Energy Insecurity and Health: Understanding Primary and Secondary Effects

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COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH

Climate Change Energy and Health

Energy Insecurity: Definition, Dimensions and Forms

Definition:

"An inability to adequately meet basic household energy needs"

Three Dimensions:

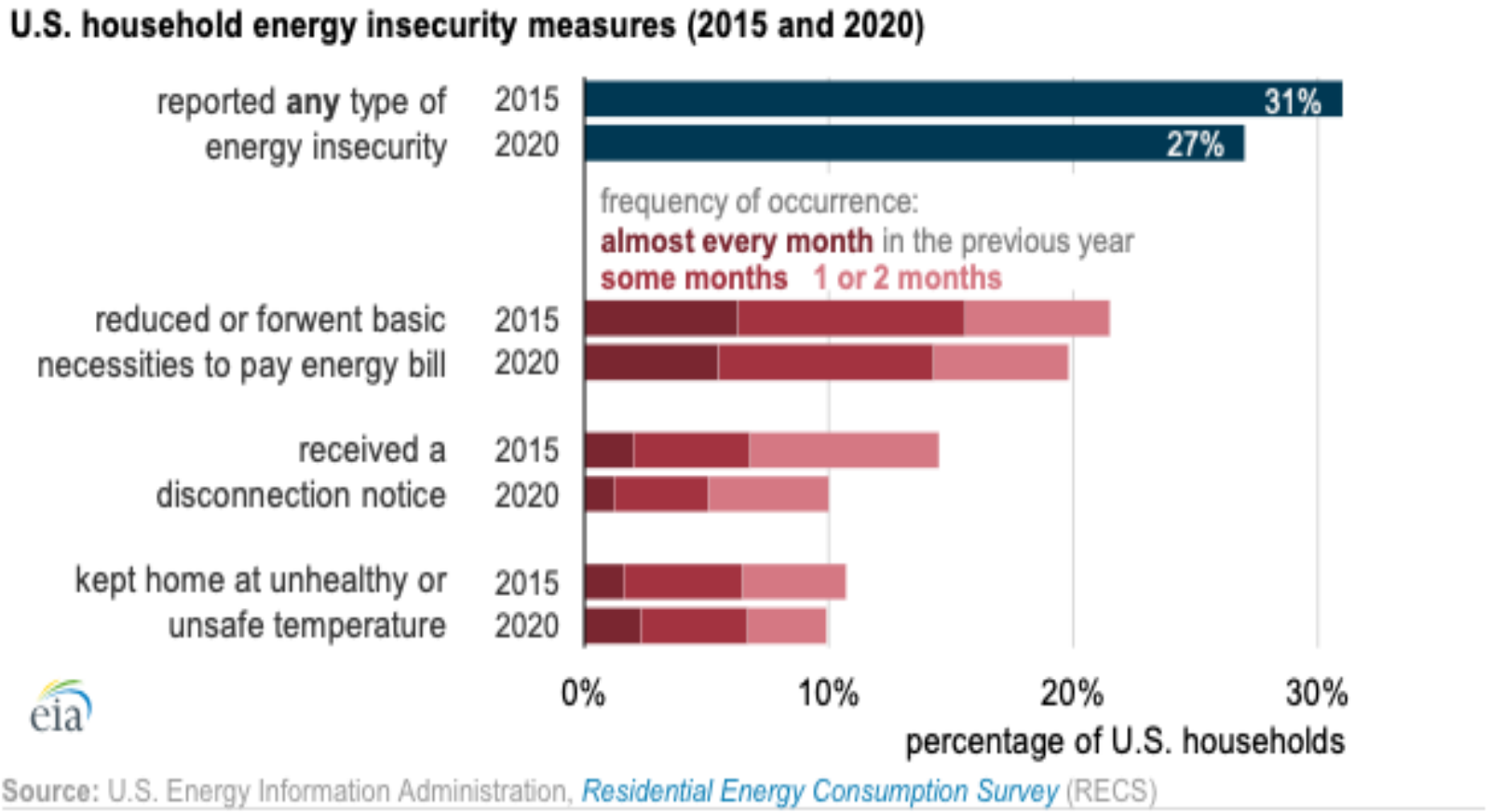
- **Economic-** high bills, low income
- **Physical-** inefficiencies, faulty home energy infrastructure and appliances
- **Behavioral-** Coping Strategies

Two Forms:

- **Acute-** power outage, shut-off, appliance breakdown, fuel shortage
- **Chronic-** ongoing financial hardship, lacking appliances, limited access to clean energy

