Spatial Restructuring and Fiscal Impacts in the Wake of Disaster:

The Case of Hurricanes Katrina and Rita

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The Context

- On 29 August 2005, Hurricane Katrina made landfall along the LA/MS state border
  - One of the deadliest and costliest storms in U.S. history
  - Catastrophic damage to coastal communities, including widespread flooding of New Orleans

- On 24 September 2005, Hurricane Rita made landfall along the LA/TX state border
  - Caused extensive damage, particularly in the coastal parishes of southwest LA

Region Designated for Hurricane-Related FEMA Assistance

Hurricane Affected Counties
- Most Affected
- Affected

Source: Bureau of Labor Statistics 2006
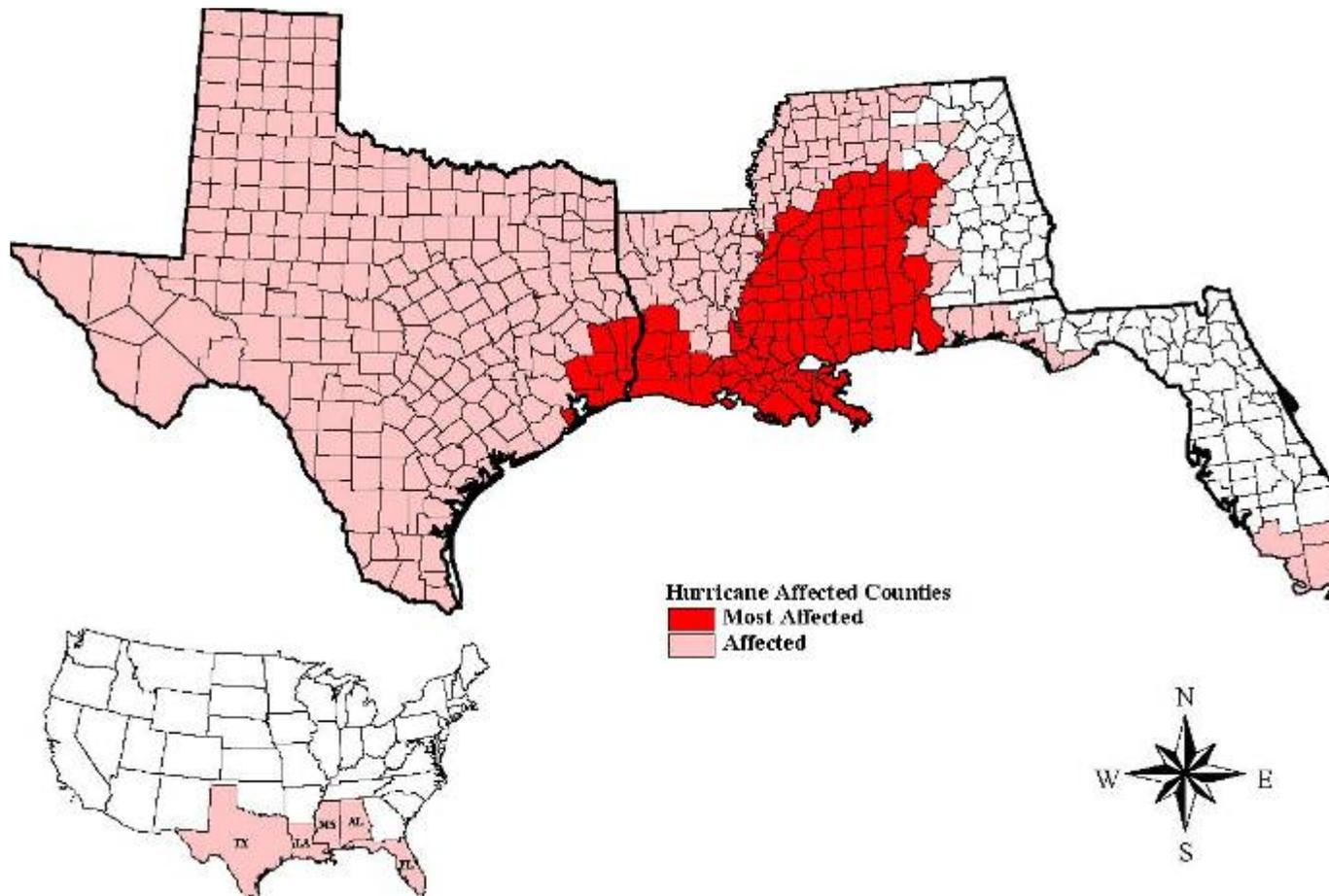
Research Objectives

