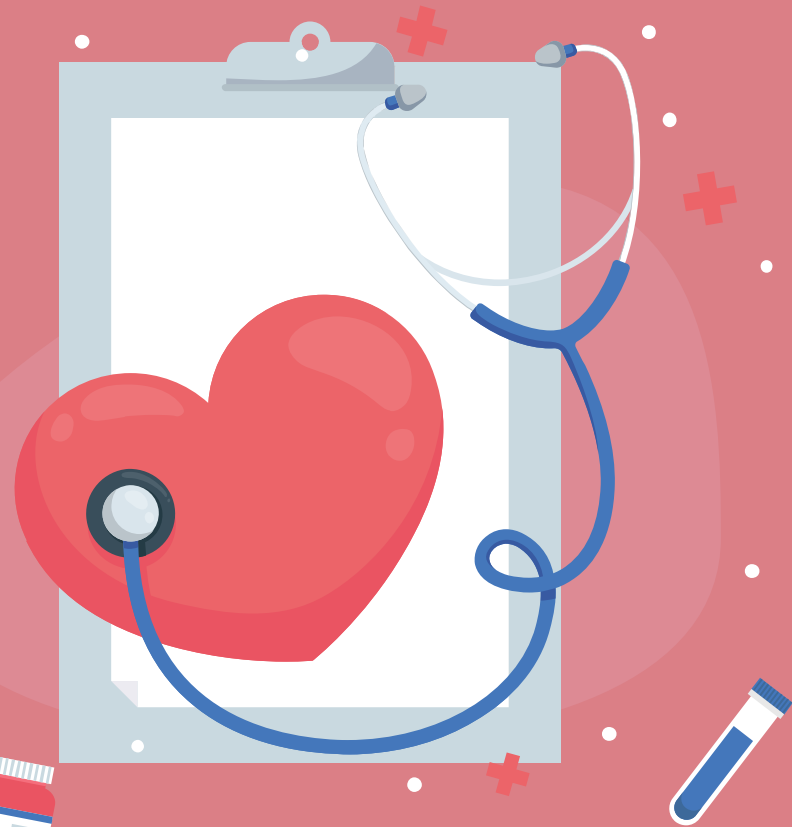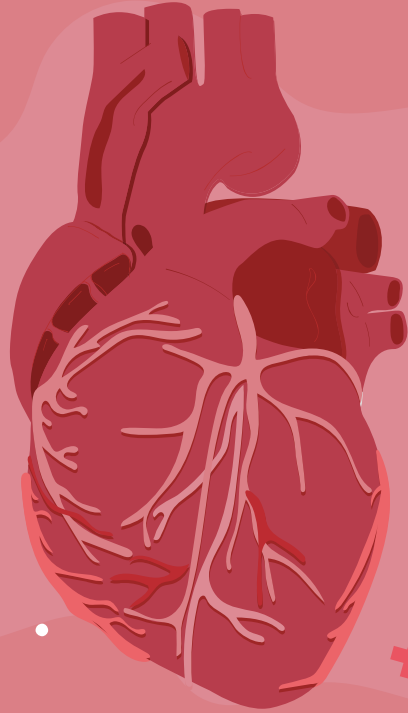# Socioeconomic Status, Urbanization and Congestive Heart Failure

Jane Condon

CONTINUE

What is Congestive Heart Failure?

Congestive Heart Failure (CHF) is a chronic condition in which the heart cannot effectively pump blood to meet the body's demands. This causes an excessive amount of blood to build up in other parts of the body, such as the lungs, legs, and feet.

CHF may result in severe complications, such as:

- Sudden Cardiac Arrest
- Pulmonary Hypertension
- Kidney Damage
- Liver Damage

Source: Cleveland Clinic

Questions to be Answered:

- What is the effect of **socioeconomic status** on **congestive heart failure**? I.e., do counties with:

  - Higher average **income** and/or lower **poverty** levels
  - Higher **education** levels
  - Lower rates of **food insecurity**

  Have better outcomes than counties with:

  - Lower average **income** and/or higher **poverty** levels
  - Lower **education** levels
  - Higher rates of **food insecurity**

- What is the effect of urbanization level on congestive heart failure?

