middle Mile Interconnect Facility** is a **Data Center**, which is a facility responsible for driving Internet content delivery and managing network resources.

(Beckett, 2021; Federal Communications Commission, 2020; Mars, 2022; National Telecommunications and Information Administration, 2022; Velazco, 2022)



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# Presentation Outline: Conceptual Framework

- Introduction
- Conceptual Framework
  - divides
  - digital divides
- Methods
- Results
- Discussion



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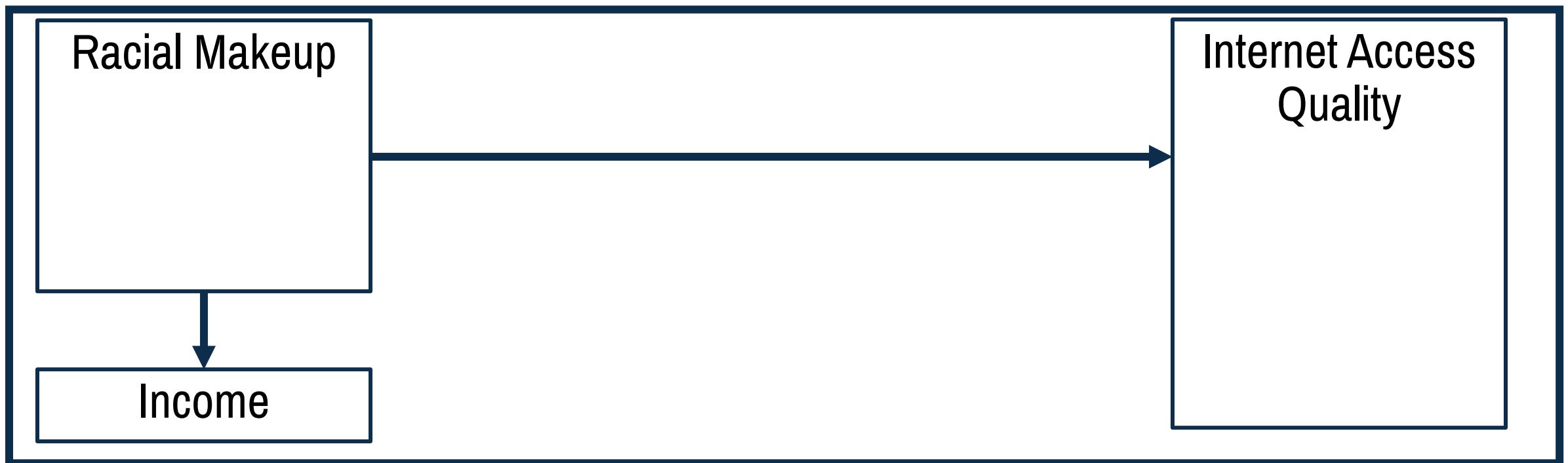
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# Conceptual Framework

## Community



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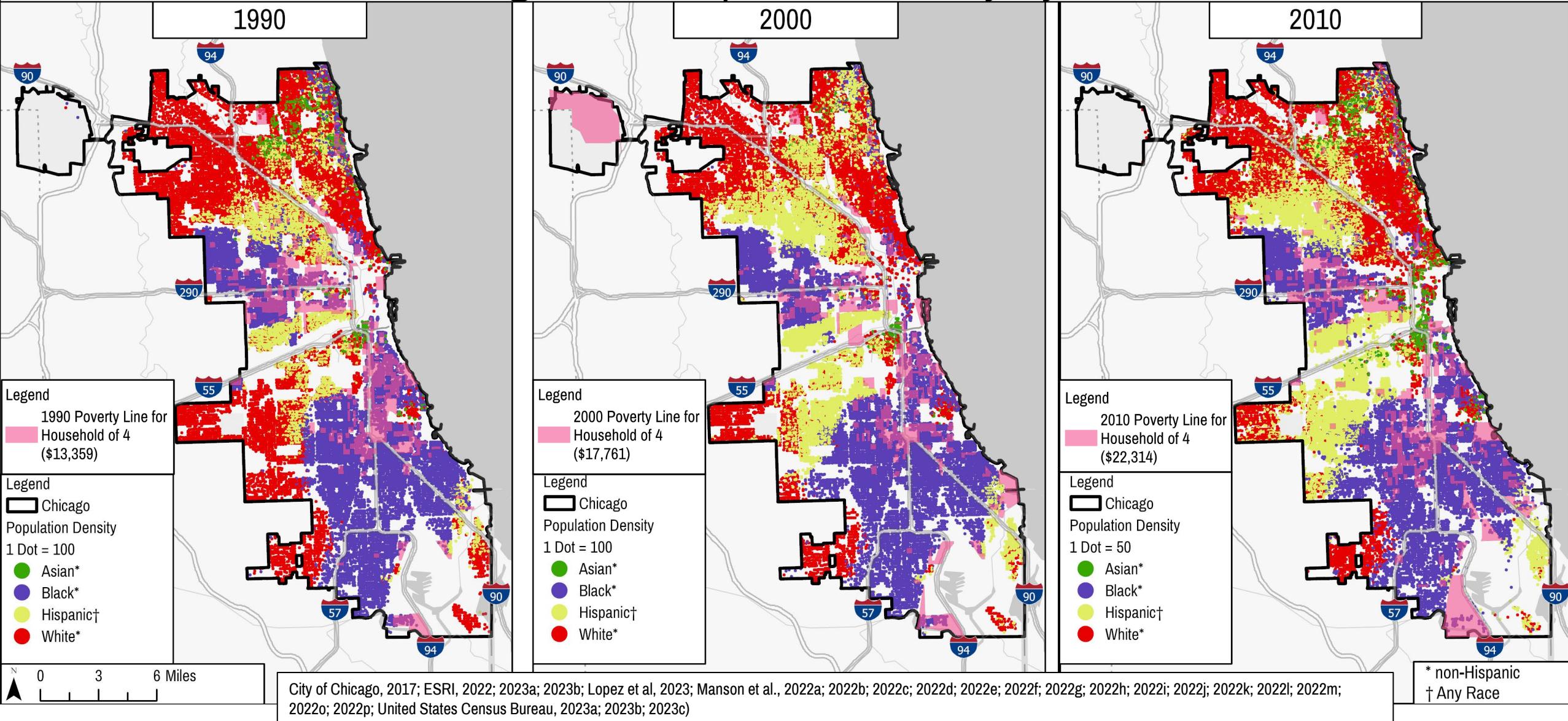
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# Chicago Block Population Density By Race



