Environmental Hazards, Migration, and Race

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This study contributes to our understanding of the association between internal migration patterns and environmentally hazardous facilities, with a focus upon race-specific outmigration at the county-level, nationwide. Among research suggesting inequalities with regard to the social distribution of environmental risk, selective migration is often implied to be a key dynamic leading to differential exposure to proximate environmental hazards. Nonetheless, the models presented here provide no evidence of differential migratory response by race to environmentally hazardous facilities, net of a wide array of socioeconomic controls for labor force opportunity, climate, and demographic structure. Future research should consider these associations at more precise geographies and/or at the individual level.

KEY WORDS: environmental hazards; migration; race.

Most theory and much empirical research acknowledge that contextual characteristics matter in decisions about internal migration. For instance, as models of migration expanded beyond simple wage (cost) differential models, the migration decision has been seen to be responsive to a variety of locational social characteristics, such as ethnic composition. Still, only a

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handful of examinations have incorporated environmental characteristics, such as climate, as migration determinants or as correlates of aggregate migration streams (e.g., Graves, 1980; Heaton & Lichter, 1986; McGranahan, 1999; Walters, 1994). The aggregate association between migration and human-made environmental risks (e.g., hazardous waste facilities) has also been only rarely explored (e.g., Hunter, 1998). This study contributes to our understanding of the association between migration patterns and environmental risk factors, specifically the presence of potentially hazardous industrial sites, through the development of spatial models reflecting associations between internal migration, socio-economic characteristics, and measures of proximate hazardous waste generators, toxic releases, and Superfund sites at the county level nationwide.

An additional area of contribution from this study derives from our focus upon race-specific internal migration, thereby yielding insight into the social demography of the incorporated environmentally hazardous facilities. Some studies on the distribution of environmental hazards suggest unequal distribution of risk since it appears that minority and low-income communities have greater than average observed and potential exposures to many pollutants (e.g., Hunter, 2000; Rinquist, 1997; Tiefenbacher & Hagelman, 1999), although, notably, other research finds little disparity (e.g., Davidson & Anderton, 2000; Oakes, Anderton, & Anderson, 1996). Among research suggesting unequal risk distribution, selective migration is often implied to be a key dynamic leading to differential exposure to proximate environmental hazards. This research directly addresses this potential through a nationwide examination of race-specific internal migration streams as associated with county-level presence of proximate hazardous waste generators, toxic releases, and Superfund sites.

This project has been informed by two primary areas of literature: 1) contextual aspects of migration patterns, and 2) the social demography of environmental hazard distribution. Each is briefly reviewed below, followed by an explanation of our research methodology, research results, and conclusions.

CONTEXTUAL ASPECTS OF MIGRATION

Much demographic research has examined the associations between migration and contextual factors such as economic conditions and community social characteristics. Less often examined are the associations between migration and specific environmental factors, although even Wolpert's classic migration theory (1966) specifically incorporated "environmental stressors" as components of evaluation of place utility within the migration decision-making process. Proximate environmentally hazardous facilities may represent "stressors" and act to lessen the attractiveness of particular locales. Research does, indeed, suggest that individuals exhibit partiality towards pollution-free residential surroundings (e.g., Blackwood & Carpenter, 1978; Greenwood et al., 1997). Further evidence for these types of preferences is provided by the public protest often surrounding proposals for new environmental hazards, "locally-unwanted land uses" (LULUs) (e.g., Lober, 1995). The link between migration and these environmental concerns was examined by McAuley and Nutty (1982), who found that although housing costs rank consistently among the most important local factors, "healthiness of the local environment (clean air, water, etc.)" ranked second or third in importance among those in earlier stages of the life cycle. Hsieh and Liu (1983) also note that environmental quality is an important factor explaining short-run (across 1–2 year periods) interregional migration.