  - Do **urban** or **rural** communities have a higher mortality rate for Congestive Heart Failure?

Variables of Interest (County Level)

Household Income

Median Household Income → U.S. Census Bureau

Education Level

% of people with a Bachelor's degree or higher and % of people without a high school diploma → U.S. Department of Agriculture

Poverty

% of people in poverty → U.S. Census Bureau

Level of Food Insecurity

% of people facing food insecurity → Feeding America

Urbanization Level

Rural Urban Continuum (scale of 1-9, where 1 = most urban and 9 = most rural) → U.S. Department of Agriculture

Crude Mortality Rate

Number of CHF-related deaths per 100,000 population per year → CDC WONDER

Steps (Using R)

1

Obtain and Merge Datasets

2

Data Cleaning

3

Remove Large Outliers

4

Exploratory Data Analysis

5

Data Visualization

6

Linear Regression
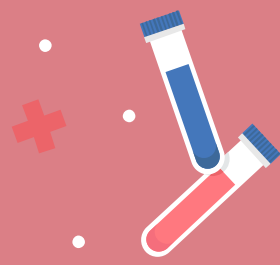
Congestive Heart Failure Statistics Across the Dataset

	Min	Median	Mean	Max
Crude Mortality Rate (per 100,000)	0.00	27.60	32.27	309.60
Deaths	0.0	61.0	162.7	10523.0

PREV   NEXT

Median Household Income vs. Crude Mortality Rate

Median Household Income vs. Congestive Heart Failure
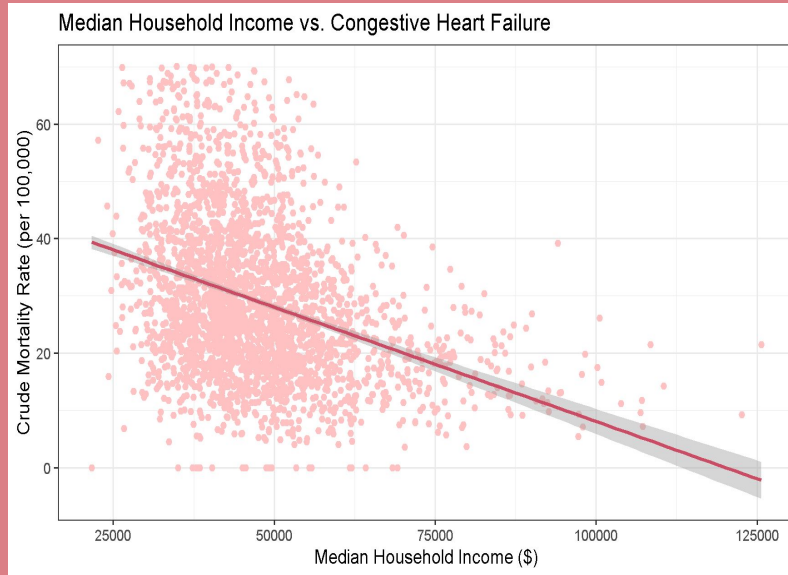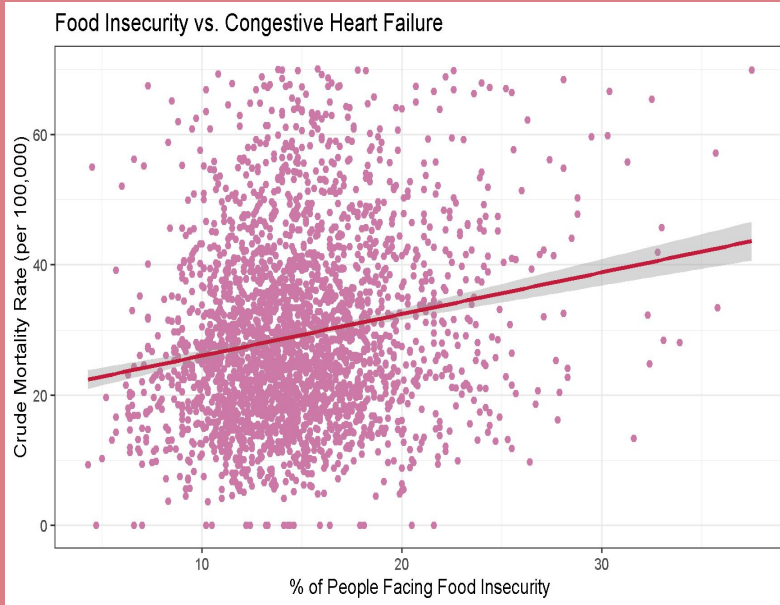
Correlation: -0.349