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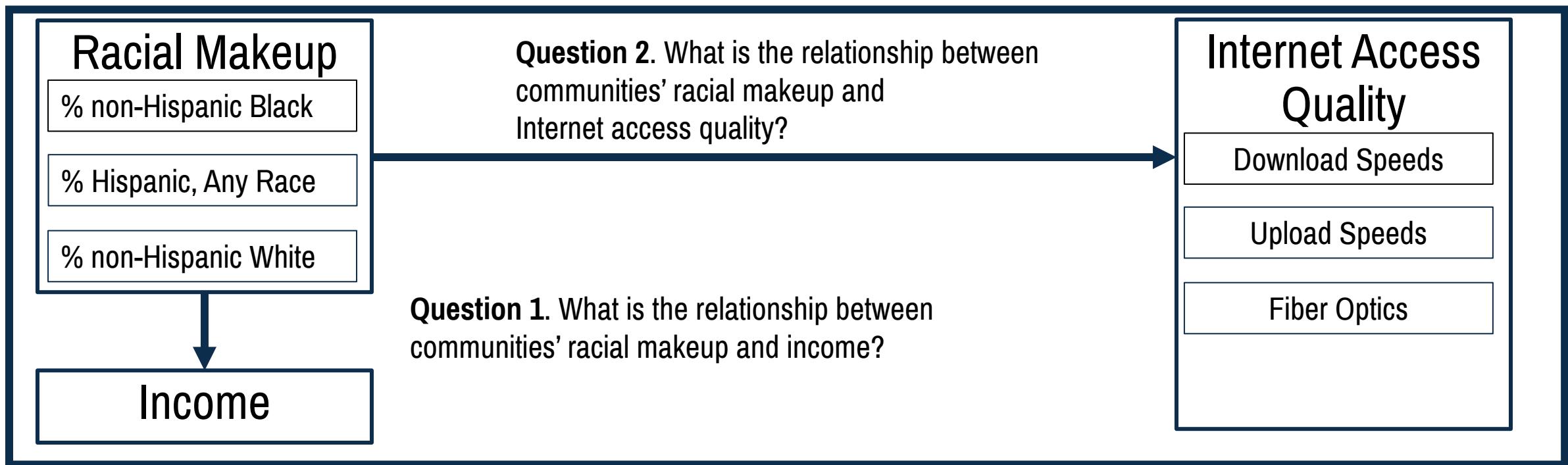


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# Conceptual Framework

## Community



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# Presentation Outline: Methods

- Introduction
- Conceptual Framework
- Methods
  - Geographic units
  - Data sources
  - Data cleaning, organizing and joining
  - Datasets
  - Preliminary Statistics
  - Methods
- Results
- Discussion



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# Methods: geographic units

- RQ1- Census block groups
- RQ2- Census blocks

(City of Chicago, 2017; Manson et al, 2022r; 2022s; Rossiter, 2011; United States Census Bureau, 2022)



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# Methods: Data Sources

## Racial Makeup

2020 Census Table P2.  
*Hispanic or Latino, and Not  
Hispanic or Latino by Race*

## Income

2016-2020 American  
Community Survey (ACS)  
Table B19013. *Median  
Household Income in the  
Past 12 Months (in 2020  
Inflation-Adjusted Dollars)*

## Internet Access Quality

2022 FCC Tables.  
Fixed Broadband  
Availability Datasets  
For Illinois

(City of Chicago, 2017; Federal Communications Commission, 2022a; 2022b; 2022c; 2022d; 2022e;  
Manson et al., 2022n; 2022o; 2022p; 2022q; 2022r; 2022s; United States Census Bureau, 2022)



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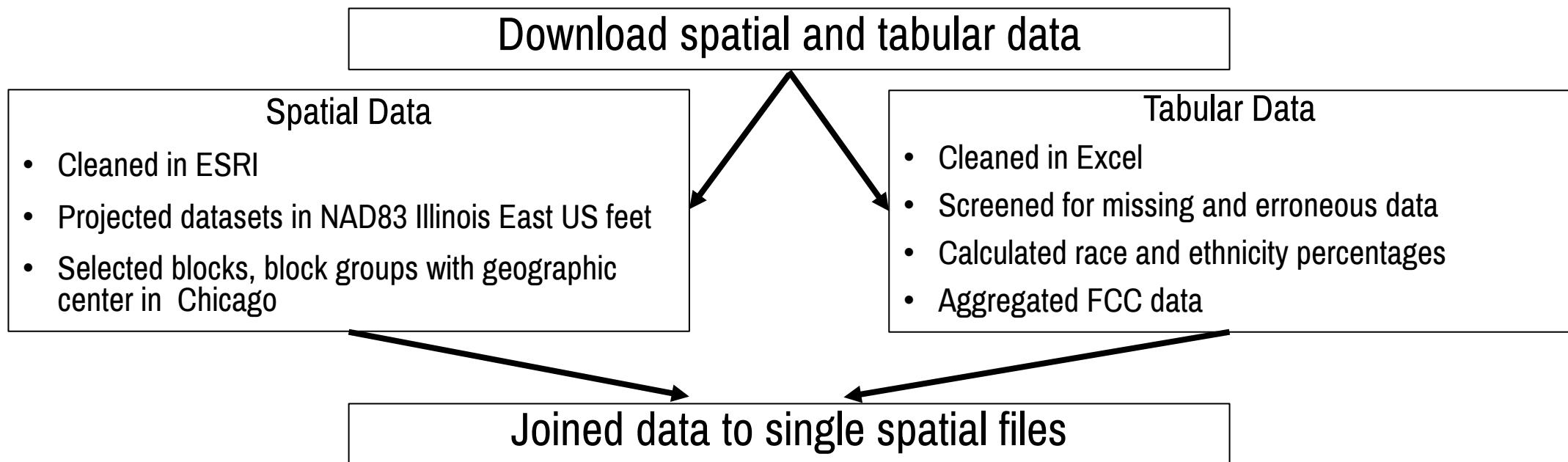
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# Data cleaning, organizing, joining