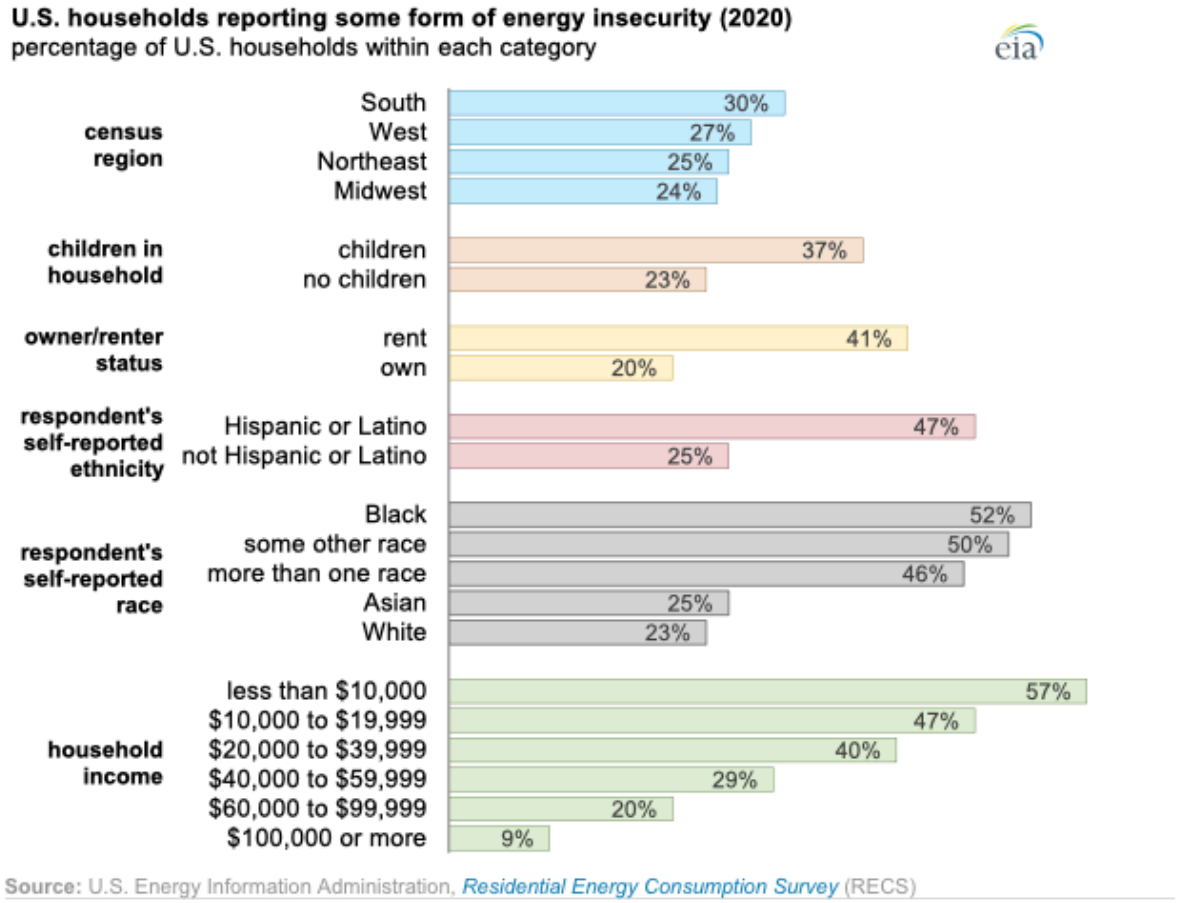
Hernández, *Soc Sci & Med* 2016; Jessel, Sawyer and Hernández, *Frontiers in Public Health*, 201