- Draw on mixed methods design to examine the socioeconomic impacts of the hurricanes on the GOM Region

  - Region in which oil and gas production has a major presence in social and economic life

- Overarching conceptual frame:

  - Disasters are inherently social phenomena

  - Disasters are shaped by the social structure and reflect the process of social change
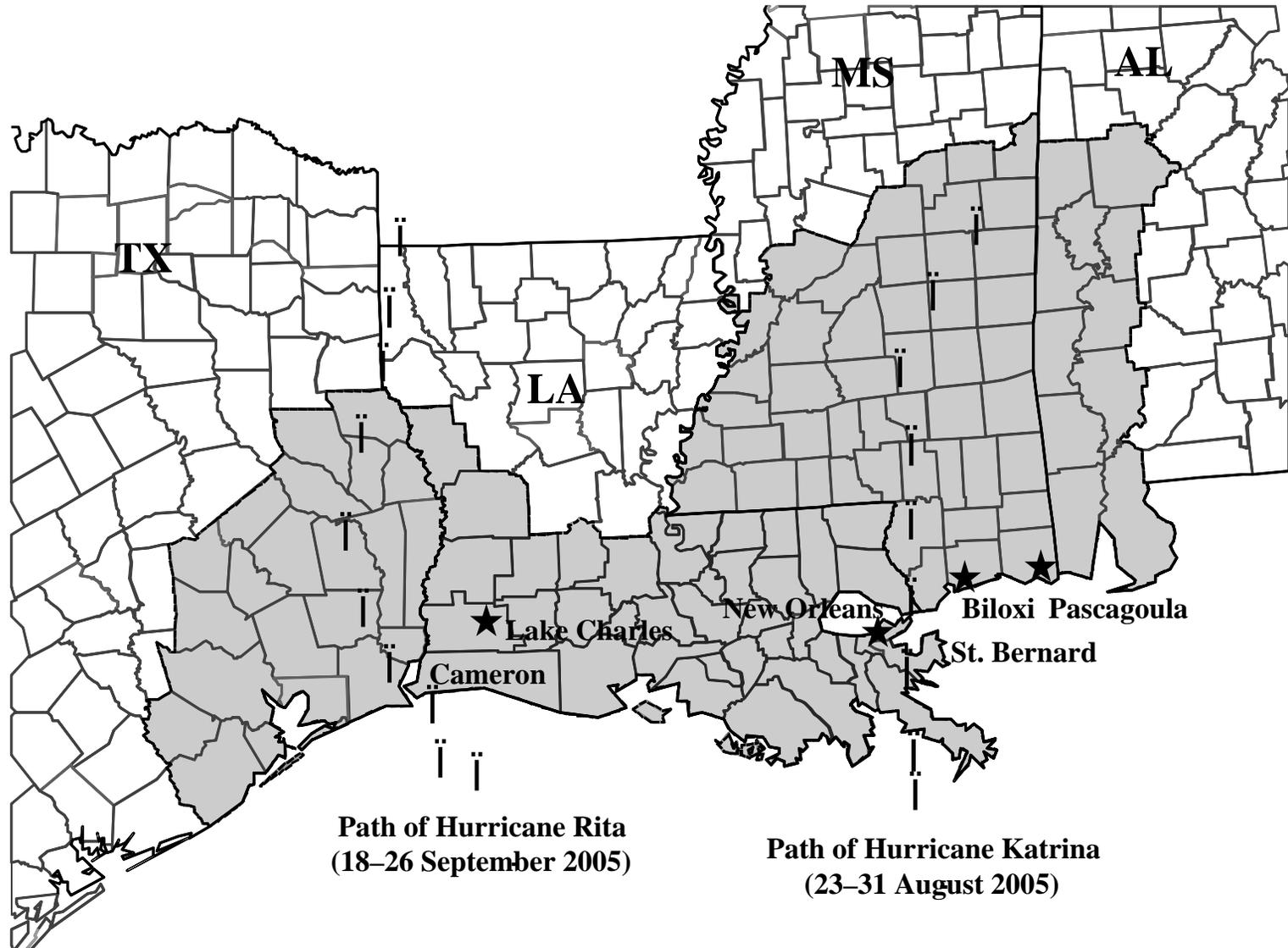
Research Design