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# Datasets

## Question 1

### Block groups:

- With geographic center in Chicago
- Population > 0
- Census reported median income

(City of Chicago, 2017; Manson et al., 2022n; 2022o; 2022r)

## Question 2

### Blocks with:

- With geographic center in Chicago
- Population > 0
- FCC data
- Active and habited building

(City of Chicago, 2017; 2021; Federal Communications Commission, 2022a; 2022b; 2022c; 2022d; 2022e; Manson et al., 2022p; 2022s)



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# Methods: Preliminary Statistics, Methods

## Community



(Generalized Linear Regression (Spatial Statistics), n.d.; How Generalized Linear Regression Works, 2023; Kisseeley, 2021; What They Don't Tell You about Regression Analysis, n.d.)



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# Presentation Outline

- Introduction
- Conceptual Framework
- Methods
- Results
  - Communities' racial makeup
  - Research question 1
  - Research question 2
- Discussion



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# Chicago Communities' Racial Makeup

	2020 Chicago Block Group Population Percentages (n=1,965)										
	<10%	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	>=90%	
American Indian*	1,965	-	-	-	-	-	-	-	-	-	
Asian*	1,618	205	85	30	16	-	5	3	3	-	
Black*	1,063	140	67	47	35	28	45	73	113	354	
Hispanic†	758	348	196	120	105	89	75	80	111	83	
Pacific Islander*	1,965	-	-	-	-	-	-	-	-	-	
White*	817	142	110	147	128	155	167	209	89	1	
Other*	1,965	-	-	-	-	-	-	-	-	-	
Mixed Race	1,963	1	1	-	-	-	-	-	-	-	

\*non-Hispanic descent

†any race

	2020 Chicago Block Population Percentages (n=28,988)										
	<10%	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	>=90%	
American Indian*	28,946	28	10	1	1	2	-	-	-	-	
Asian*	24,933	2,359	796	393	213	127	80	37	26	24	
Black*	15,737	1,532	768	574	489	596	703	1,006	2,165	5,418	
Hispanic†	10,200	4,197	2,779	2,108	1,630	1,516	1,446	1,461	1,645	2,006	
Pacific Islander*	28,986	2	-	-	-	-	-	-	-	-	
White*	13,883	2,269	1,726	1,709	1,629	1,820	1,845	1,987	1,586	534	
Other*	28,839	124	16	4	-	2	-	1	1	1	
Mixed Race	27,337	1,378	195	44	12	13	5	1	1	2	

(City of Chicago, 2017; Manson et al., 2022r; Manson et al., 2022s)



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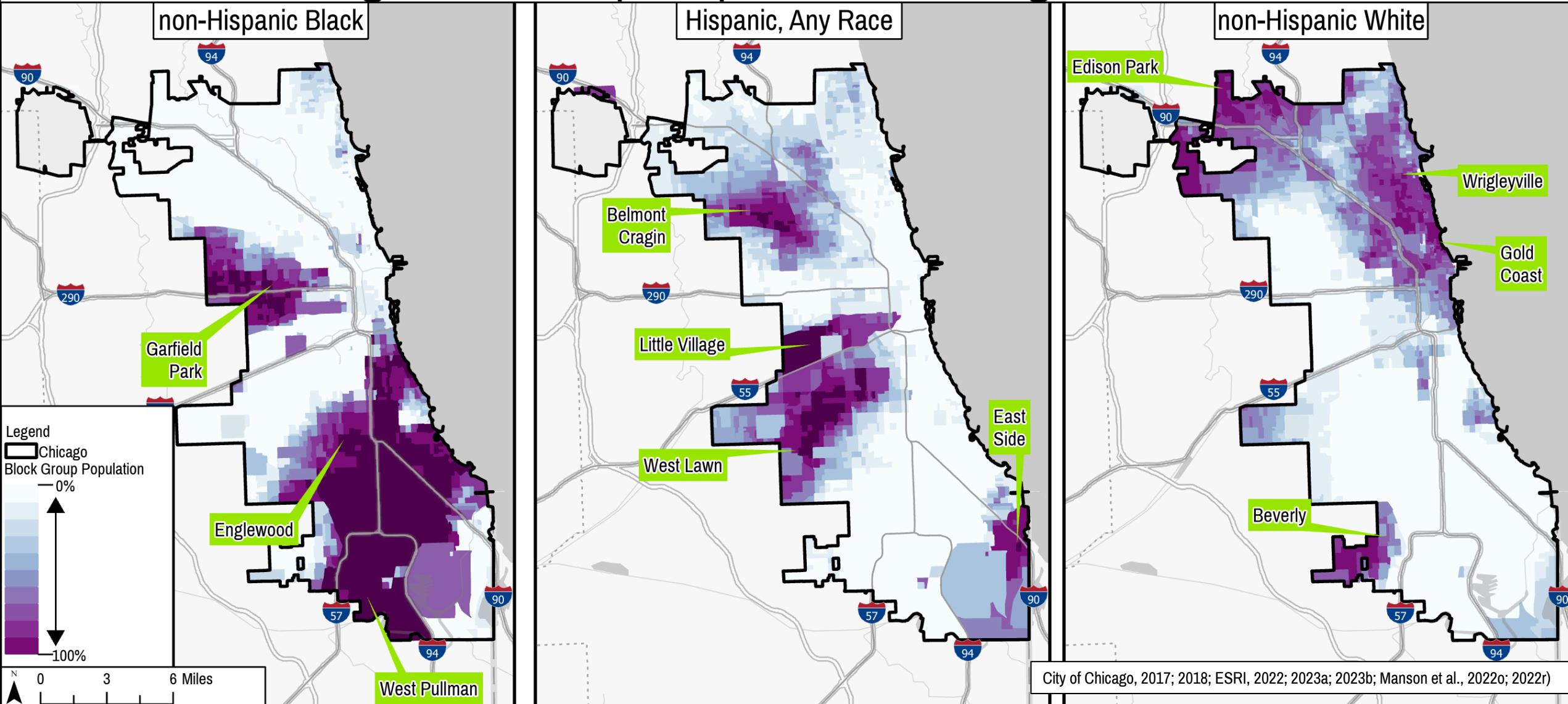
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# Chicago Block Groups Population Percentages Identified as



