Poverty, Public Health and Local Foods

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Increasingly poor public health is a drag on the economy.

- **The total estimated cost of diagnosed diabetes in 2012 is $245 billion, including $176 billion in direct medical costs and $69 billion in reduced productivity.--- American Diabetes Association**

- **The estimated annual health care costs of obesity-related illness are $190 billion and [b]usinesses are suffering due to obesity-related job absenteeism ($4.3 billion annually). --- National League of Cities**

- **Obesity costs private employers $45 billion annually as a result of medical expenses and excessive absenteeism. --- Trust for America's Health**

- **$5 billion annually for additional jet fuel needed to fly heavier Americans, compared to fuel needed at 1960 weights. --- Huffington Post**

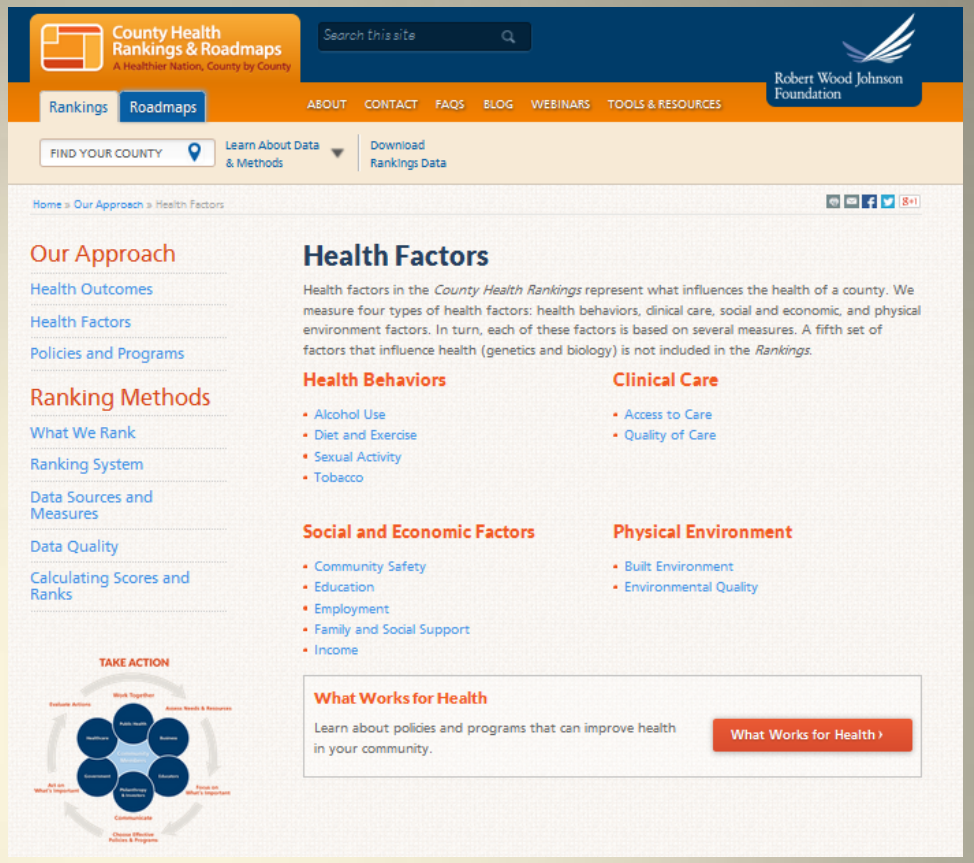
Increasingly poor public health is a drag on the economy.

- **Direct out of pocket medical expenses**

- **Indirect costs to the economy:**
  - **Absenteeism**
  - **Presenteeism**

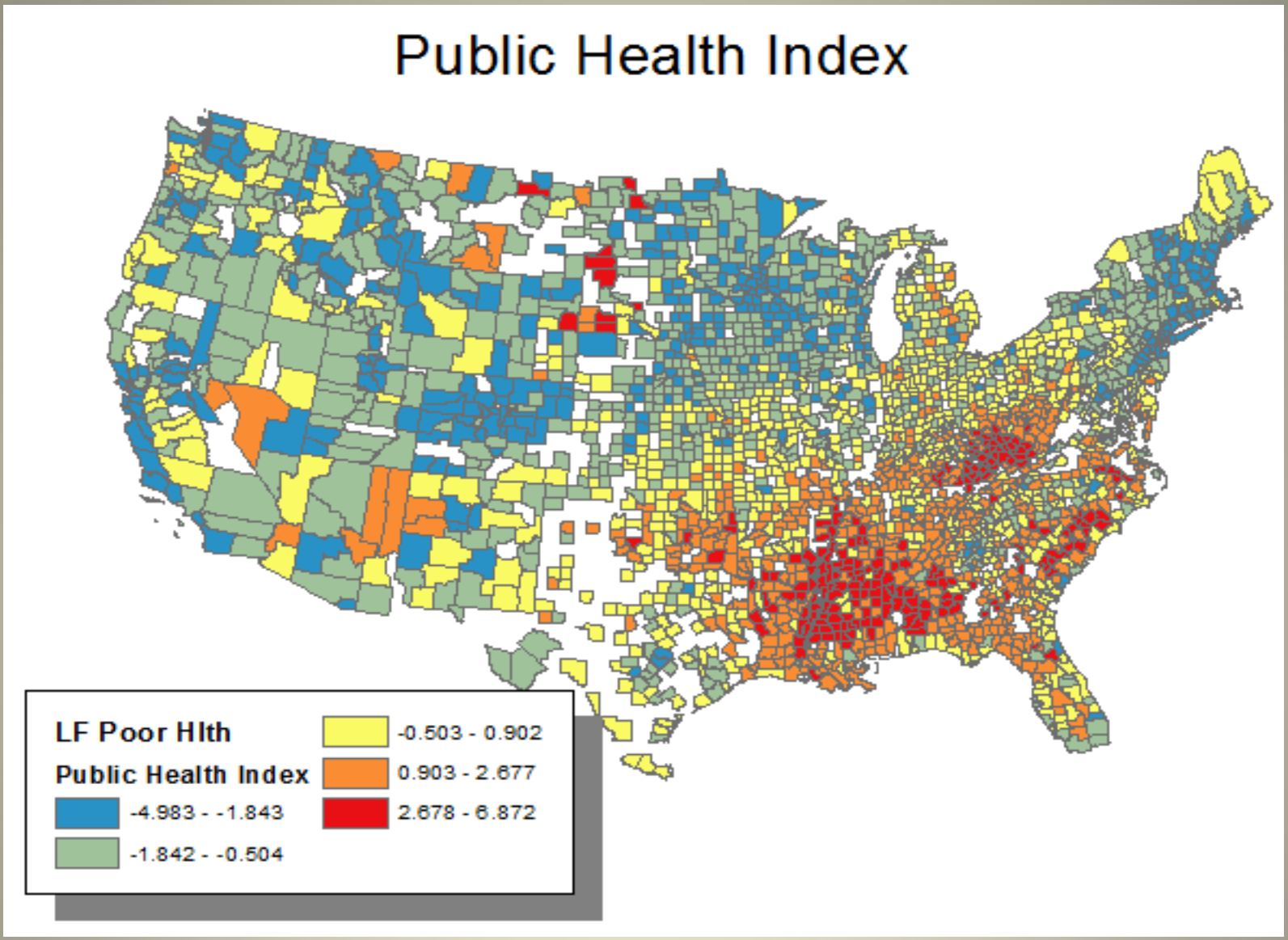
"The correlation between health and economic performance is extremely robust across communities and over time." --- Hamoudi and Sachs (1999) (Center for International Development at Harvard Working Paper 30).