There is a **negative** relationship between median household income and crude mortality rate. Counties with a **higher** median household income generally have a **lower** crude mortality rate than counties with a low median household income. This means that people from **low-income areas** are **more likely to die** from congestive heart failure.

Food Insecurity vs. Crude Mortality Rate

Food Insecurity vs. Congestive Heart Failure

Crude Mortality Rate (per 100,000)

% of People Facing Food Insecurity

Correlation: 0.185

There is a **weak positive** relationship between food insecurity and crude mortality rate. Counties with a **high** rate of food insecurity generally have a **higher** crude mortality rate than counties with a low rate of food insecurity. This means that people facing **food insecurity** are **more likely to die** from congestive heart failure.

PREV   NEXT

Poverty vs. Crude Mortality Rate

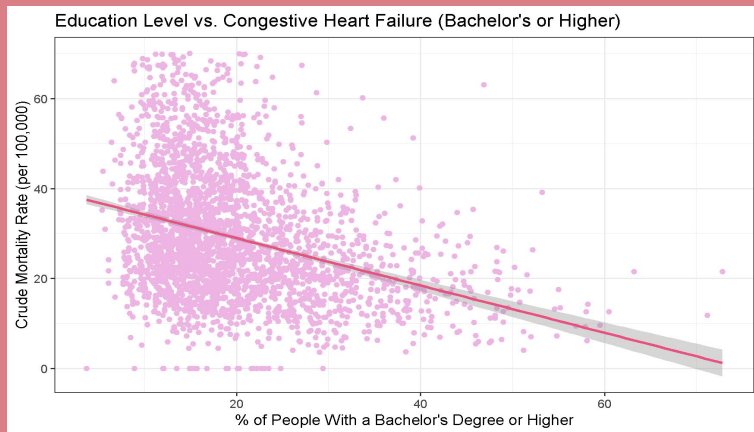Poverty vs. Congestive Heart Failure
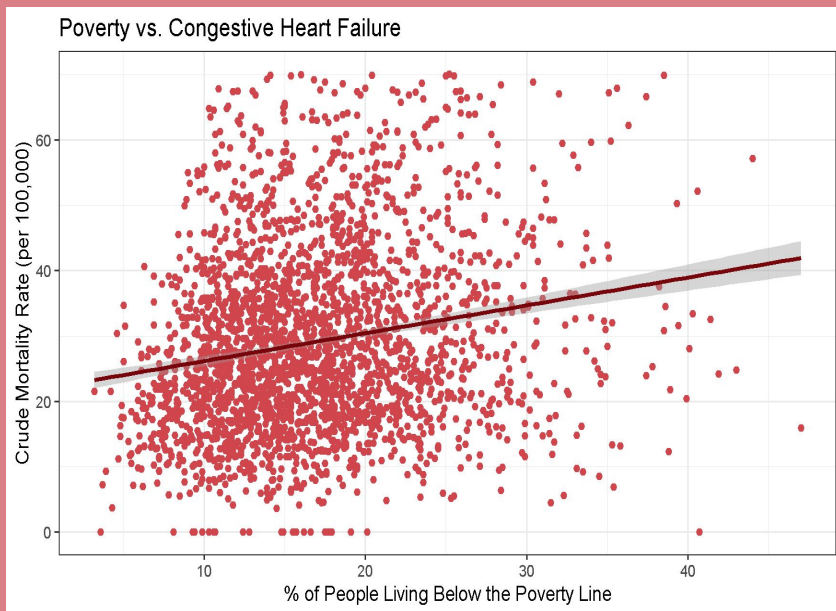
Correlation: 0.190