- Mixed methods

    - Extensive **literature review** on the socioeconomic dimensions of disaster (over 250 annotated references catalogued to date)

    - **Guided conversations** with local leaders and industry representatives in impacted communities

    - **Secondary data analysis** to develop a statistical portrait of population and labor market restructuring in the impacted region

Guided Conversations

- Draw on qualitative data collected via guided conversations with public and private sector decision makers

  - How perceive and express understandings of the disaster recovery process

- Participants drawn from Katrina and Rita impacted communities

Geography of the Study Region

MS

AL

TX

LA

★Lake Charles

New Orleans

Biloxi Pascagoula

St. Bernard

Cameron

Path of Hurricane Rita
(18–26 September 2005)

Path of Hurricane Katrina
(23–31 August 2005)

Guided Conversations

- Sample included 22 decision makers
  - Public sector participants (9)
  - Private sector participants (13)
    - Oil and gas industry representatives (7)
- Public sector discussions focused on community recovery
- Private sector discussions focused on jobs, human resource issues, and industrial restructuring

Findings

- Two central themes emerged:
  - ***Obstacles*** to recovery
  - ***Opportunities*** in the wake of the storms

- Obstacles encompassed four major concepts:
  - Problems with ***financing/funding***; ***infrastructure***; ***human capital***; and the ***emotional toll***

- Opportunities encompassed two major concepts:
  - ***Job growth***; and ***planning***

Obstacles to Recovery

- ***Financing/funding problems***

"It's very nice to be able to sit down and talk about (recovery) plans … but it's hard to implement them … I'd like to see someone come in here with a set of plans <u>and</u> the money to carry them out."

- ***Infrastructure problems***

"I just moved into my new house in November. That's a year and three months after the hurricane …. We still have employees who are trying to [find housing] … so they are still living in RVs that were provided by the company."

Obstacles to Recovery

- ***Human capital problems***

"I think a lot of people just decided 'I'm not going through this ever again. I'm leaving and I'm starting over.' It really affected middle income, lower income people … because initially they didn't have any work here … so they left, they had to feed their families."

- ***Emotional toll***

"I see a lot of depression in people and I see a lot of anger … the storm did a lot of damage to people emotionally. It's going to take a lot of time before people start working together again and trusting each other."

Opportunities in Wake of Storms

- ■ ***Job growth***

"Our organization has a huge opportunity right now. We're looking to expand and grow … [The situation] does lend itself to growth if you have the resources to take advantage of [the climate] and run with it."