The first step in our analysis is to develop a measure of public health….



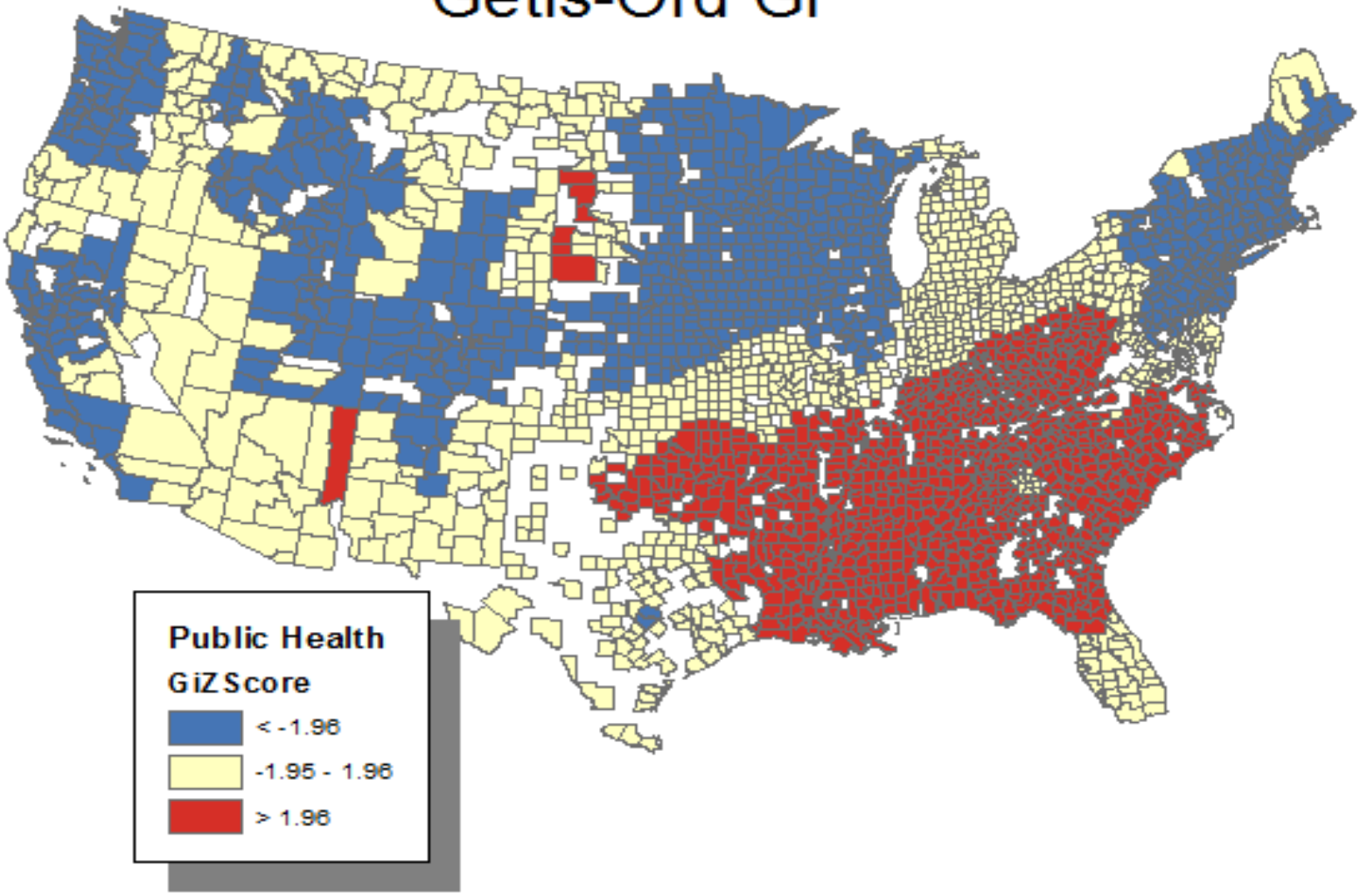
University of Wisconsin Population Health Institute

Public Health Index	
	Eigenvalues
Low Birth Weight Rate	0.3764
Adult Obesity Rate	0.4383
Adult Diabetes Rate	0.4887
Premature Death (Years of Potential Life Lost)	0.4746
Poor or Fair Health (%)	0.4497
Variance Explained	0.6462