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# Question 1. Block Group Median Income Breakdown

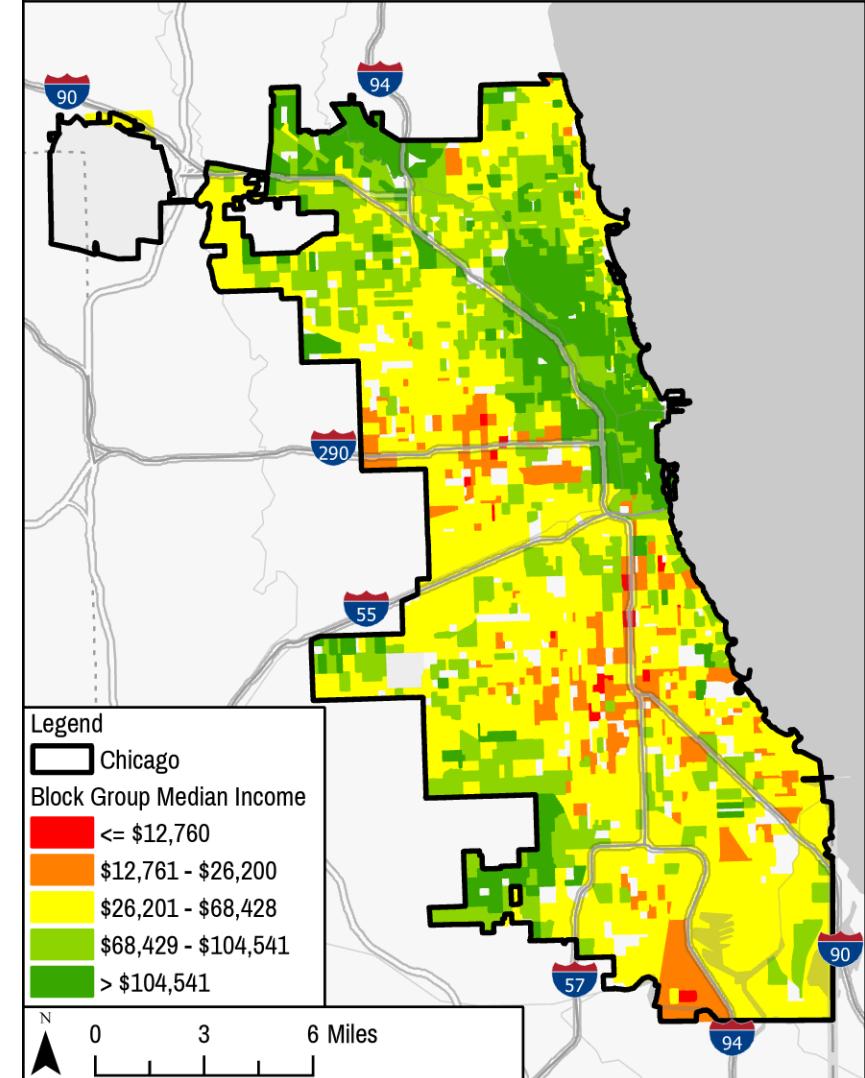
Median Income Ranges	<= \$12,761	\$12,761 - \$26,200	\$26,201 - \$68,428	\$68,429 - \$104,541	> \$104,541
Block Groups	16	176	987	478	308

n	Min.	Max.
1,965	\$2,499	\$250,001

Income	2020 Income Levels
\$12,760	U.S. Poverty Level Household of One
\$26,200	U.S. Poverty Level Household of Four
\$68,428	IL Median Income Household of One
\$104,541	IL Median Income Household of Four

(APSE Office of the Assistant Secretary for Planning and Evaluation, n.d.; City of Chicago, 2017; 2018; ESRI, 2022; 2023a; 2023b; Manson et al., 2022n; 2022o; 2022q)