While environmental pollution or other risks may represent negative locational characteristics, positive environmental attributes increase destination attractiveness. Econometric migration models have revealed associations with locational amenities (e.g., Knapp & Graves, 1989) and some suggest that an indication of the societal value placed upon such amenities is reflected in wage differentials across locations (Knapp & Graves, 1989). Certainly in the conventional economic model, population movement acts as an equilibrating mechanism reducing geographic wage differentials (DaVanzo, 1981), yet these wage differentials are, themselves, often due to variation in location-specific amenities (e.g., Graves, 1983; Graves & Mueser, 1993; Knapp & Graves, 1989; Mathur et al., 1988; von Reichert & Rudzitis, 1994). The existence of location-specific amenities (or disamenities) is important, because migration is the only way to consume (or avoid) them. To be more specific, individuals might accept somewhat lower pay to reside in a location with an attractive climate or other environmental amenities; conversely, individuals might have to receive higher compensation to continue to live in an environmentally unattractive locale.

As such, as an alternative to the notion of "flight" from environmentally risky areas, we might think of the tradeoffs that households consider in their quest for a satisfactory residential environment. The earliest economic frameworks posited that migrants tend to choose destinations that offer the highest level of benefits. As defined by Graves (1983, p. 542), these benefits are, "at the most general level, the variations in utility that result from occupying alternative locations." As an example, Nelson (1978) quantifies the value of air quality as the impact of air pollution on residential property values, and suggests that households more sensitive to the tangible and intangible effects of air pollution will take up residence in areas with relatively clean air. These types of arguments suggest that socioeconomically disadvantaged households may be more willing to accept proximate environmental risk in order to achieve affordable housing.

MIGRATION AND THE SOCIAL DISTRIBUTION OF ENVIRONMENTALLY HAZARDOUS FACILITIES

Related to the view that disamenities may play a role in tradeoffs in proximate environmental quality, several recent studies on the social distribution of environmental hazards suggest minority and low-income communities have greater than average observed and potential exposures to many pollutants (e.g., Hunter, 2000; Rinquist, 1997; Tiefenbacher & Hagelman, 1999), although other studies have notably found no such inequalities (e.g., Oakes, Anderton, & Anderson, 1996). These cross-sectional studies were followed by longitudinal investigations of the timing of facility placement as related to community socioeconomic factors, in order to better examine the processes that may potentially lead to unequal risk exposure. Many studies have implied, either directly or indirectly, that selective migration is a key dynamic leading to environmental inequalities, where market dynamics lead to lowered property values and socioeconomically "advantaged" populations move out, while those unable to leave remain behind.

As examples of such studies, Shaikh and Davis (1999) found that, within the Denver metropolitan area, hazardous facility siting appears related to income, rent, and unemployment. They explored migration patterns in relation to market dynamics, finding that communities with one or more hazardous facilities experienced more rapid declines in white populations relative to communities without such hazards. Lowered property values as related to the social distribution of hazards are also mentioned by Brooks and Sethi (1997), as their cross-sectional analyses suggests that black communities experience higher pollution levels due to (1) inequitable siting practices that specifically target politically vulnerable communities; and (2) a housing market that selectively prevents members of such communities from escaping exposure through migration to less-exposed areas. Boer et al. (1997) echo these findings within a Los Angeles County case study finding that communities most affected by facilities that treat, store, or dispose of hazardous waste are working-class communities of color. Migration patterns as related to areas of environmental risk are seen as directly related to a lack of choice over a broader residential market, leading to more minorities moving into areas with potential hazards than even Anglos of similar income levels. They argue that as hazardous waste facility placement drives down local property values, housing becomes increasingly occupied by households of lower socioeconomic status. As a final example, Mitchell et al. (1999) compared community population composition at the time of siting with present compositions, finding increased socioeconomic disadvantage surrounding facility locations across time. The researchers attribute community contextual changes to housing market dynamics and selective migration patterns.

RESEARCH QUESTION AND HYPOTHESIS

We test the proposition that socioeconomically disadvantaged populations are less responsive to proximate environmentally hazardous facilities from the perspective that lower SES populations possess less ability to "vote with their feet" by relocating to areas posing lower levels of risk. From another perspective, it is possible that socioeconomically disadvantaged groups may make tradeoffs, in the sense that housing prices tend to decline as housing quality and neighborhood amenities decrease. By contrast, the presence of environmentally hazardous facilities should act as a substantial neighborhood disamenity, "pushing" socioeconomically *advantaged* groups from such risky locales. To be clear, our work examines *aggregate* associations through modeling of the correlates of demographic patterns across geographic units. Our analyses do not, therefore, specifically explore household-level migration decision-making processes, but rather the aggregate outcome of many such processes as reflected in internal migration flows.