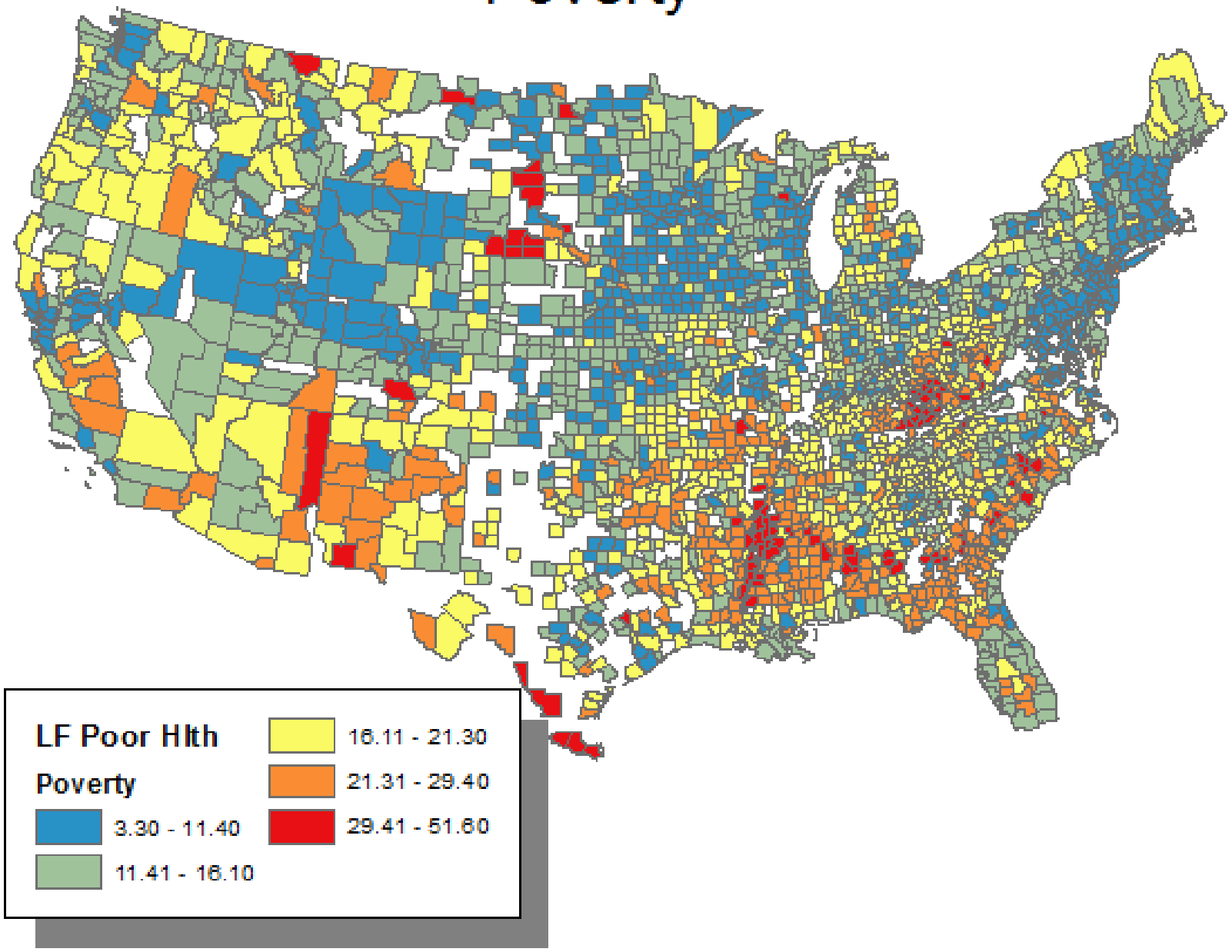


Higher **values of the index is indicative of** ***worse*** **or** ***poorer*** **public health.**