Chicago Block Group Median Income



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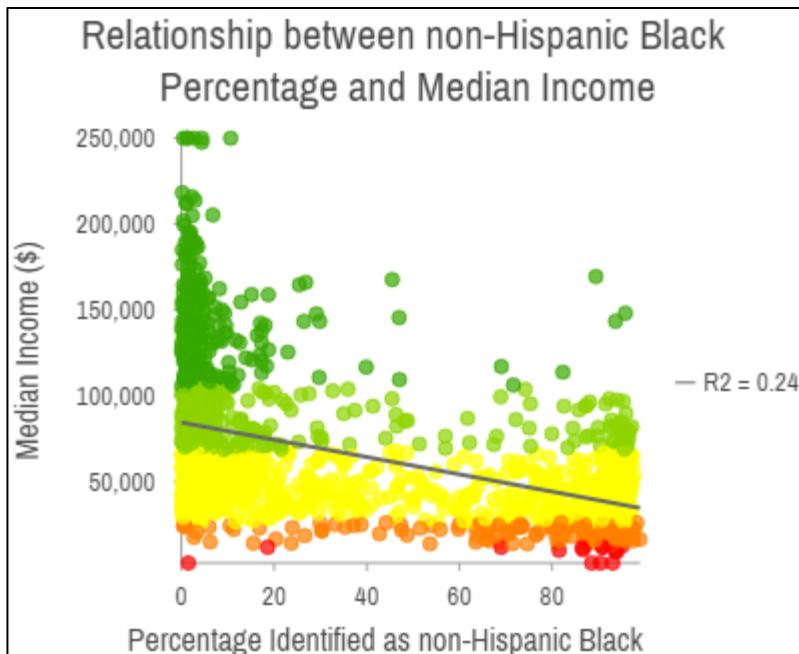
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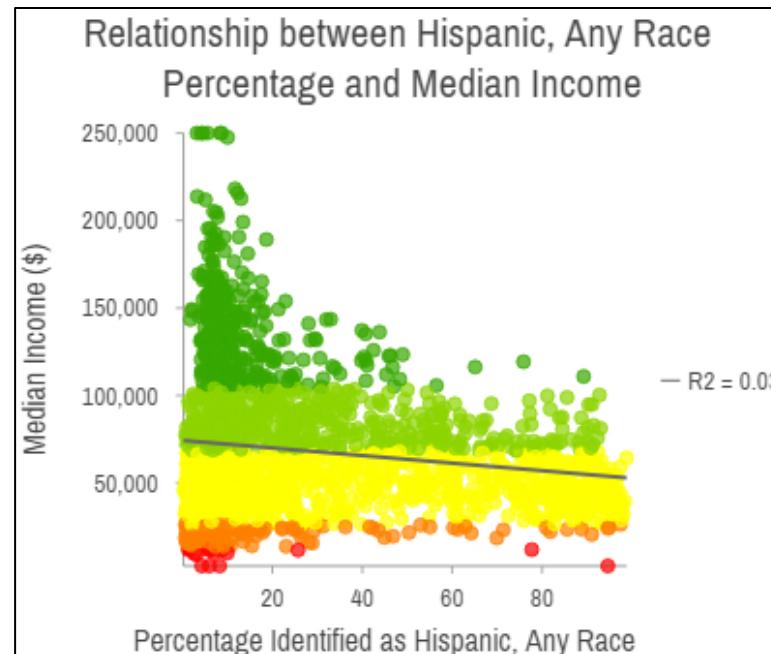
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# Question 1. Linear Regression

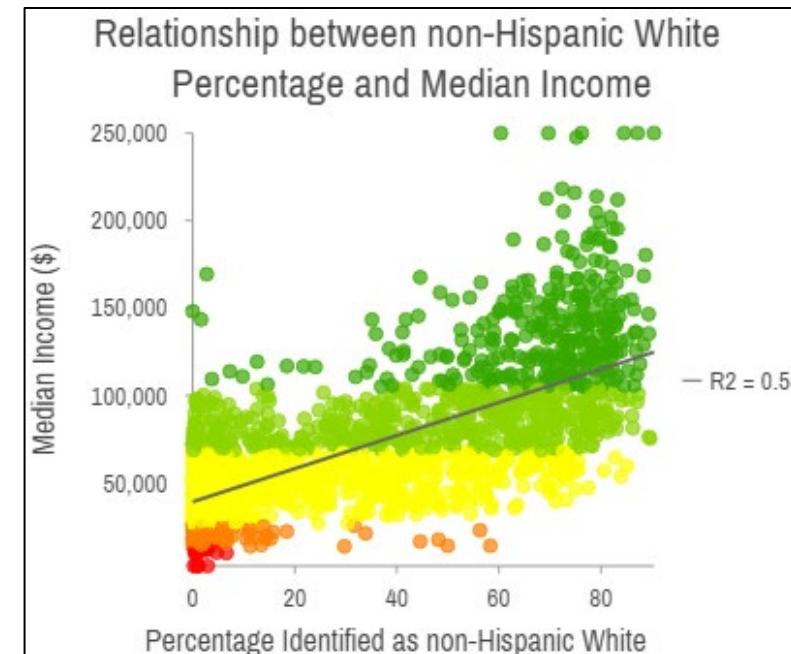
(n=1,965)



$$Y = \$84,390 - \$504X$$
$$(\pm 1,012) \quad (\pm 20)$$
$$P=0.000000^*$$



$$Y = \$74,385 - \$218X$$
$$(\pm 1,231) \quad (\pm 30)$$
$$P=0.000000^*$$



$$Y = \$39,132 + \$947X$$
$$(\pm 904) \quad (\pm 21)$$
$$P=0.000000^*$$

APSE Office of the Assistant Secretary for Planning and Evaluation, n.d.; City of Chicago, 2017; Generalized Linear Regression (Spatial Statistics), n.d.; How Generalized Linear Regression Works, 2023; Kisselev, 2021; Manson et al., 2022n; 2022o; 2022q; 2022r)



