

The Effects of Hurricane Katrina on Food Access Disparities in New Orleans

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Disparities in neighborhood food access are well documented, but little research exists on how shocks influence such disparities. We examined neighborhood food access in New Orleans at 3 time points: before Hurricane Katrina (2004–2005), in 2007, and in 2009. We combined existing directories with on-the-ground verification and geographic information system mapping to assess supermarket counts in the entire city. Existing disparities for African American neighborhoods worsened after the storm. Although improvements have been made, by 2009 disparities were no better than prestorm levels. (*Am J Public Health*. Published online ahead of print January 13, 2011; e1–e3. doi:10.2105/AJPH.2010.196659)

Those who observed events in the aftermath of Hurricane Katrina could have little doubt that racial disparities in living conditions in New Orleans were dramatic. We documented that such disparities existed before Katrina in access to food at the neighborhood level.¹ Although such disparities have been documented in many areas throughout the country,^{2–7} almost no research exists on how such disparities change over time or how particular shocks, such as weather-related or man-made disasters, affect them. Retail access to food is a key aspect of health promotion efforts and an essential component of community development, including disaster recovery. We examined the extent to which racial/ethnic disparity in neighborhood access to supermarkets in New Orleans was affected by the events surrounding Katrina and recent poststorm developments.

METHODS

We used census tract neighborhoods as the unit of analysis, focusing on residents within a tract, but allowing for their food shopping in a slightly larger area. Building on previous research in New Orleans,^{1,8} we defined tract neighborhoods as the area encompassing 2 km (1.2 miles) in all directions along the network of streets from the center point of a tract. We analyzed data on all 175 residential tracts in the City of New Orleans from 3 points in time: before Katrina (2004–2005), after Katrina I (2007), and after Katrina II (2009). All supermarkets in the city were identified and geocoded at the 3 points. In each case, we began with an existing directory and performed on-the-ground verification. Details about this approach are described elsewhere.^{8–10}

As in our previous research, we categorized neighborhoods as predominantly African American if 80% or more of the tract population was identified as such.^{1,5} Tract-level race/ethnicity data for the pre-Katrina data came from the 2000 US Census. Post-Katrina tract-level racial composition data for 2007 and 2009 were obtained from the Environmental Systems Research Institute,^{11,12} which uses a complex demographic algorithm in its population estimates.¹³

We used Poisson regression to estimate factors associated with the number of supermarkets within each 2-km neighborhood (dependent variable). This count variable was neither over- nor underdispersed. Independent variables included a dichotomous indicator for whether the tract was predominantly African American or not. We also used 2 dummy variables to indicate whether the observation was from 2007 or 2009, with 2004 to 2005 as the reference category. We created 2 interaction terms by multiplying the race indicator with each year indicator. Tract population density, also obtained from the Environmental Systems Research Institute,^{11,12} was included as a predictor to control for its potential influence on supermarket placement. We conducted all analyses with Stata/SE 9.0 (StataCorp LP, College Station, TX).¹⁴

RESULTS

Table 1 provides descriptive information on New Orleans census tracts. Incomes were lower

in predominantly African American than in racially mixed tracts. Mean population density was higher in African American tracts before the storm but not significantly different than racially mixed tracts after the storm.

Overall supermarket access declined after Katrina, regardless of race; in 2007, residents were 42% less likely (incidence rate ratio [IRR]=0.58; 95% confidence interval [CI]=0.44, 0.74) to have access to an additional supermarket than before the storm (Table 2). By 2009, although access had improved, it had not returned to pre-Katrina levels (IRR=0.78; 95% CI=0.64, 0.97).

Our analyses confirmed a pre-Katrina disparity in supermarket access. When population density was controlled, residents of African American tracts before Katrina were 40% less likely (IRR=0.60; 95% CI=0.43, 0.86) to have an additional supermarket in their neighborhood than were residents of other neighborhoods (Table 2). Our analyses also indicated that this disparity increased after Katrina. In 2007, residents of African American tracts were 71% less likely than were other city residents to have access to an additional supermarket (IRR=0.29; 95% CI=0.17, 0.50). By 2009, the disparity in access had returned to pre-Katrina levels.

DISCUSSION

Residents of predominantly African American neighborhoods experienced a relative lack of access to supermarkets before Hurricane Katrina. The storm and its aftermath worsened this disparity. By 2009, the food retail landscape had improved from 2007 levels. More supermarkets were open throughout the city, and residents of African American neighborhoods experienced some gains in access. But the improvement was a qualified one: disparities in access for African American neighborhoods remained and were no better than prestorm levels.