One in three U.S. households are energy insecure

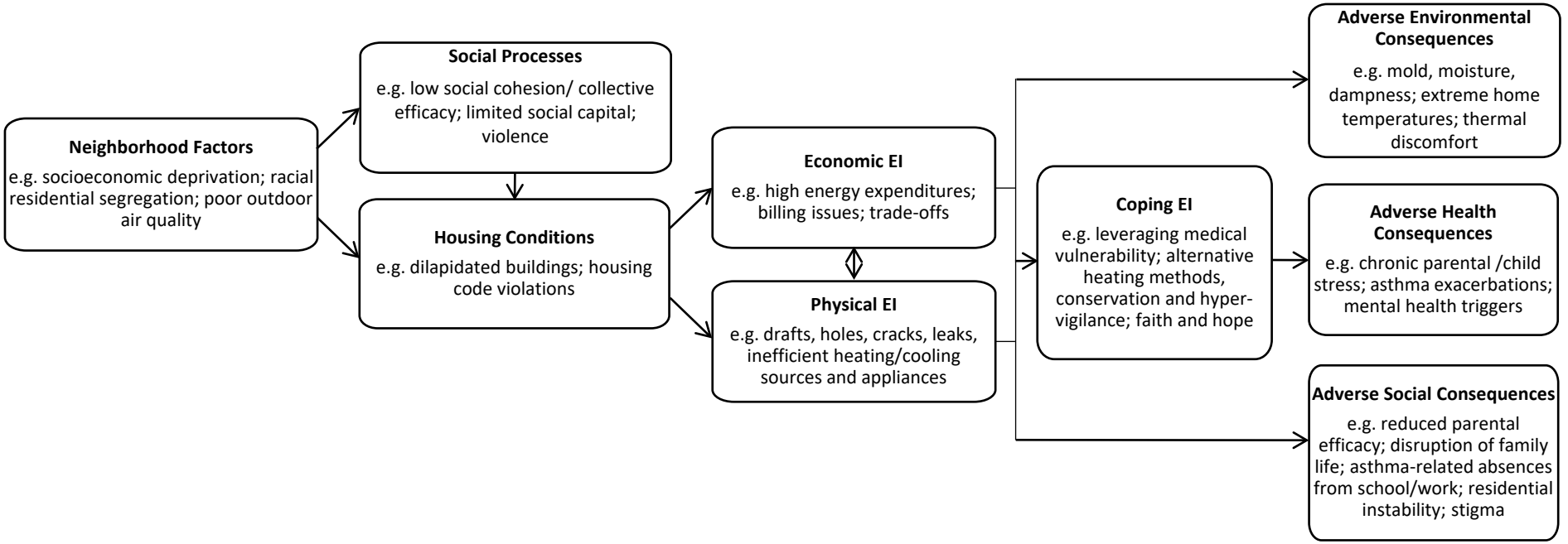


Source: U.S. Energy Information Administration, *Residential Energy Consumption Survey* (RECS)