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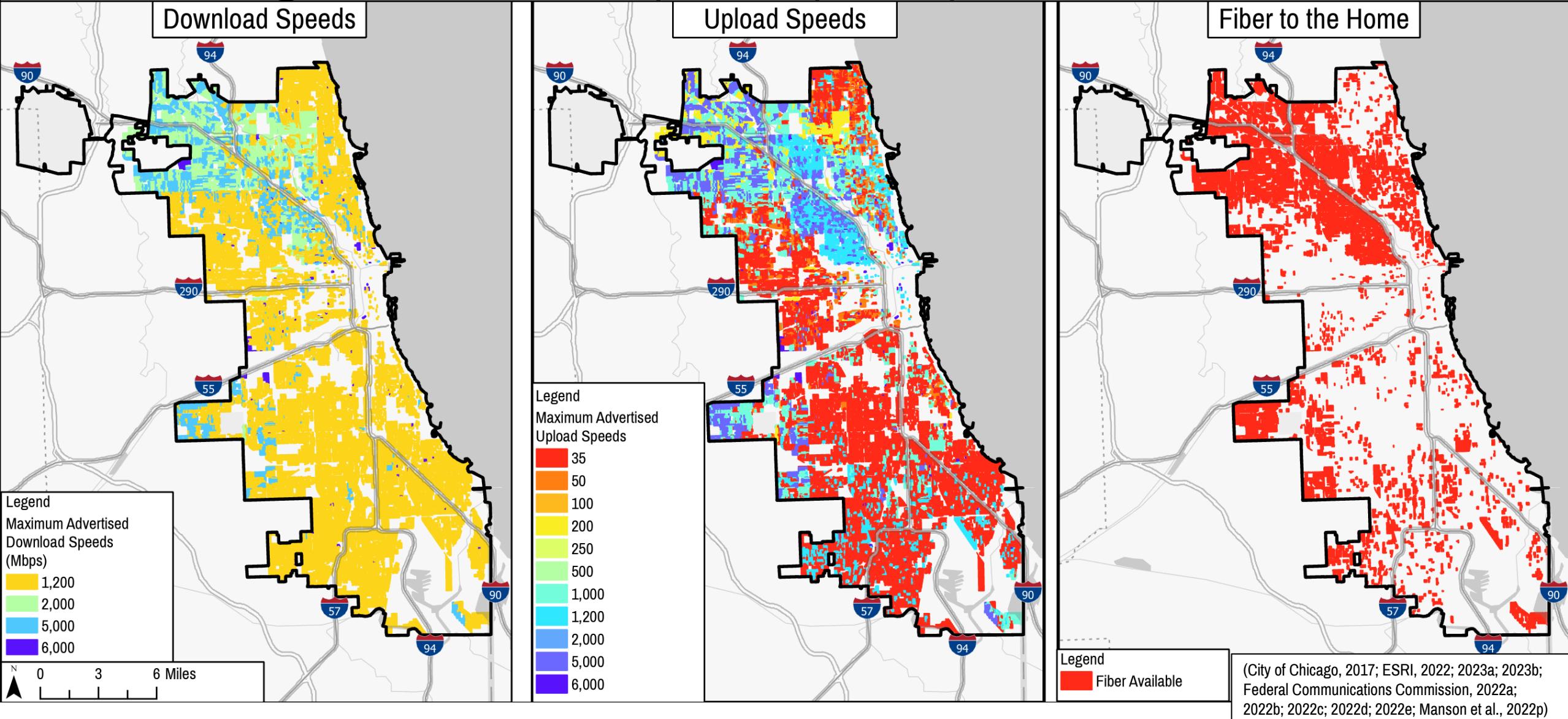
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# Chicago Block Download Speeds, Upload Speeds, Fiber to the Home



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# Research Question 2: Internet Speeds, Fiber

Maximum Advertised Download Speeds (Mbps)	1,200	2,000	5,000	6,000
Blocks Served	28,988	7,454	4,037	77

Maximum Advertised Upload Speeds (Mbps)	35	50	100	200	250	500	1,000	1,200	2,000	5,000	6,000
Blocks Served	28,988	14,340	13,053	13,047	11,963	11,961	11,939	7,239	4,042	4,037	77

Total Blocks	Blocks with Fiber
28,988	11,884

(Federal Communications Commission, 2022a; 2022b; 2022c; 2022d; 2022e; Manson et al., 2022p)



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# Question 2: Logistic Regression

n=28,988

Column1	non-Hispanic Black				Hispanic				non-Hispanic White			
	logit(p)	D	$\sigma$ - int.	$\sigma$ - coeff.	logit(p)	D	$\sigma$ - int.	$\sigma$ - coeff.	logit(p)	D	$\sigma$ - int.	$\sigma$ - coeff.
2,000 Mbps Download	-0.23 - 0.05x	0.22	$\pm 0.016$	$\pm 0.0001$	-1.13 + 0.002x	0.0008	$\pm 0.019$	$\pm 0.0004$	-2.33 + 0.037x	0.2	$\pm 0.025$	$\pm 0.0005$
50 Mbps Upload	0.82 - 0.03x	0.17	$\pm 0.016$	$\pm 0.0003$	-0.13 + 0.004x	0.002	$\pm 0.017$	$\pm 0.0003$	-1.10 + 0.04x	0.22	$\pm 0.018$	$\pm 0.0005$
Fiber to the Home	0.31 - 0.02x	0.12	$\pm 0.016$	$\pm 0.0003$	-0.51 + 0.004x	0.003	$\pm 0.017$	$\pm 0.0003$	-1.24 + 0.03x	0.12	$\pm 0.018$	$\pm 0.0004$

All P<0.00000



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## 2,000Mbps Download

p	odds	logodds
.001	.001001	-6.906755
→.01	.010101	-4.59512
.15	.1764706	-1.734601
.2	.25	-1.386294
→.25	.3333333	-1.098612
.3	.4285714	-.8472978
.35	.5384616	-.6190392
.4	.6666667	-.4054651
.45	.8181818	-.2006707
→.5	1	0
.55	1.222222	.2006707
.6	1.5	.4054651
.65	1.857143	.6190392
.7	2.333333	.8472978
.75	3	1.098612
.8	4	1.386294
.85	5.666667	1.734601
.9	9	2.197225
.999	999	6.906755
.9999	9999	9.21024

## 50Mbps Upload

p	odds	logodds
.001	.001001	-6.906755
→.01	.010101	-4.59512
.15	.1764706	-1.734601
.2	.25	-1.386294
→.25	.3333333	-1.098612
.3	.4285714	-.8472978
.35	.5384616	-.6190392
.4	.6666667	-.4054651
.45	.8181818	-.2006707
→.5	1	0
→.55	1.222222	.2006707
.6	1.5	.4054651
.65	1.857143	.6190392
.7	2.333333	.8472978
.75	3	1.098612
.8	4	1.386294
.85	5.666667	1.734601
→.9	9	2.197225
.999	999	6.906755
.9999	9999	9.21024