Linking this expectation specifically to race, existing socioeconomic differentials by race and demonstrable racial differentials in basic migration patterns suggest that ethnic differentials will be manifest in migration patterns. Further, lack of information about proximate environmental hazards in lower SES communities, and increasing sensitivity to environmental amenities and disamenities in advantaged and majority communities would further serve to produce and maintain inequalities in the social distribution of environmentally hazardous facilities. As such, our central hypothesis states that we expect counties with higher levels of the incorporated indicators of environmental risk factors to lose relatively greater numbers of white residents relative to minorities.

METHODS

Our analyses are conducted with a nationwide, county-level dataset reflecting race-specific migration streams, socioeconomic characteristics, and the presence of three specific environmental indicators of proximate hazardous industrial sites. The choice of a study design which emphasizes the relationship between county-level environmental risks and aggregate out-migration is not meant to deny that more precise consideration of proximity of environmental risk may play an important role in household mobility decisions. Instead, it stems from the need to establish, with a comprehensive data source, a baseline relationship between environmental risk factors and long-distance movement of race-specific populations, while adequately controlling for other social and economic contextual factors that are reported to impact out-migration.

Hazardous Waste

The hazardous waste data relate to the reporting year, 1991, and are taken from the LandView II database. LandView II is a data product created through collaboration between the EPA, the Bureau of the Census, and the National Oceanic and Atmospheric Administration. The measure reflects the number of large quantity hazardous waste generators (LQGs), with "large quantity" defined as facilities generating over 100 kg of hazardous waste in any calendar month. Four indicators of large quantity hazardous waste facilities are included: those counties with one such facility, those with 2–4, those with 5–20 and those over, 20. These classifications are based upon logical breaks in the data and those counties with no large quantity hazardous waste generators act as the reference category.

Toxic Releases

The county-level toxic release data are from the Toxic Release Inventory database obtained via the Right-to-Know Network (RTK-NET). The incorporated measure reflects average annual toxic releases, by county, for the years, 1988 through 1990. Data from the first TRI reporting year, 1987, have been deemed unreliable by the EPA and are therefore not included in the analysis. Categories based upon quantiles of toxic release levels are included in the regression estimations. Those counties with no toxic releases act as the reference category.

Superfund Sites

The county-level Superfund data used in this research are from the EPA's CERCLIS database also obtained via RTK-NET. The data incorporated here reflect the number of sites, within a particular county, which were proposed for National Priority List (NPL) status during the time period, 1985–1990.[1] NPL (Superfund) sites are those inactive hazardous waste sites that have been deemed to pose significant potential public health risks. Three categories of proposed Superfund sites are included in the regression estimates: those counties with one such site, those with two, and those with more than two. These classifications are based upon logical breaks in the data. Those counties with no Superfund sites therefore act as the reference category.

Socioeconomic Characteristics

Independent variables representing economic and social factors associated with migration are also included. In order to better reflect pre-migration conditions, the socio-economic variables reflect 1980 characteristics, with some indicators of change over the decade, 1980–1990. We incorporate the log of total population (1980) in order to control for scale, with a metropolitan county dummy variable also included to capture some of these population effects. In addition, economic conditions are measured through median household income (1980) and change in median household income (1980–1990), percentage unemployed (1980) and change in percentage unemployed (1980–1990), percentage employed in manufacturing industries (1980) and change in manufacturing employment (1980–1990). The proportion of owner-occupied housing units within a county (1980) indicates the prevalence of homeownership, while measures of age composition (1980) are included to capture the employment-related migration of the 18–34 age group and the retirement-related migration of those over age 65. Finally, environmental amenities are measured through the USDA's Environmental Amenities index, a composite measure (18 point scale) of county physical characteristics (climate, typography, and water area) that are presumed to enhance area attractiveness (McGranahan, 1999). Table 1 provides further descriptive information for all variables incorporated in the following analyses, including the measures of proximate environmentally hazardous facilities.