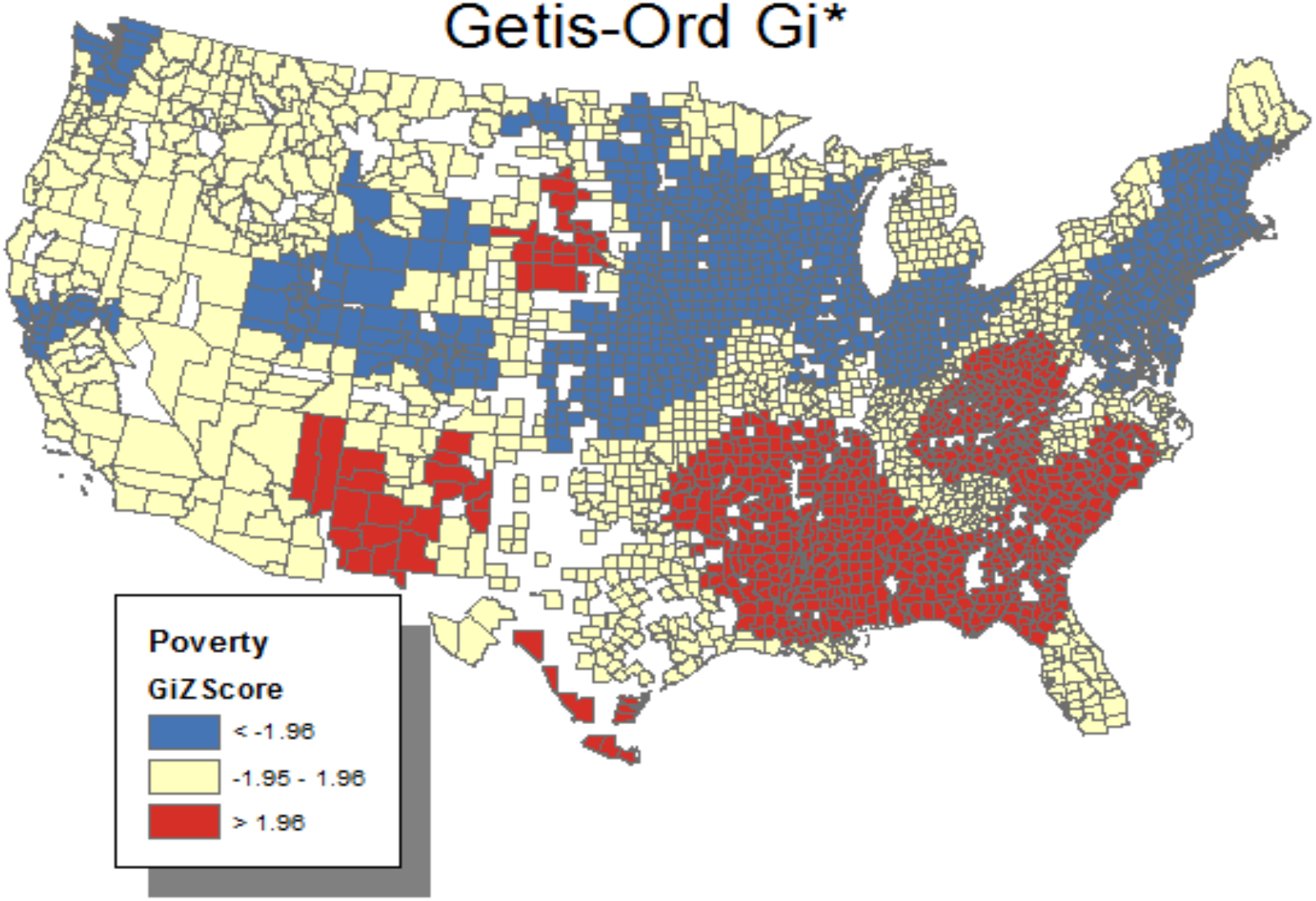
Public Health Index
Getis-Ord Gi*



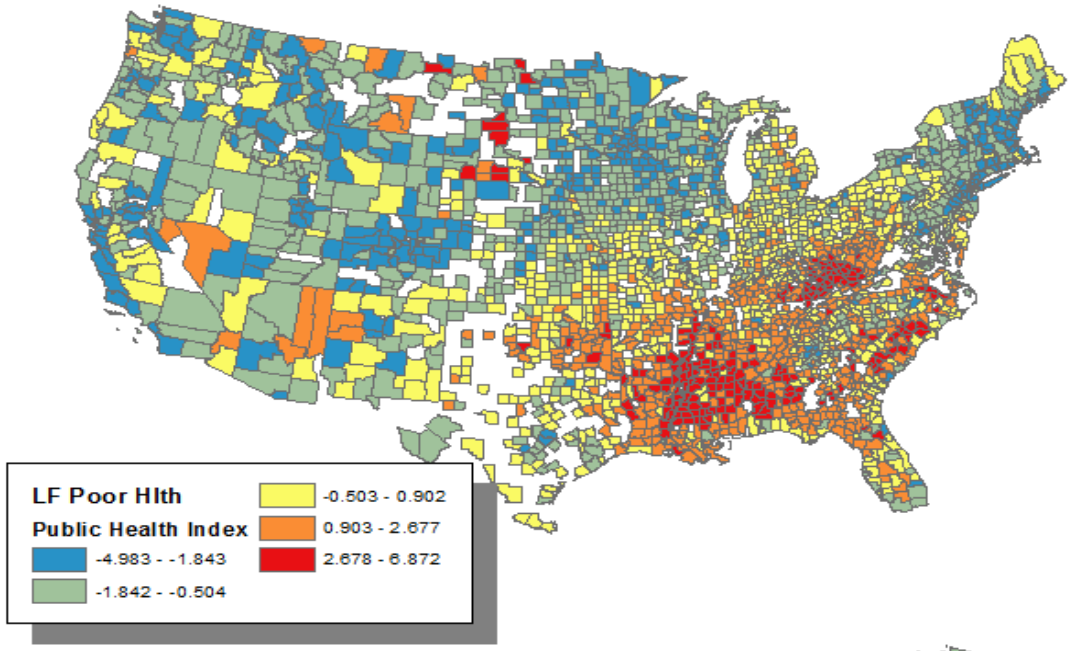
Poverty


LF Poor Hlth
Poverty
3.30 - 11.40
11.41 - 16.10
16.11 - 21.30
21.31 - 29.40
29.41 - 51.60