Energy insecurity is patterned by vulnerability

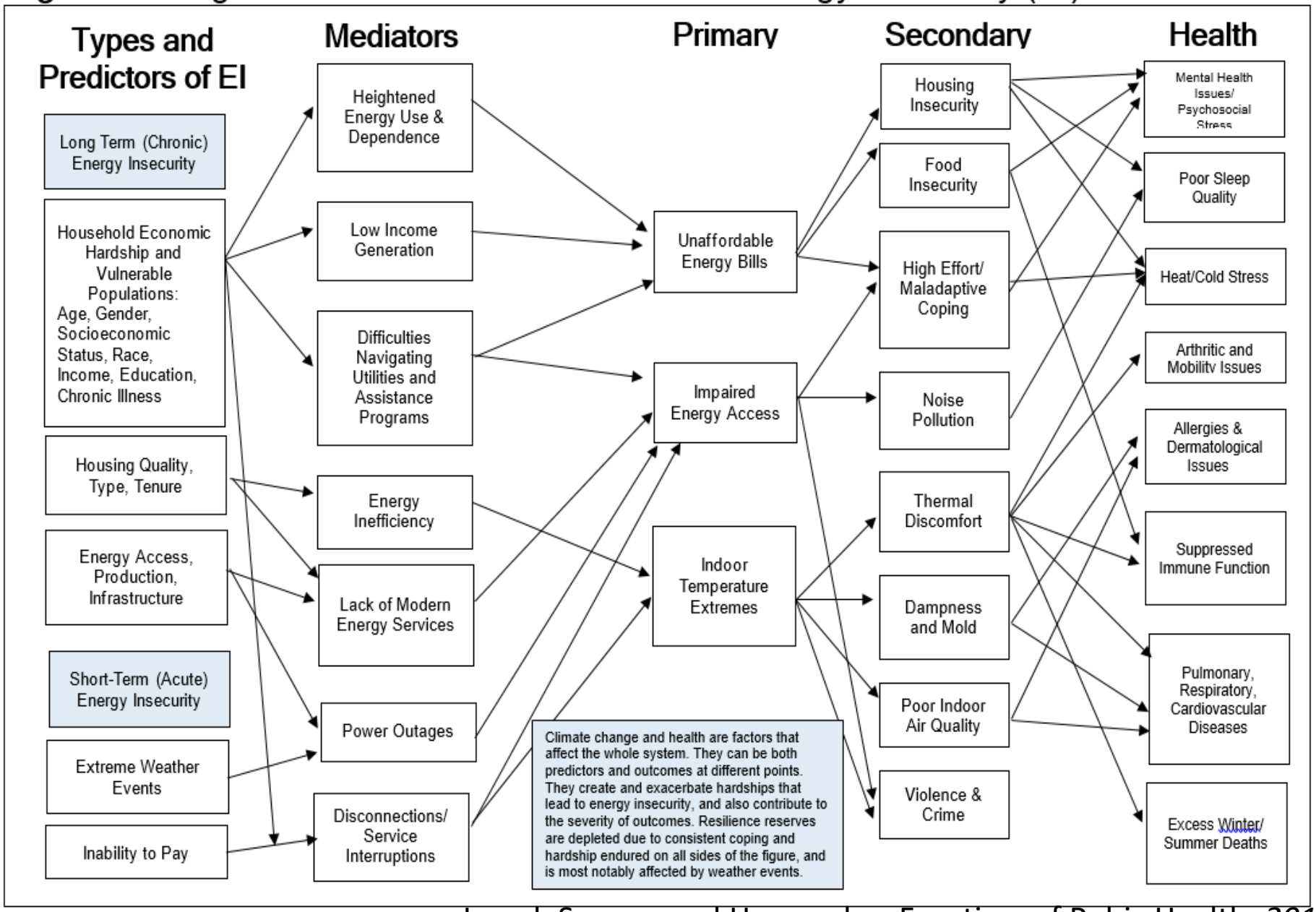


Energy Insecurity:
A Pathway to Disease and Disadvantage



Hernández, *Social Science & Medicine*, 2016

Figure 1. Diagram of links between household energy insecurity (EI) and health.



Jessel, Sawyer and Hernandez, Frontiers of Pubic Health, *2019*

Energy + Health

- Respiratory Health
- Sleep Quality
- Mental Health
- Heat or Eat- Food Insecurity
- Thermal comfort
- Air Pollution
- Social Connectedness

Energy Insecurity and Health

Adjusted Logistic Regression Results for Selected Outcomes*	Energy Secure	Moderately Energy Insecure Households	Severely Energy Insecure Households	P-value
		aOR (95% CI)	aOR (95% CI)	
Asthma (%)	ref	1.57 (0.91-2.72)	1.89 (1.19-3.01)	0.02
Pneumonia past 12 mos. (%)	ref	1.03 (0.35-3.00)	4.44 (1.68-11.72)	<0.01
Diabetes (%)	ref	0.73 (0.46-1.18)	1.15 (0.73-1.81)	0.31
Depressive disorder (%)	ref	1.75 (1.12-2.72)	1.81 (1.19-2.75)	<0.01
Self-reported anxiety/depression**(%)	ref	1.49 (0.44-5.03)	3.45 (1.34-8.87)	0.03
Poor quality sleep***(%)	ref	1.27 (0.84-1.93)	1.81 (1.22-2.68)	<0.01
Hypertension (%)	ref	1.02 (0.68-1.54)	0.79 (0.54-1.16)	0.47
Accidental fall past 12 mos. (%)	ref	0.91 (0.44-1.91)	1.76 (0.76-4.10)	0.33

*Models include income and race
**Self-reported severe or extreme anxiety/depression. P-value reflects differences between no anxiety/depression, slight or moderate anxiety/depression, and severe or extreme anxiety/depression
***Self-reported sleep problems in the past two weeks

Hernández and Siegel, Energy Research and *Social Science*, 2018

Energy +/- Food: "Heat Vs. Eat"

Energy Assistance reduces Food Insecurity

TABLE 4 Adjusted Outcomes by LIHEAP Participation

Variable	Does not Receive Home Energy Assistance ($n = 5925$)	Receives Home Energy Assistance ($n = 1149$)	95% CI	*P*
Mean *z* weight/age	−0.033	0.076	NA	.01
At nutritional risk for growth problems[a]	1.23	1.00	1.00–1.52	.05
Hospitalizations since birth	1.02	1.00	0.86–1.20	.84
Acute hospital admission (Boston and Little Rock EDs, $n = 4445$)	1.32	1.00	1.00–1.74	.05
At risk for overweight[b] (2–3 years olds only, $n = 691$)	0.83	1.00	0.46–1.49	.52

Multivariate analyses are adjusted for site of interview, year of measurement, race/ethnicity of caregiver, birthplace of mother (US born versus immigrant), mother's marital status, employment status, child's low birth weight, household food security status, and receipt of other assistance program benefits (subsidized housing, WIC, TANF, or food stamps). Age of child was included as a covariate in the model for "hospitalizations since birth". NA indicates not applicable.

[a] <5th percentile weight-for-age or <10th percentile weight-for-height.

[b] >95th percentile BMI-for-age.