There is a **weak positive** relationship between poverty and crude mortality rate. Counties with a **high** rate of poverty generally have a **higher** crude mortality rate than counties with a low rate of poverty. This means that people living in **poverty-stricken areas** are **more likely to die** from congestive heart failure.
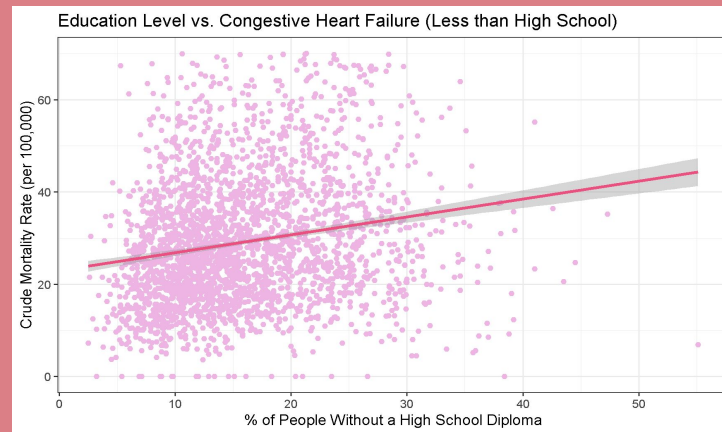
PREV NEXT

Education Level vs. Crude Mortality Rate

Education Level vs. Congestive Heart Failure (Bachelor's or Higher)

Crude Mortality Rate (per 100,000)

% of People With a Bachelor's Degree or Higher

Correlation: -0.337

Education Level vs. Congestive Heart Failure (Less than High School)

Crude Mortality Rate (per 100,000)

% of People Without a High School Diploma

Correlation: 0.190

There is a **negative** relationship between education level and crude mortality rate. Counties with a **high** percentage of people with a Bachelor's degree or higher generally have a **lower** crude mortality rate, and counties with a **high** percentage of people without a high school diploma have a **higher** crude mortality rate. This means that people living in **more educated counties** are **less likely to die** from congestive heart failure.

Urbanization vs. Crude Mortality Rate

Urbanization Level vs. Congestive Heart Failure

Crude Mortality Rate (per 100,000)