Poverty
Getis-Ord Gi*



Public Health Index



Poverty

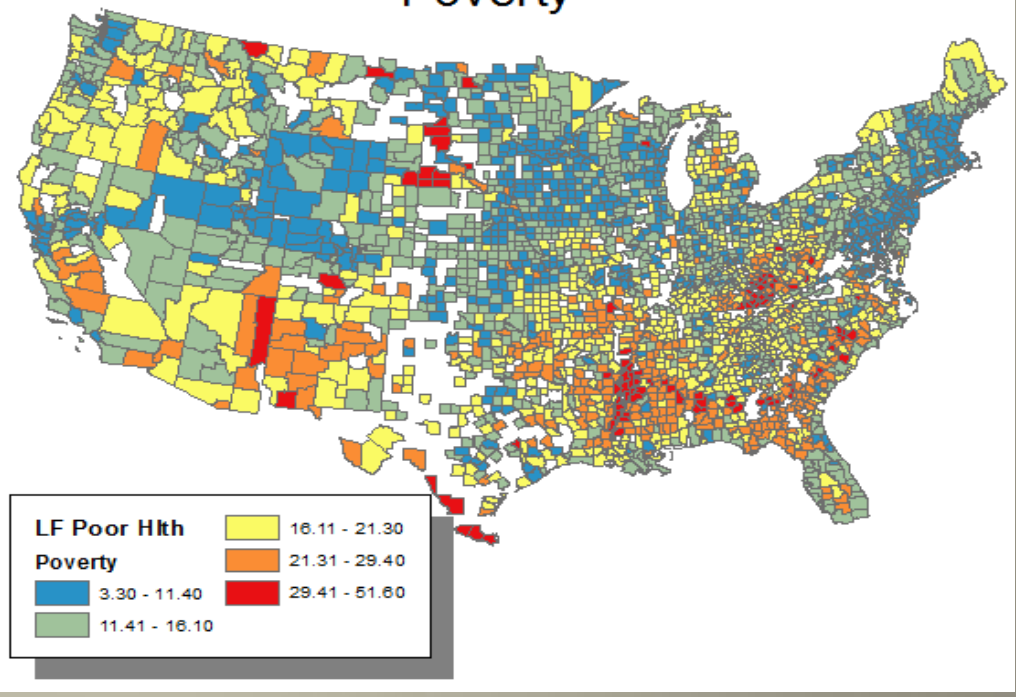
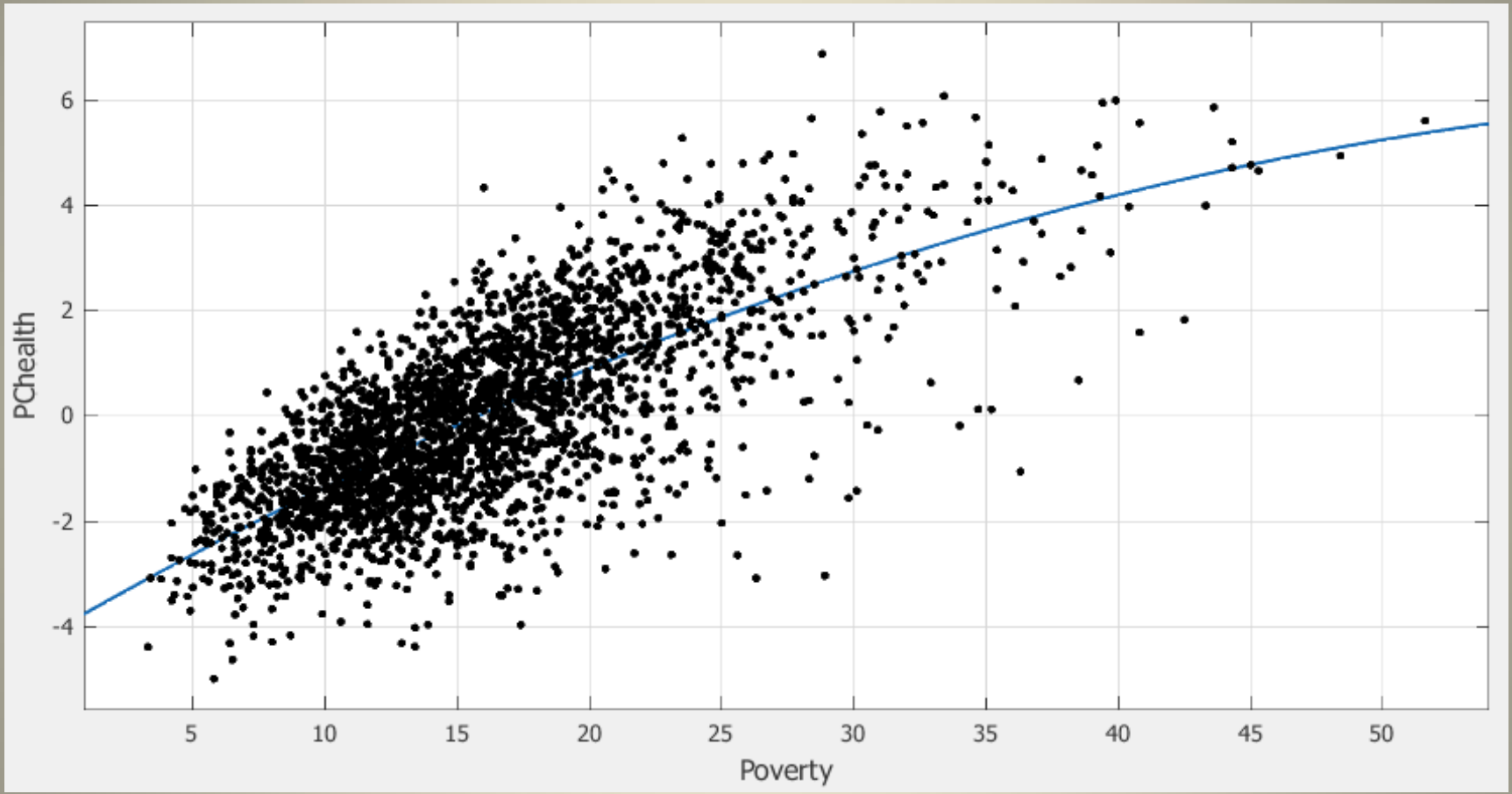


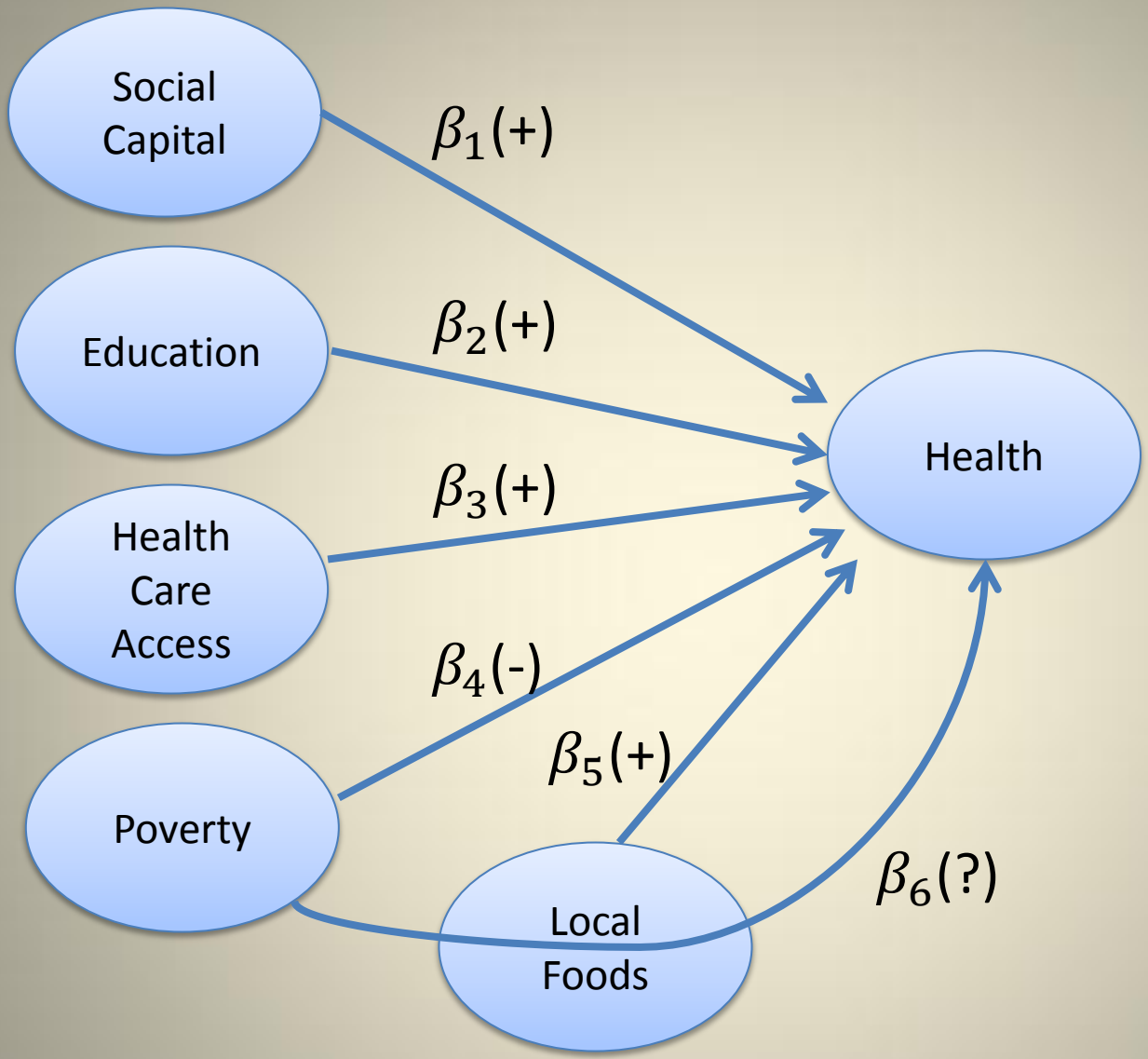
Figure 2: Simple Scatter Plot of Poverty on Public Health Index