Table 1 reveals the significant dispersion in outmigration numbers by county, reflecting both aggregate ethnic group size in the county (which will be controlled statistically) and the wide geographic variation in migratory experience. Review of the socioeconomic traits points to moderate variation in most of the characteristics, with maximum values indicating that some counties experience an extremely strong impact of, say, unemployment or elderly population. A review of the table's lower portion indicates that substantial numbers of counties have zero or one of the environ-

TABLE 1

Descriptives of Included Variables[a]

	Mean	Min	Max	S.D.	Obs
Outmigrants by Race, 1985–1990					
White (non-hispanic)	11834	1	918043	33371	3065
Black	1233	0	138691	5986	3065
Asian	356	0	92042	2510	3065
Hispanic	885	0	279288	6585	3065
Population Characteristics					
1980 population	72570	0	7477503	236968	3065
1980 white population	71859	90	5607021	200582	3065
1980 black population	9792	0	1316564	50754	3065
1980 asian population	2290	0	979894	22167	3065
1980 hispanic population	7207	0.00	3215235	70236	3065
Proportion population less than age 18, 1980	0.29	0.00	0.53	0.04	3065
Proportion population age 65 and over, 1980	0.13	0.00	0.34	0.04	3065
Proportion population (age 25+) college graduates, 1980	0.11	0.00	0.48	0.05	3065
Proportion foreign-born, 1980	0.02	0.00	0.37	0.03	3065
Change in proportion foreign-born, 1980–1990	0.00	–0.05	0.13	0.01	3065
Economic Characteristics					
Median household income, 1980	14231	2499	30011	3315	3065
Change in median household income, 1980–1990	–558	–30513	11751	3879	3065
Proportion civilian labor force unemployed, 1980	0.07	0.00	0.28	0.03	3065
Change in proportion CLF unemployed, 1980–1990	0.00	–0.12	0.14	0.03	3065
Proportion employed in manufacturing, 1980	0.21	0.00	0.62	0.12	3065
Change in proportion employed in manufacturing, 1980–1990	–0.02	–0.24	0.20	0.04	3065
Housing Characteristics					
Proportion housing units owner-occupied, 1980	0.68	0.08	1.00	0.11	3065

TABLE 1 (*continued*)

	Mean	Min	Max	S.D.	Obs
Change in proportion housing units owner-occupied, 1980–1990	0.10	−0.25	1.78	0.17	3065
Median housing value, 1980	34910	10600	200001	13656	3065
Change in median housing value, 1980–1990 (dollars)	18306	−16700	394300	22337	3065
Geographic Characteristics					
Land Area	2498087	63923	52000000	3385798	3065
Metropolitan county	N = 697				
New England	N = 65				
Mid Atlantic	N = 149				
East North Central	N = 437				
West North Central	N = 618				
South Atlantic	N = 552				
East South Central	N = 364				
West South Central	N = 470				
Mountain	N = 280				
Environmental Amenities					
USDA Amenity Scale	0.06	−6.40	11.17	2.29	3065
Environmental Risk Categories					
Toxic Releases (log million pounds released)					
Zero toxic releases	N = 855				
Quartile 1	N = 559				
Quartile 2	N = 555				
Quartile 3	N = 547				
Quartile 4	N = 549				
Proposed Superfund Sites					
Zero proposed Superfunds	N = 2488				
One proposed Superfund	N = 340				
Two proposed Superfunds	N = 108				
Greater than 2 proposed Superfunds	N = 129				
Hazardous Waste Large Quantity Generators (LQGs)					
Zero LQGs	N = 1276				
One LQG	N = 490				
2–4 LQGs	N = 549				
5–20 LQGs	N = 546				
Greater than 20 LQGs	N = 204				

[a]Unit of Analysis: U.S. counties within 48 contiguous states.

mental risks (not necessarily zero on all); the zero value will form our reference category.