- ■ ***Planning***

"The biggest task that faces us right now is rebuilding in a responsible accountable fashion …. We would like the people of future generations to look back on this time and say 'That's when they were hit by something really bad, yet they came out of it and made good decisions. They built for the future."
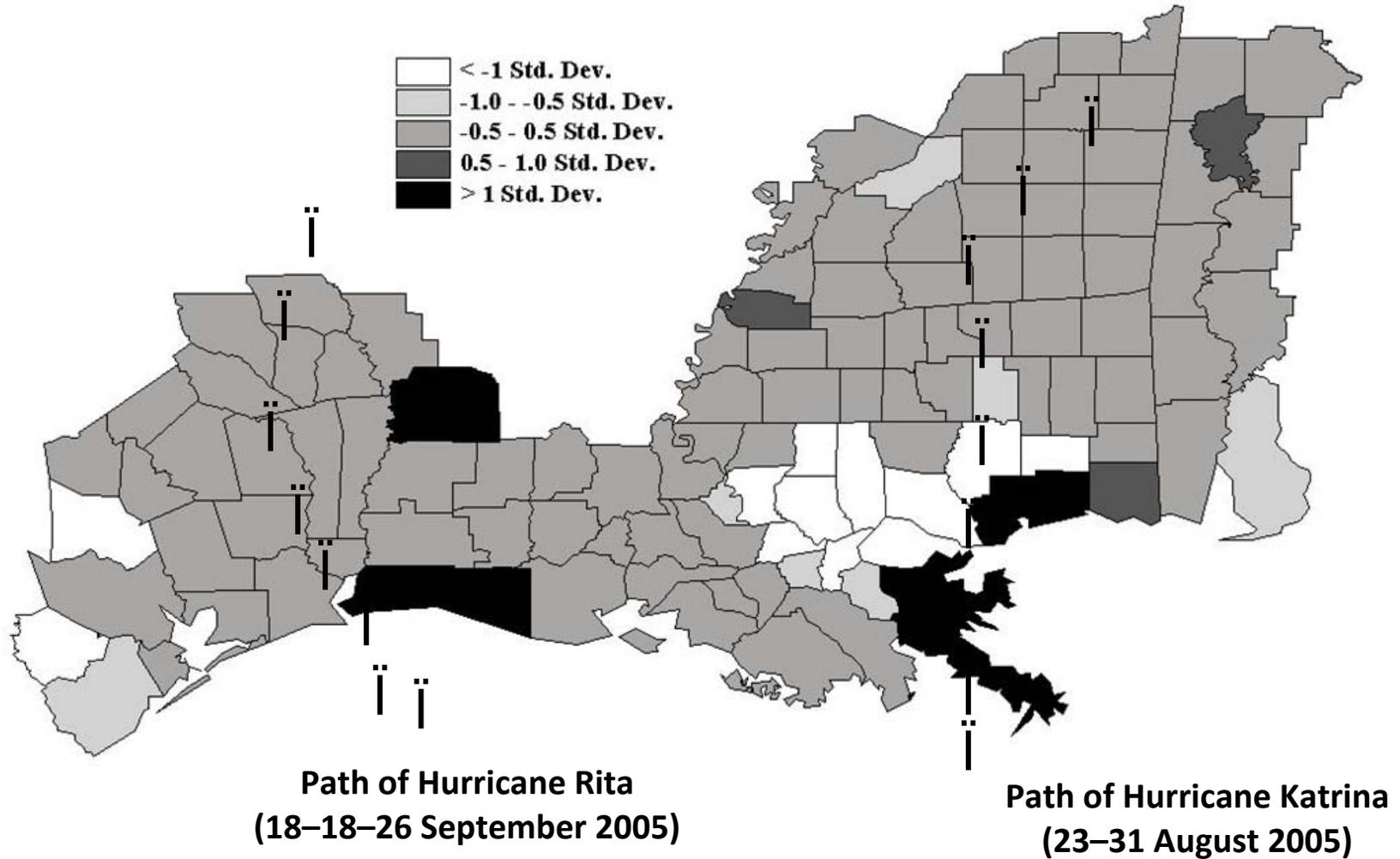
Secondary Data Analysis: Social Vulnerability and Migration

- ***Social vulnerability***: Notion that the socioeconomic characteristics of an area, such as community composition and stratification, influence susceptibility to disasters

- The objective of this phase of study was to examine how various dimensions of social vulnerability were related to migration patterns following the storms

Data and Methods

- County/parish-level data drawn from a variety of sources available from the U.S. Census Bureau

- Hurricane affected region includes 117 counties/parishes within four Gulf Coast states: AL, MS, LA, and TX

- Developed social vulnerability index (SoVI) and examined its relationship to migration (1 July 2005–1 July 2006) via OLS and spatial regression

Percent Net Migration (ln) for Counties in the Impacted Region

Legend:
- < -1 Std. Dev.
- -1.0 - -0.5 Std. Dev.
- -0.5 - 0.5 Std. Dev.
- 0.5 - 1.0 Std. Dev.
- > 1 Std. Dev.