Local Foods has been promoted along several lines which for our purposes can be condensed into three categories:

- **healthier society,**
- **social or economic justice**
- **environmental sustainability**

Figure 1. Structural Framework



$$Public\ Health = \beta_1 Poverty + \beta_2 Education + \beta_3 Social\ Capital + \beta_4 Health\ Care\ Access + \beta_5 Local\ Foods + \beta_6 (Local\ Foods * Poverty) + \varepsilon$$

$Public\ Health$ = Health Index from before

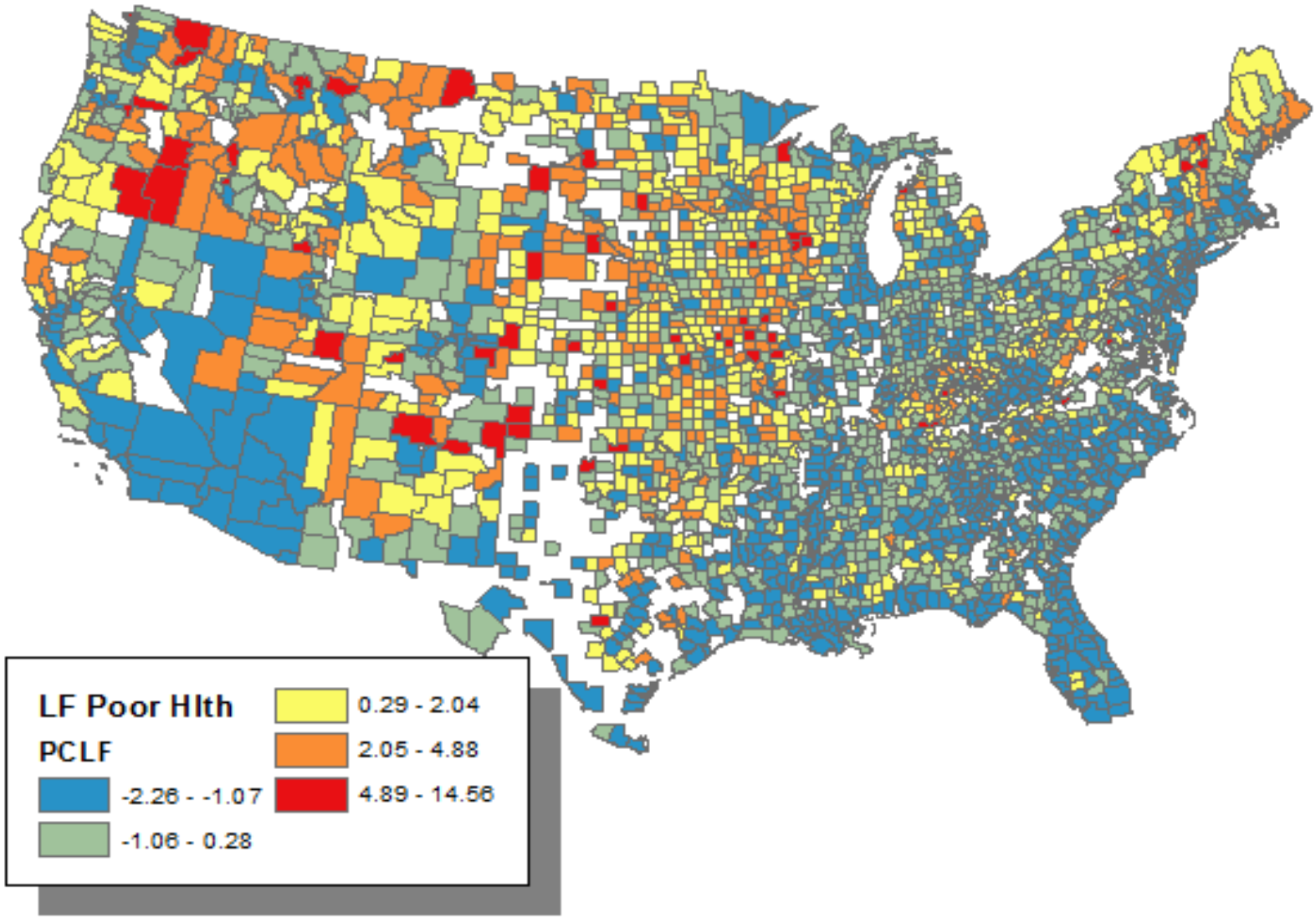
$Poverty$ = Overall personal poverty rate

$Social\ Capital$ = Index from Rupasingha, Goetz and Freshwater (2006), Rupasingha and Goetz (2007) and Goetz and Rupasingha (2006).