Analytical Strategy

Each race-specific model incorporates independent variables that represent previously outlined explanations for internal out-migration, and in addition, variables that measure environmental risks. The dependent variable, for each race-specific model, is the natural logarithm of the number of outmigrants between, 1985 and 1990 reported in the 1990 U.S. Census. To control for the association between number of outmigrants and size of population, the natural logarithm of the race-specific county population reported in 1980 is included as an explanatory variable. A more conventional form of the model might use the natural logarithm of the race-specific out-migration rate as the dependent variable. This form is equivalent to the form chosen here except the former constrains the coefficient on the natural logarithm of population size to be unity. The more general form we have chosen allows each race group to be differentially responsive to aggregate size of the population in the county. Another advantage of this form is that each estimated coefficient can be interpreted as the expected percentage change in the number of outmigrants per unit change in the regressor.

In order to clearly interpret the migration effects of the proximate environmentally hazardous facilities, we specify them as categories, with zero as the reference group. We do this for two reasons. First, as Table 1 shows, these indicators take the value zero for many counties. The choice of the particular categories for each of the three environmental risks was determined after careful review of the distributions of the risk variables themselves and some exploratory multivariate work under alternative specifications. Again the functional form has a distinct interpretation: the coefficient represents the percentage change in county outmigration for the presence of an environmental risk in that category. Such effects are, of course, net of population size in the county.

Estimation of the models deviated from classical regression techniques on three counts. First, in ordinary least squares (OLS) estimation there is an assumption of equal error variances across all observations. In this situation, counties with small race-specific populations are necessarily more unstable in reported outmigration than those with a larger representation of a race group. Consequently, these counties should be devalued relative to the counties with larger race-specific populations. For this reason, we weighted counties in increasing proportion to the size of the race-specific population, using a weighted least squares (WLS) approach. Second, significant unexplained spatial correlation was found in all four race-specific models. This was true for adjacent counties as well as for counties within a 100-mile radius. Spatially correlated errors were confirmed by LaGrange Multiplier tests and other procedures available in *SpaceStat, A Software Program for the Analysis of Spatial Data, Version 1.80* (Anselin, 1995). Third, significant correlation was also found in the residuals across the race-specific models. Each of these three conditions violates the classical OLS assumptions, and, if ignored, will still produce unbiased estimates. However, the estimates of standard errors will be inefficient and will invalidate hypothesis testing (Anselin, 1988; Zellner, 1962; Greene, 2000).

The strategy used to gain reliable standard errors of the estimates (i.e. not influenced by the heterogeneity of error variances, the spatially correlated errors, or the correlated errors across models) was to use WLS to obtain the estimated effects of the explanatory variables and then to use bootstrapping techniques to generate the standard errors for each of the WLS regression parameter estimates. Ten thousand samples were drawn from the 3065 counties with replacement. As a result of the bootstrapping analysis there was confirmation that the WLS estimates are unbiased and that the WLS standard errors are generally smaller than those revealed by the empirical distributions. The WLS coefficients are reported in Table 2 along with the results of the hypothesis tests based on the standard errors generated from the bootstrapped distributions.

RESULTS

As reflected in Table 2, county population characteristics contribute substantially to the prediction of outmigration of all racial groups, with only slight variation across racial categories.[2] In addition, and as would be expected, the total population of racial groups within a county contributes significantly to prediction of outmigration of that racial group for all categories considered. Counties with younger and older age structures tend to experience lower levels of black outmigration, while areas of immigrant concentration tend to lose relatively fewer Asians.