Path of Hurricane Rita
(18–18–26 September 2005)

Path of Hurricane Katrina
(23–31 August 2005)
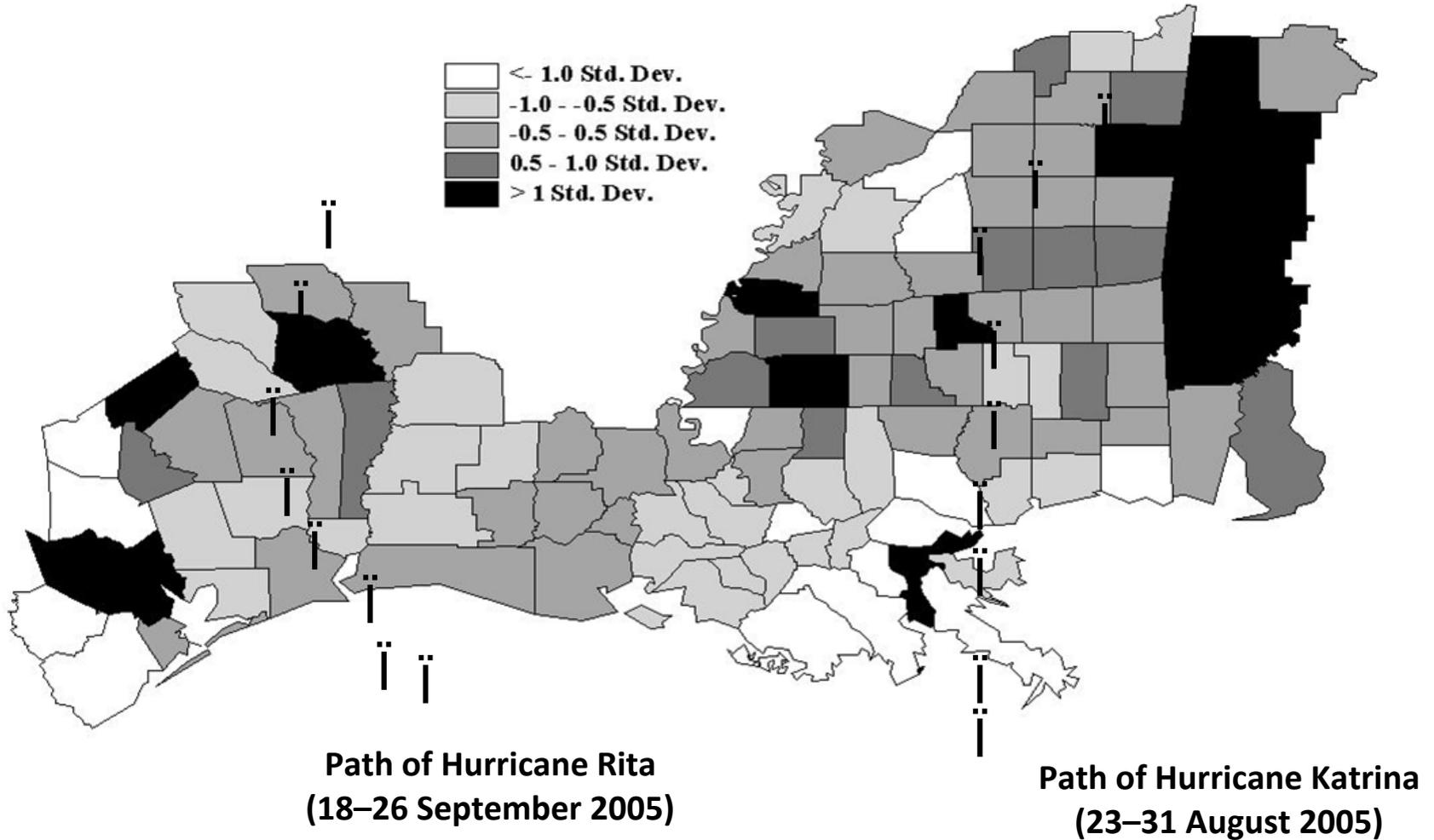
Social Vulnerability Index (SoVI)

- Used factor analysis to develop a county-level Social Vulnerability Index (SoVI)

  - Cutter, Boruff and Shirley (2003)

- Used principal component factor analysis to reduce 24 predictor variables associated with vulnerability to 5 independent factors

- Summed across factor scores to provide a cumulative measure of social vulnerability for each county in the impacted region

Social Vulnerability Index (SoVI)

Factor	Name	Percent Variance Explained	Dominant Variable
1	Disadvantaged Populations	26.3	% Living in poverty
2	Less Development	20.2	Number of physicians/1,000 population*
3	Density of Built Environment	12.5	# of Housing units/mi²
4	Elderly Populations	12.2	% 65 years and older
5	Dependent Populations	8.5	% 5 years and younger

* Rescaled as inverse.