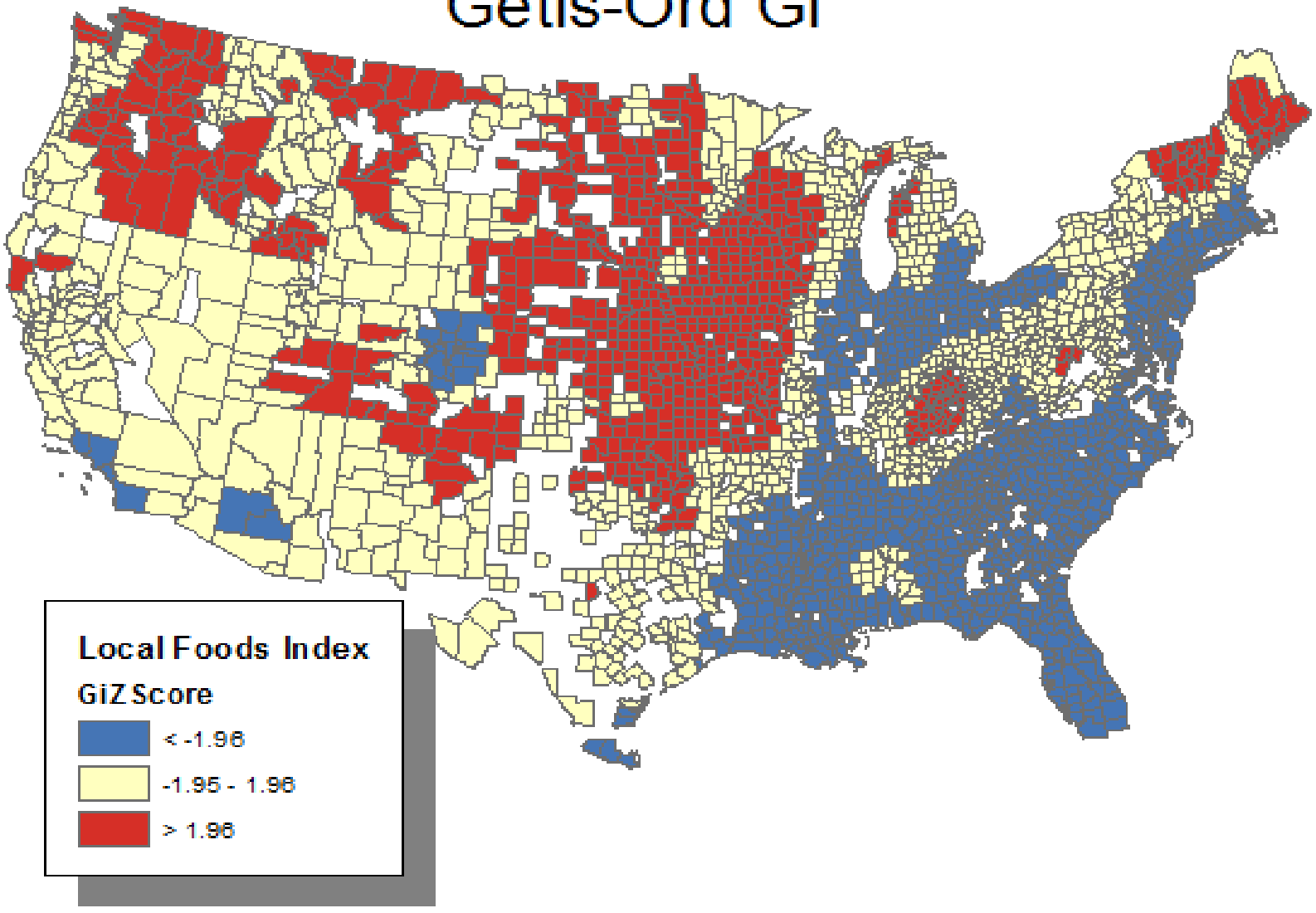
$Health\ Care\ Access$ = number of general practitioner physicians per 1,000 persons

Table: Local Food Indices	
	Eigenvalues
Number of Farms with Sales less than $100K per 1,000 Population	0.3995
Number of Organic Farms per 1,000 Population	0.3324
Number of Farms with Value Added Production per 1,000 Population	0.4309
Number of CSA Farms per 1,000 Population	0.3614
Number of Orchard, Fruit, Vegetable and Berry Farms per 1,000 Population	0.2597
Number of Farms with Direct Sales per 1,000 Population	0.4585
Direct Sales per Capita	0.3173
Number of Farmers' Markets per 1,000 Population	0.1878
Variance Explained	0.4624

Local Food Index



Local Food Index
Getis-Ord Gi*



Spatial Dependency in Regression Model	
	Moran I
Moran I	0.4450
Moran I-statistic	38.9056
Marginal Probability	(0.0001)
	LM error test
LM value	1496.7739
Marginal Probability	(0.0001)
chi(1) .01 value	6.6350
	LR test
LR value	1233.7138
Marginal Probability	(0.0001)
chi-squared(1) value	6.6350

BSAR: $y = \rho W y + \beta X + \varepsilon, \quad \varepsilon \backsim N(0, \sigma^2 V), \quad V = diag(v_1, \dots, v_n)$

BSEM: $y = \beta X + \varepsilon, \quad \varepsilon = \lambda W \varepsilon + u, \quad u \sim N(0, \sigma^2 V), \quad V = diag(v_1, \dots, v_n)$

BSDM: $y = \rho W y + \beta X + \theta W X + \varepsilon, \quad \varepsilon \backsim N(0, \sigma^2 V), \quad V = diag(v_1, \dots, v_n)$

To operationalize the <u>Bayesian approach</u> LeSage suggests a Markov Chain Monte Carlo (MCMC) estimation method…The Gibbs sampling procedure must be repeated until the values of the estimates converge. For this study we use 100,000 draws with the first 1,000 draws removed in effect acting as a ”burn-in” to minimize the likelihood of poor starting values.