Economic factors demonstrate anticipated associations, although these associations are not consistent across racial groups. Unemployment levels exhibit the most consistent associations, being positively associated with Black, Asian, and Hispanic outmigration. Also as anticipated, homeownership typically dampens outmigration. As for the geographic control variables, New England and the Mid-Atlantic Census Divisions lose relatively less population than do Western counties, while the West, South, Central,

TABLE 2

Multivariate Estimations of Outmigration by Race, U.S. Counties, 1985–1990

	Model 1 White Outmigrants	Model 2 Black Outmigrants	Model 3 Asian Outmigrants	Model 4 Hispanic Outmigrants
Population Characteristics				
Log 1980 population	0.0057	0.0570*	0.0043	0.1090*
Log 1980 white population	0.9222*	—	—	—
Log 1980 black population	—	0.8202*	—	—
Log 1980 asian population	—	—	0.8724*	—
Log 1980 hispanic population	—	—	—	0.7609*
Proportion population less than age 18, 1980	–0.5489	–1.0201*	–1.2540	–1.2029
Proportion population age 65 and over, 1980	–0.5722	–1.7215*	–1.7767*	–1.3604*
Proportion population (age 25+) college graduates, 1980	0.7033*	0.3203	0.4201	0.4443
Proportion foreign-born, 1980	–1.0686*	0.6576	0.5350	–0.0248
Change in proportion foreign-born, 1980–1990	0.9328	0.6909	–2.3480*	0.0748
Economic Characteristics				
Median household income, 1980 (in thousands)	0.0131	–5.27E-06	9.74E-06	6.07E-06
Change in median household income, 1980–1990 (thousands)	0.0009	–2.00E-05*	9.15E-06	–6.64E-06
Proportion civilian labor force unemployed, 1980	1.5559	4.2271*	2.5113*	1.3640
Change in proportion CLF unemployed, 1980–1990	1.7045	3.2084*	3.3495*	2.4990*
Proportion employed in manufacturing, 1980	0.8386*	–0.4169*	–0.2986	–0.6613*
Change in proportion employed in manufacturing, 1980–1990	–0.6786*	–0.1007	–0.7964	–0.2884
Housing Characteristics				
Proportion housing units owner-occupied, 1980	1.1421*	–0.5214*	–0.0945	–1.0032*
Change in proportion housing units owner-occupied, 1980–1990	–0.6713*	–0.4564*	–0.5405*	–0.5939*
Median housing value, 1980 (dollars)	9.91E-07*	–2.66E-07	1.60E-06	–4.97E-06*
Change in median housing value, 1980–1990 (dollars)	1.14E-06*	1.36E-06*	1.59E-06	3.18E-06*

Geographic Characteristics				
Land area	–1.84E-09	–8.90E-10	8.88E-10	–3.06E-09
Metropolitan county	0.0031	0.0313	0.1238*	–0.0328
New England	–0.1811*	–0.2818*	–0.0253	–0.6622*
Mid Atlantic	–0.1222*	–0.1331	–0.0108	–0.2707*
East North Central	0.0292	–0.1080	0.0384	–0.2786*
West North Central	0.0909*	0.1776	0.1938*	–0.2191*
South Atlantic	0.0159	–0.0479	0.1579	–0.2855*
East South Central	–0.0512	–0.1790	0.0588	–0.2096*
West South Central	0.1320*	0.0459	0.3215*	0.0214
Mountain	0.1616*	0.1876	0.2499*	0.0801
Environmental Amenities				
USDA Amenity Scale	0.0022	–0.0047	–0.0146*	–0.0110
Environmentally Hazardous Facility Indicators				
Toxic Releases (log million pounds released) (zero = ref category)				
Quartile 1	–0.0165	–0.0361	–0.2444*	–0.0422
Quartile 2	0.0435*	–0.0135	–0.1577	–0.0253
Quartile 3	0.0288	–0.0051	–0.1686	0.0430
Quartile 4	0.0301	–0.0187	–0.2196*	0.0125
Proposed Superfund Sites (zero = ref category)				
One proposed Superfund	0.0113	–0.0490	0.0479	0.0279
2 proposed Superfunds	0.0032	–0.0542	0.1355*	0.0784
Greater than 2 proposed Superfunds	–0.0019	–0.0734	–0.0024	0.0359
Hazardous Waste Large Quantity Generators (LQGs) (zero = ref category)				
One LQG	0.0091	0.0240	0.0287	0.0140
2–4 LQGs	–0.0053	0.0615*	–0.0117	0.0691
5–20 LQGs	–0.0258	0.0158	0.0418	–0.0352
Greater than 20 LQGs	–0.0280	–0.0162	0.1475	–0.0616
Constant	–0.3206*	–0.4840*	–0.1077	0.2910*
R^2	0.9920	0.9865	0.9902	0.9925

*Coefficient is more than 1.65 times its standard error.

and Mountain regions tend to lose more. The environmental amenities scale exhibits a statistically significant association only with Asian outmigrants, with the coefficient suggesting higher amenity areas lose relatively fewer Asians as compared to areas lacking desirable natural features.