The New Orleans Food Policy Advisory Committee—a group sanctioned by the city council and composed of leaders from public health agencies, the retail food sector, nonprofit organizations, financial institutions, city government, and academia—developed a set of recommendations to address food access problems in post-Katrina New Orleans.¹⁵ The

TABLE 1—Demographic Characteristics and Food Access in Census Tract Neighborhoods by Racial Composition: New Orleans, LA, 2004–2005, 2007, and 2009

	Before Katrina (October 2004–August 2005)		After Katrina I (September–November 2007)		After Katrina II (September–November 2007)	
	African American (n = 83), Mean (SD) or %	Racially Mixed (n = 92), Mean (SD) or %	African American (n = 86), Mean (SD) or %	Racially Mixed (n = 89), Mean (SD) or %	African American (n = 93), Mean (SD) or %	Racially Mixed (n = 82), Mean (SD) or %
Demographic characteristics						
Population size	2945 (1683)	2591 (1596)	1155 (796)	1845* (1474)	1733 (1105)	2003 (1341)
Population density, no./km ²	4555 (2587)	3168* (1625)	1877 (1422)	2473 (1740)	2577 (1803)	2816 (1678)
Household income, \$	19 255 (8043)	37 502* (21 447)	23 671 (9689)	40 177* (17 092)	24 891 (10 407)	41 538* (18 238)
African Americans, ^a	92.3 (5.6)	38.1 (26.3)	92.5 (6.0)	37.4 (25.8)	93.8 (5.1)	41.6 (26.9)
Supermarkets/neighborhood	1.3 (1.3)	1.6 (1.3)	0.2 (0.5)	1.0* (1.2)	0.6 (0.8)	1.2* (1.2)
Supermarkets/10 000 people	5.4 (6.0)	8.7* (8.6)	1.8 (4.5)	6.5* (8.3)	4.3 (5.5)	7.2* (7.3)
Frequency distribution^b						
No supermarkets	36.1	26.1	81.4	47.2	49.5	31.7
1 supermarket	27.7	23.9	14.0	25.8	40.9	32.9
>1 supermarket	36.1	50.0	4.7	27.0	9.7	35.4

Note. For census tract neighborhoods, n = 175.

^aPercentage of African Americans in a tract, averaged across all tracts in a category. Statistical test not performed because differences were by design: a tract was designated African American if more than 80% of residents were African Americans.

^bPercentage of neighborhoods in each supermarket access category. The distribution of neighborhoods by supermarket access category was significantly different ($P < .05$) between African American neighborhoods and racially mixed neighborhoods in 2007 and 2009.

* $P < .05$

TABLE 2—Hierarchical Linear Modeling Poisson Regression Results on Disparities in Store Access Over Time: New Orleans, Louisiana, 2004–2005, 2007, and 2009

	Model 1, ^a IRR (95% CI)	Model 2, ^b IRR (95% CI)
Time		
Before Katrina, 2004–2005 (Ref)	1.00	1.00
After Katrina I, 2007	0.58 (0.44, 0.74)	0.68 (0.52, 0.89)
After Katrina II, 2009	0.78 (0.64, 0.97)	0.80 (0.62, 1.03)
Neighborhood		
Racially mixed (Ref)	...	1.00
African American	...	0.60 (0.43, 0.86)
Time × neighborhood interactions		
African American × after Katrina I	...	0.48 (0.27, 0.86)
African American × after Katrina II	...	0.95 (0.62, 1.46)
Summary of model 2 results: neighborhood disparity by time^c		
African American mixed, before Katrina		0.60 (0.43, 0.86)
African American mixed, after Katrina I		0.29 (0.17, 0.50)
African American mixed, after Katrina II		0.58 (0.39, 0.85)

Note. CI = confidence interval; IRR = incidence rate ratio. Ellipses indicate variable not included in model. Models controlled for population density (no./km²).

^aModel 1 controlled only for the time, providing evidence of overall citywide changes in supermarket access between baseline (before Katrina) and follow-up times (after Katrina). It did not consider disparities in access.

^bModel 2 was the complete model. It provided evidence of differences in supermarket access over time, by neighborhood racial makeup, and by interactions between the two.

^cIRRs based on model 2 estimates for differences between African American and racially mixed neighborhoods for each time period. Intercept and interaction effects were combined in 1 rate.

first recommendation targeted fresh food retailing as a priority, particularly for underserved areas. By 2009, the City of New Orleans had approved the Fresh Food Retail Incentive Program to provide assistance, in the form of low-interest and forgivable loans, to increase healthy food access in underserved areas. The city identified \$7 million for the program, which is to come from Community Development Block Grant funding as part of the long-term recovery efforts passed through Louisiana from the Department of Housing and Urban Development. As of this writing, the program is still in its development stage, but such efforts could accelerate post-Katrina development and reduce underlying disparities in access that existed before the storm. ■

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Contributors

D. Rose originated the study, led its implementation, helped interpret the analysis, and wrote the article. J.N. Bodor supervised field implementation and conducted the analysis. J.C. Rice led the analysis. C.M. Swalm completed the geomapping procedures. P.L. Hutchinson assisted with the study and analysis. All authors reviewed and approved the final version of the article.

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Human Participant Protection

Institutional review board approval was not required because human participants were not involved in this study.

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