## Fiber to the Home

p	odds	logodds
.001	.001001	-6.906755
→.01	.010101	-4.59512
.15	.1764706	-1.734601
→.2	.25	-1.386294
.25	.3333333	-1.098612
.3	.4285714	-.8472978
.35	.5384616	-.6190392
→.4	.6666667	-.4054651
→.45	.8181818	-.2006707
.5	1	0
.55	1.222222	.2006707
.6	1.5	.4054651
.65	1.857143	.6190392
.7	2.333333	.8472978
.75	3	1.098612
→.8	4	1.386294
.85	5.666667	1.734601
.9	9	2.197225
.999	999	6.906755
.9999	9999	9.21024

→ Non-Hispanic Black

→ Non-Hispanic White

→ Hispanic

(FAQ: How do I interpret log odds ratios in logistic regression?, 2021; Federal Communications Commission, 2022a; 2022b; 2022c; 2022d; 2022e; Generalized Linear Regression (Spatial Statistics), n.d.; How Generalized Linear Regression Works, 2023; Manson et al., 2022p; 2022s)



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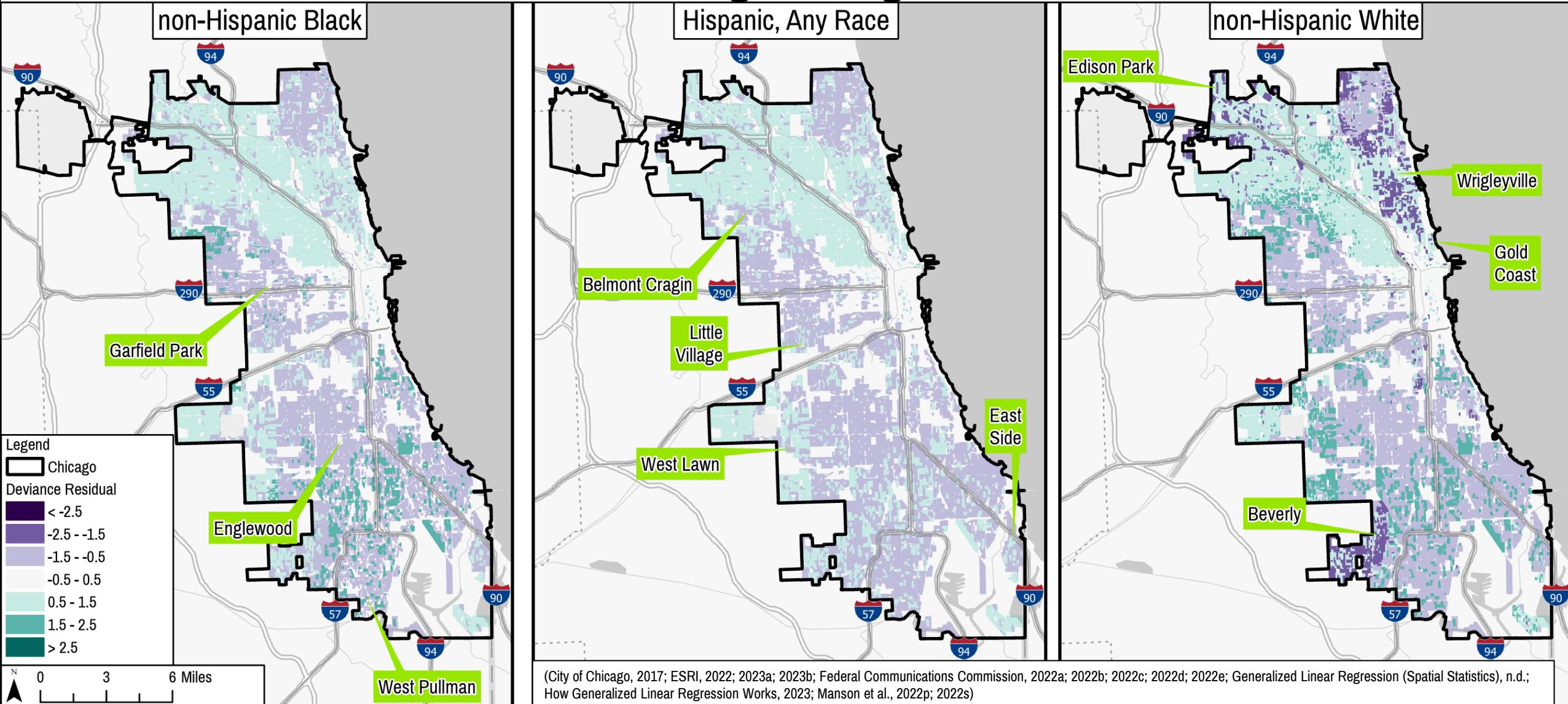
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# Fiber to the Home Logistic Regression Residuals



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# Presentation Outline: Discussion

- Introduction
- Conceptual Framework
- Methods
- Results
- Discussion
  - Summary
  - How can the grant awarded to ComEd help close Chicago's Digital Divide?