Environmentally Hazardous Facilities

Our key variables of interest demonstrate little statistical significance in the prediction of race-specific outmigration streams. In fact, of the 44 "risk" coefficients (4 toxic release categories, 3 Superfund categories, and 4 hazardous waste facility categories for each racial group), only 5 coefficients achieve statistical significance. In addition, no clear patterns emerge with regard to the direction of the coefficients.

Indeed, the most striking finding with regard to our hypothesis is one of non-significance. We anticipated that counties with higher levels of the incorporated indicators of environmental risk factors would lose relatively greater numbers of white residents relative to minorities. This hypothesis is not supported. Instead, we find that net of population, economic, housing, and geographic characteristics, no clear patterns emerge with regard to differential loss of race-specific populations as associated with county presence of environmentally hazardous facilities.

DISCUSSION

This study has examined the association between race-specific outmigration and environmental risk levels with the intention of contributing to our understanding of the environmental context of migration and the dynamics underlying the social distribution of environmental hazards. The results yield one key finding: net of a wide array of socioeconomic controls for labor force opportunity, climate, and demographic structure, we can detect no substantial differential migratory response by race to environmentally hazardous facilities.

There are several reasons to expect that segments of the population *might* be less likely to respond to proximate environmental risk through relocation. First, migration has costs. As such, only those willing and able to pay such costs will see outmigration as a potential answer to concern with community characteristics. Second, environmentally-risky facilities often offer economic benefits. As stated by Yandle and Burton (1996, p. 490), there have been situations in which communities "would welcome heavy industry, and the accompanying waste disposal problems, in return for growth and high-paying industrial jobs." As such, the economic benefits accompanying some environmental risk may act to retain those segments of the population most directly accruing these benefits.

Regardless, the results presented here do not provide evidence of selective migration patterns as a factor in the social distribution of environmentally hazardous facilities. Nonetheless, two key potentially related limitations should be noted.

First, on a methodological level, the results suggest that the geographic scale used in this study may be inappropriate for examination of the hypotheses dealing with differential migration patterns as related to the facilities included here. That is, if the anticipated relationships exist at a more precise geographic level, aggregating data to the county-level may mask within-county relationships (e.g., short distance residential moves within a county may be sufficient to relocate from some types of proximate hazards). Indeed, as reviewed above, several studies undertaken at the community and/or metropolitan level have implied migration and market dynamics play a role in unequal environmental burden (e.g., Boer et al., 1997; Mitchell et al., 1999; Shaikh & Davis, 1999).

Another possible explanation for the lack of movement from environmentally hazardous facilities may be related to public knowledge and/or concern with proximate hazards. Specifically, we have no guarantee that county residents are aware of the risks incorporated here. This is particularly relevant in geographically large counties in which environmental contexts may vary greatly.

Still, the study presented here represents an important baseline examination of the degree to which county-level, migration patterns of various racial groups nationwide appear sensitive to the level of environmentally hazardous facilities in local areas. Future work in this area could enhance our understanding of these important social dynamics through exploration of more precise geographic levels, as well as individual-level data. Indeed, future research on demographic processes will likely be central in the continually evolving work on the social distribution of environmental conditions.

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ENDNOTES

1. Sites *proposed* for Superfund status are included in the present analysis as opposed to those for which status was confirmed. This decision was based on the fact that the *proposal* of Superfund status tends to garner media and community attention, thus representing the time at which the public may become aware of the proximate hazard(s) and outmigration might be expected.
2. An indicator of metropolitan county status is the better predictor of the number of Asian outmigrants.

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