Geography of Social Vulnerability

Legend:
- < -1.0 Std. Dev.
- -1.0 - -0.5 Std. Dev.
- -0.5 - 0.5 Std. Dev.
- 0.5 - 1.0 Std. Dev.
- > 1 Std. Dev.

Path of Hurricane Rita
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Regression Analysis

Unstandardized Regression Coefficients for the Relationship between Percent Net Migration (ln) and Dimensions of Social Vulnerability

Independent Variables	OLS		Spatial Lag	
Disadvantaged populations	0.095*	(0.041)	0.075*	(0.033)
Less development	-0.008	(0.040)	-0.001	(0.033)
Density of built environment	0.106**	(0.040)	0.063†	(0.033)
Elderly populations	0.050	(0.040)	0.023	(0.033)
Dependent populations	0.022	(0.042)	0.002	(0.033)
Percent occupied housing units w/ damage	0.007***	(0.002)	0.005**	(0.002)
Constant	1.992***		0.786***	
Moran's I	0.339***		n/a	
Rho (Lag parameter)	n/a		0.575***	
R²	0.196		0.443	

Note. Standard errors are reported in parentheses.
† p<.10; * p<.05; ** p<.01; *** p< .001.

Key Findings

- Places with more ***disadvantaged populations***, ***housing damage***, and ***building density*** were more likely to experience ***out-migration*** in the wake of the storms

- Significant ***spatial effects*** were at play in shaping this relationship ("spillover effects")

  - Out-migration: Clustered around greater New Orleans

  - In-migration: Clustered around metro areas of Baton Rouge, Hattiesburg, and the North Shore (suburbs of New Orleans north of Lake Pontchartrain)

Secondary Data Analysis: Labor Market Restructuring

- The objective of this phase of study was to examine the changes in local labor markets following the storms

    - Of special interest was the experience of the oil and gas sector relative to other sectors

    - Again, focus on 117-county region designated by FEMA

Data and Methods

- Draw on county-level data from County Business Patterns (CBP) which uses an algorithm to overcome data suppression

  - WholeData CBP (Isserman and Westervelt 2006)

- Analyze data from 2000–2006

- Methods primarily descriptive at this point

Changes in Overall Employment

- In the entire 117 county region, no evidence of tremendous change in overall job numbers between 2004 and 2006
- Do see major changes in certain places
  - Harrison County, MS   -22%
  - Orleans Parish, LA   -39%
  - Cameron Paris, LA   -39%
  - St. Bernard Parish, LA   -58%

Changes in Sector-Specific Employment

- Regional share of employment in mining (primarily oil and gas) remained steady or increased throughout the region

- Areas hardest hit by hurricanes saw some of the greatest increases in share of jobs in mining
  - Orleans Parish increased from 1.4% to 2.2%
  - Cameron Parish increased from 3.7% to 6.5%
  - St. Bernard Parish increased from 0.8% to 1.6%

Changes in Sector-Specific Employment

- Healthcare among hardest hit industries

- With exception of Jackson County, MS (which held steady), all areas that took a direct hit from the storms lost healthcare as a share of all jobs

- St. Bernard in particular saw a tremendous drop in its share of healthcare employment
  - Dropped from 22.3% to 6.0%

Summary

- This project draws on a mix of methods to examine the socioeconomic impacts of the hurricanes on the GOM Region

  - Region in which oil and gas production has a major presence in social and economic life

- By addressing these issues in a variety of ways we aim to contribute to the social science research on disasters and the experience of the oil and gas industry

References

Bureau of Labor Statistics. 2006. Labor market statistics for areas affected by hurricanes Katrina and Rita: September and October 2005. http://www.bls.gov/katrina/data_after.htm

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