Table 6: Spatial Modeling Results (heteroscedastic errors)

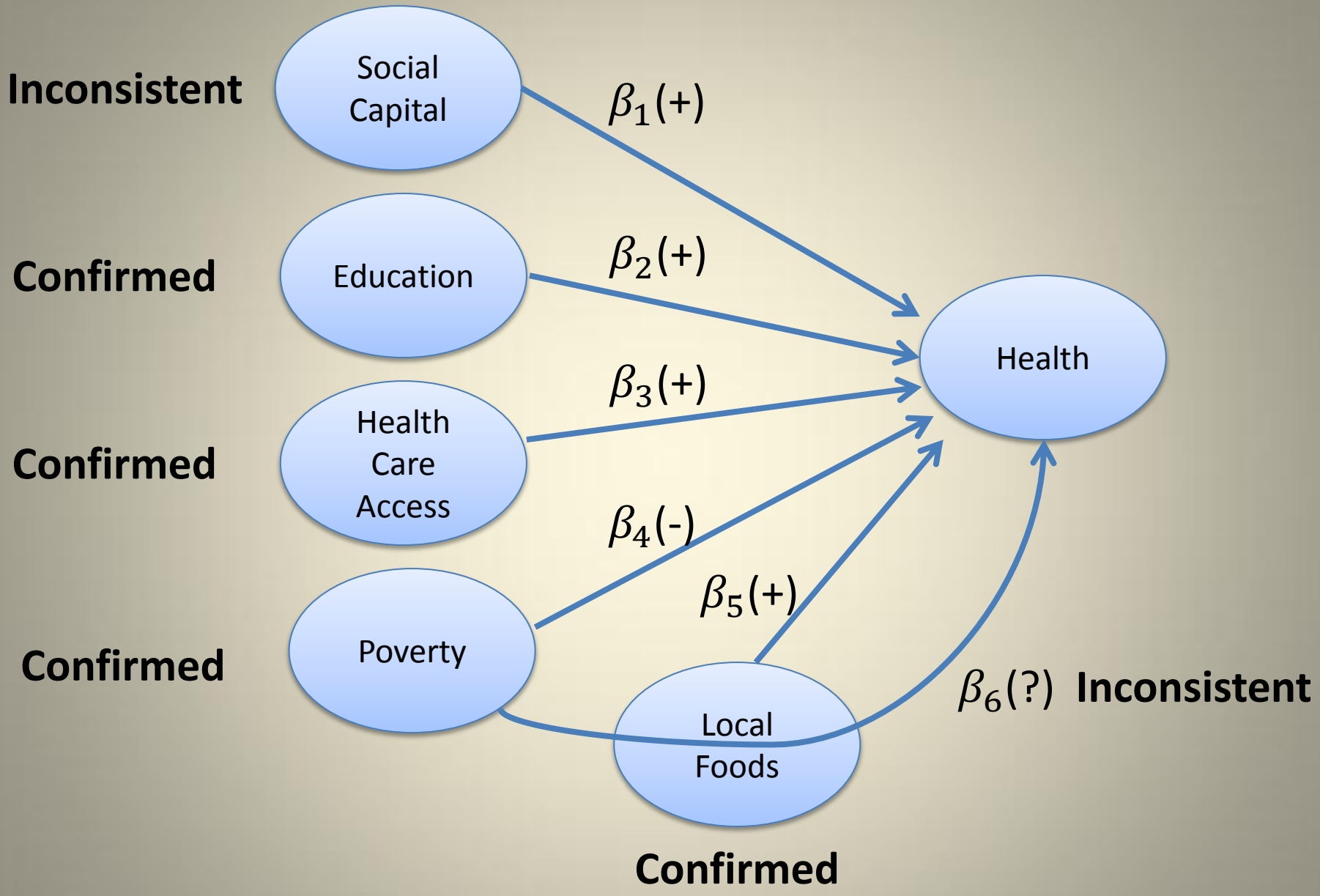
	SAR	SEM	SDM
Local Foods Index	-0.1092***	-0.1643***	-0.1114***
	(0.0001)	(0.0001)	(0.0001)
Poverty Rate	0.0814***	0.1057***	0.0858***
	(0.0001)	(0.0001)	(0.0001)
Education (Bachelor's Degree)	-0.0975***	-0.1329***	-0.1296***
	(0.0001)	(0.0001)	(0.0001)
General Practitioner Doctors per 1,000 Population	-0.1614**	-0.0886	-0.0277
	(0.0027)	(0.1037)	(0.3113)
Social Capital Index	0.0079	0.0013	0.0675**
	(0.3144)	(0.4869)	(0.0017)
(Local Foods Index)*(Poverty Rate)	0.0004	0.0040**	0.0018
	(0.3918)	(0.0256)	(0.1279)
W*(Local Foods Index)	—	—	-0.0433
			(0.1716)
W*(Poverty Rate)	—	—	-0.0347***
			(0.0001)
W*(Education (Bachelor's Degree))	—	—	0.0772***
			(0.0001)
W*(General Practitioner Doctors per 1,000 Population)	—	—	-0.2688**
			(0.0055)
W*(Social Capital Index)	—	—	-0.0520**
			(0.0313)
W*[(Local Foods Index)*(Poverty Rate)]	—	—	0.0002
			(0.4777)
ρ	0.5381***	—	0.6749***
	(0.0001)		(0.0001)
λ	—	0.6696***	
		(0.0001)	
$\bar{R}^2$			
	0.7285	0.8251	0.7469

Marginal significance in parentheses.

*** Significant at the 99.9 percent level.

** Significant at the 95.0 percent level.

* Significant at the 90.0 percent level.


Inconsistent
Social Capital
$\beta_1(+)$
Confirmed
Education
$\beta_2(+)$
Health
$\beta_3(+)$
Confirmed
Health Care Access
$\beta_4(-)$
$\beta_5(+)$
Confirmed
Poverty
$\beta_6(?)$ Inconsistent
Local Foods
Confirmed

Concluding Observations

- **Poverty is tied to poorer health.**
- **Higher concentrations of local foods is tied to better health. (Causation?)**
- **The presence of local foods does not appear to weaken the poverty and poorer health relationship.**
  - **There is some evidence that the presence of local foods strengthens the poverty and poor health relationship.**
  - **This might point to the level of income generated by agricultural production associated with local foods.**

Thank you

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