Frank, et al. "Heat or eat" *Pediatrics*, 2006

Energy +/- Food: "Heat Vs. Eat"

Food Subsidies reduce Energy Insecurity

Table 1
Demographics of Respondents, Stratified by Household Energy Insecurity (combined indicator) in the Washington Heights Community Survey, New York City, 2015 (N = 2494).

	All Households n (weighted column %) 2494 (100.0)	Severely Energy Insecure Households n (weighted row %) 342 (14.0)	Moderately Energy Insecure Households n (weighted row %) 275 (12.7)	Energy Secure Households n (weighted row %) 1877 (73.2)	P-value (*sig < 0.05)
Age of respondent (years)					0.02*
(mean/*median*)	43.3/*40.6*	42.7/*41.2*	42.6/*42.1*	43.5/*39.5*	
Households with children under 18 years of age					< 0.01*
0	1490 (63.1)	187 (13.5)	148 (8.9)	1155 (77.6)	
1	327 (18.5)	44 (12.5)	50 (17.6)	233 (70.0)	
2	189 (12.4)	29 (14.9)	30 (22.8)	130 (62.3)	
3+	78 (6.0)	12 (7.2)	14 (21.6)	52 (71.2)	
Households with adults over 60 years of age	1053 (32.5)	127 (11.6)	88 (7.8)	838 (80.7)	< 0.01*
Racial/ethnic background					< 0.01*
Hispanic/Latino	1468 (65.7)	199 (13.3)	187 (14.6)	1082 (72.1)	
Black	283 (10.7)	77 (28.4)	29 (10.7)	177 (60.9)	
White	524 (17.3)	35 (5.8)	36 (7.8)	453 (86.4)	
Other/Mixed Race	193 (6.4)	28 (17.2)	20 (9.8)	145 (72.9)	
Foreign born	1245 (52.1)	155 (12.8)	139 (14.5)	951 (72.7)	0.22
Education					0.17
Less than a high school degree	579 (31.1)	85 (15.8)	66 (14.2)	428 (70.0)	
High school degree but no college degree	900 (36.6)	140 (15.3)	111 (13.4)	649 (71.3)	
College graduate or higher	1007 (32.2)	115 (10.9)	98 (10.7)	794 (78.4)	
Household income					< 0.01*
Less than or equal to $20,000	969 (43.7)	170 (18.9)	115 (14.4)	684 (66.7)	
$20,000–$40,000	446 (24.8)	72 (13.4)	59 (17.1)	315 (69.4)	
$40,000–$60,000	290 (12.3)	38 (9.6)	37 (10.9)	215 (79.5)	
$60,000–$80,000	194 (7.5)	21 (14.7)	21 (9.8)	152 (75.5)	
$80,000–$100,000	114 (3.9)	5 (8.3)	7 (2.2)	102 (89.5)	
$100,000–$150,000	129 (4.6)	7 (6.5)	11 (11.4)	111 (82.2)	
More than $150,000	105 (3.1)	3 (1.5)	4 (5.0)	98 (93.5)	
Health care coverage					
Medicare	778 (20.6)	106 (14.5)	73 (11.5)	599 (74.0)	0.80
Medicaid	985 (39.2)	160 (14.3)	127 (14.7)	698 (71.1)	0.35
Food-related aid					< 0.01*
SNAP	863 (31.7)	151 (16.1)	122 (19.9)	590 (64.0)	
WIC	34 (1.5)	7 (12.4)	5 (24.0)	22 (63.6)	
SNAP and WIC	23 (1.5)	2 (1.6)	3 (17.0)	18 (81.4)	
Food insecurity	298 (14.1)	106 (30.8)	51 (16.9)	141 (52.3)	< 0.01*

Hernández and Siegel, Energy Research and *Social Science*, 2018

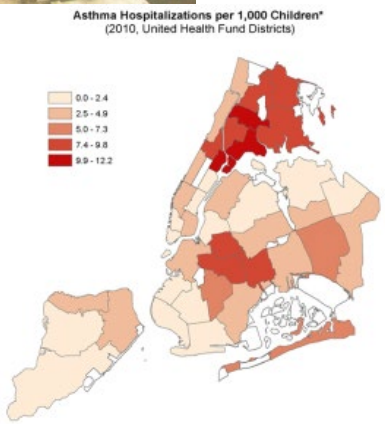
Poor Housing Quality, Thermal Discomfort and Weathering

Lewis, Hernández, Geronimous, *Energy Efficiency*, 2020

Air Pollution: Disparate Access to Clean Energy

Washington Heights/Inwood
East, Central, and West Harlem
South Bronx

- Communities of Color
- Low-income communities
- Environmental Burdens
- Health Disparities



Loneliness and Social Isolation

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