Degree of Urbanization (1 = Most Urban, 9 = Most Rural)
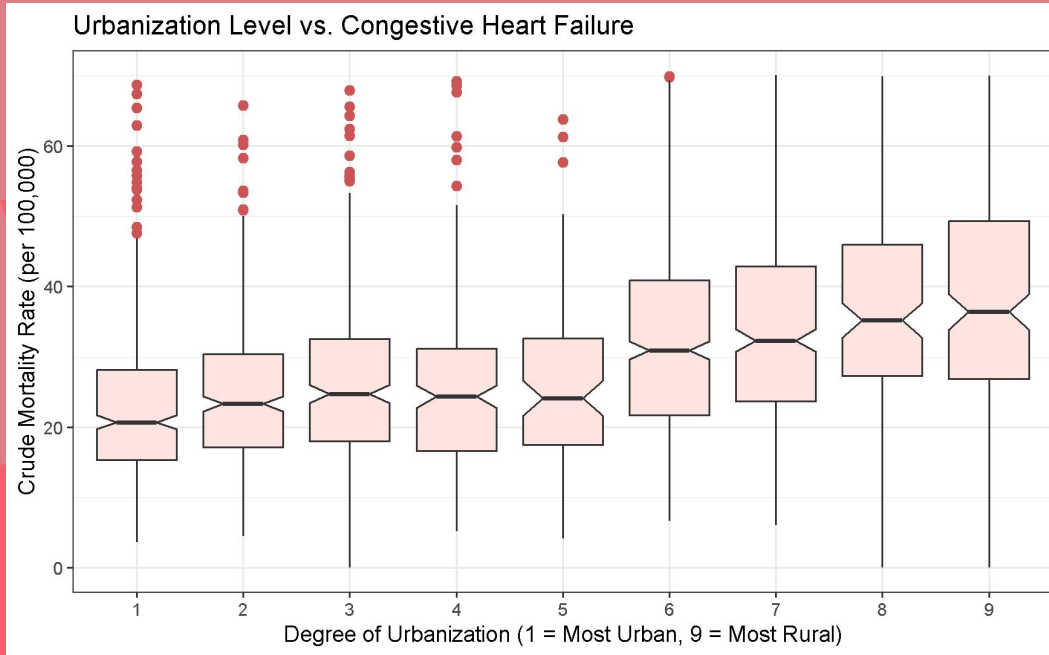
There is clearly a large difference in the crude mortality rate for urban and rural areas. Counties with an urban population < 5,000 (not adjacent to a metro area) had nearly **double** the crude mortality rate of counties in metro areas with > 1,000,000 residents. This means that residents of rural counties are nearly **twice as likely** to die from congestive heart failure.

PREV   NEXT

Linear Regression Model

Predictors	Estimates	std. Error	Statistic
(Intercept)	53.869 ***	3.384	15.921
Median Household Income	-0.000 ***	0.000	-8.516
Food Insecurity	0.365 ***	0.100	3.647
Bachelor's Degree or Higher	-0.161 ***	0.040	-4.028
Poverty	-0.554 ***	0.080	-6.916
Urbanization Level 2	-2.542 **	0.952	-2.670
Urbanization Level 3	-1.368	0.999	-1.369
Urbanization Level 4	-2.702 *	1.154	-2.341
Urbanization Level 5	-2.146	1.519	-1.413
Urbanization Level 6	2.690 **	0.960	2.802
Urbanization Level 7	4.157 ***	1.024	4.058
Urbanization Level 8	6.249 ***	1.324	4.721
Urbanization Level 9	6.586 ***	1.220	5.397
Observations	2674		
R^2 / R^2 adjusted	0.198 / 0.195		

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

Note: Data has not been scaled

PREV   NEXT

CONCLUSIONS
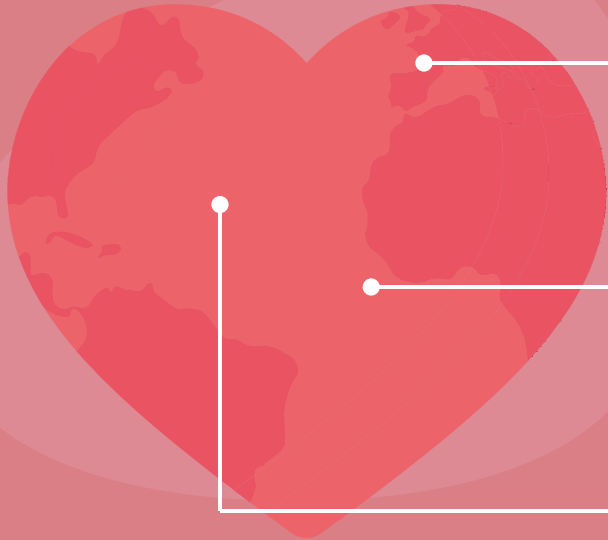
1 Overall, median household income has the greatest impact (negative) on a county's crude mortality rate. People living in high-income areas are much less likely to die from Congestive Heart Failure.

2 Poverty had a significant positive effect on the crude mortality rate. Urbanization and education level also had a significant negative effect on the crude mortality rate.

3 Food insecurity had the smallest effect on the crude mortality rate, but still had a significant positive impact on the crude mortality rate.

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