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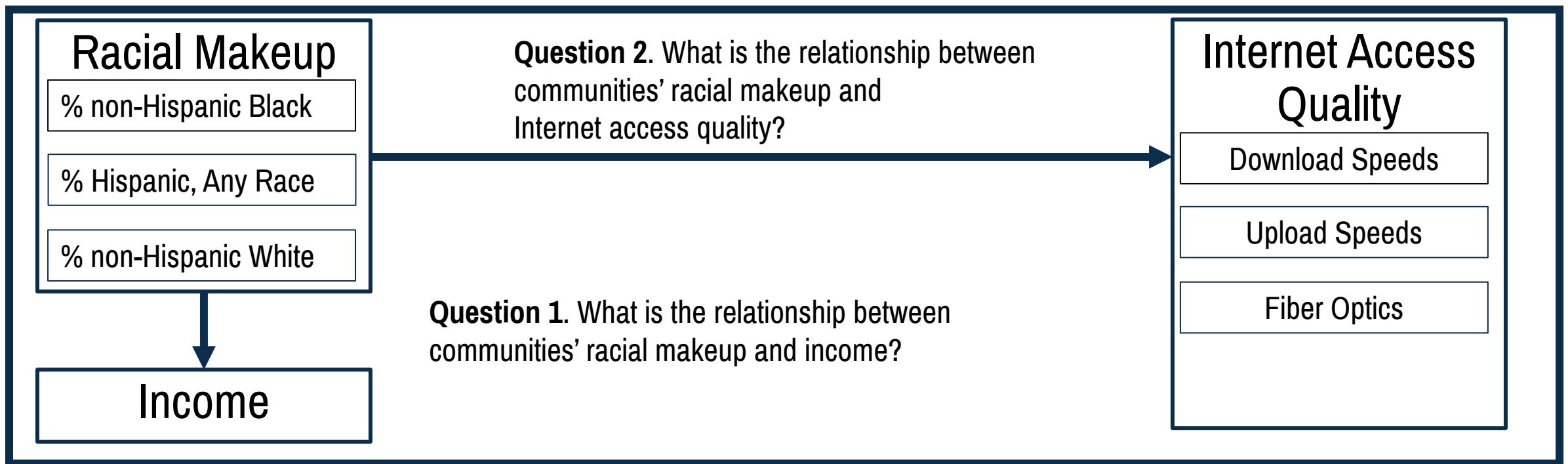
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# Discussion: Conceptual Framework

## Community



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# ComEd to help close digital divide

ComEd awarded a \$14.5 million grant to

- Help bring Middle Mile infrastructure to south and westside
- Leverage planned infrastructure investment
- Offer Last Mile providers with flexible pricing

(ComEd Media Relations, 2023; National Telecommunications and Information Administration, n.d.)



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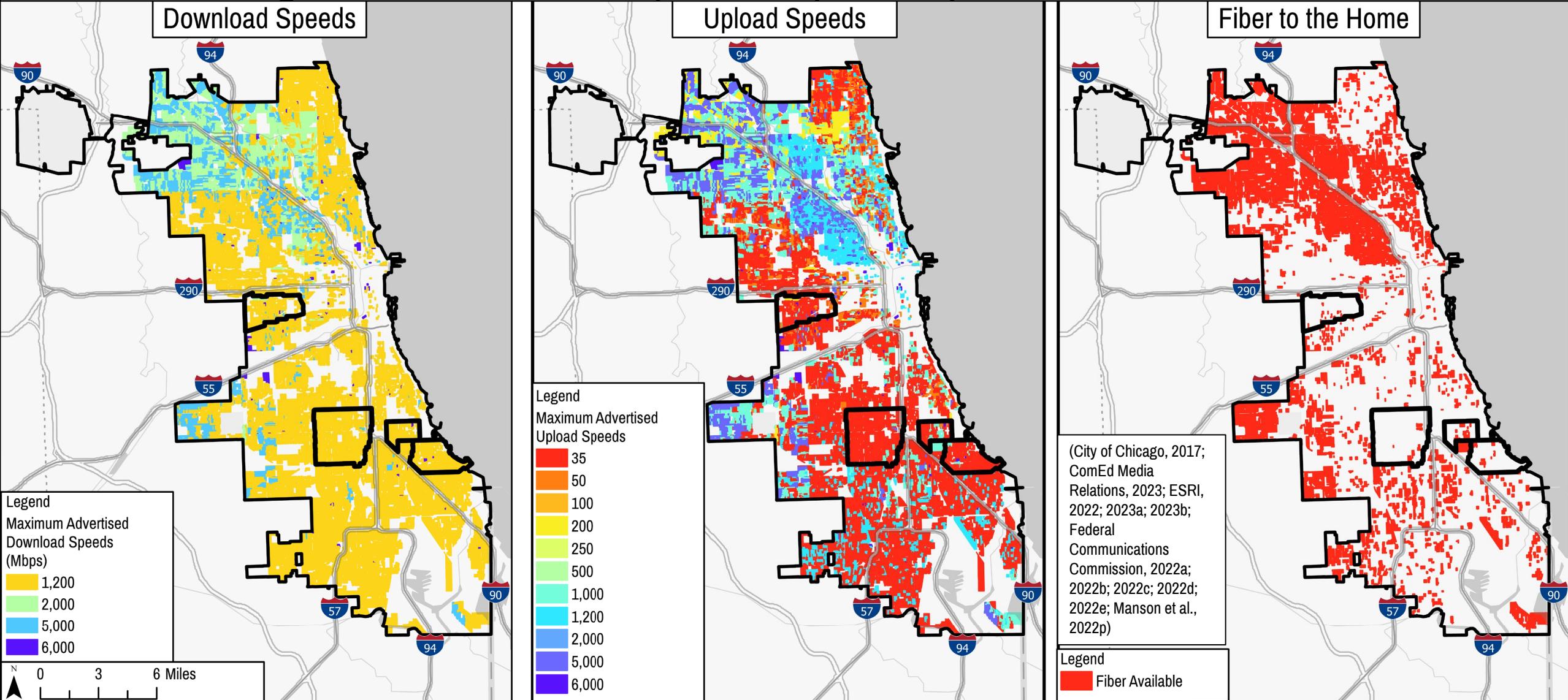
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# Chicago Block Download Speeds, Upload Speeds, Fiber to the Home



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# Questions and Comments?

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<https://broadbandusa.ntia.gov/funding-programs/enabling-middle-mile-broadband-infrastructure-program>



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