



Bolstering environmental (in)justice claims with a quasi-experimental research design



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ARTICLE INFO

Article history:

Received 21 August 2014

Received in revised form 4 July 2015

Accepted 10 August 2015

Keywords:

Environmental justice

Immigration

Quasi-experiment

Propensity score matching

Waste incinerators

France

ABSTRACT

Claims of environmental injustice are often confounded by the potential for reverse causality. An undesirable land use may concentrate minorities and poor people locally as the established population moves out and others remain or move in. This paper addresses the issue of causality for the case of waste incinerators in France with a before and after, matched control design. Site selection, population migration, and the capacity and emissions of incinerators have mutually reinforcing effects that can exacerbate environmental injustice. We develop a predictive model of incinerator siting in France and use it to identify a viable twin location for every incinerator site, similar in most aspects, except the twins were not selected to host a facility. In turn, these matches enable us to construct explicit counterfactuals and measure the true impact of incinerators on demographic change. We find solid evidence that concentration of immigrants influences incinerator location and weak evidence for the converse, that incinerator location influences concentration of immigrant populations. We also find that concentration of immigrants greatly affects the operations of incinerators, with greater capacity and greater emissions at incinerators located near the highest concentrations of immigrant populations.

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1. Introduction

In the 1980s, environmental justice (EJ) research pointed to a crucial form of inequity when it showed that minority communities in the United States are significantly more likely than their white counterparts to live close to toxic sites, even when controlling for income (Bullard, 1983, 1990; United Church of Christ, 1987). Since then, the field has moved towards showing disproportionate exposure of disadvantaged communities to point and nonpoint pollution sources across the U.S. and resulting disproportionate health impacts; refining statistical and spatial analytical methodologies (for example, with regards to levels of analysis, accounting for spatial and temporal lags); applying and testing the EJ hypothesis in the context of other industrialized countries and of global north-south relations; and explaining the inequalities observed. EJ research remains centered in the U.S. (Reed and George, 2011), although its relevance to European social-ecological contexts has

been established (Laurent, 2011, 2014) and European scholarship on distributional inequities is burgeoning.

With regard to explanations for the inequalities observed, questions of causality have been addressed mainly by considering whether polluting activities such as toxic sites or highways are sited in predominantly disadvantaged or vulnerable communities (racial minorities, working class, immigrant communities depending on the context), or whether, in response to housing market dynamics, disadvantaged communities move to (or disproportionately stay in) polluted areas – which can be construed as an economically rational tradeoff of pollution for lower property values and rents (Been, 1994). Oakes et al. (1996) directly evaluated the alternative explanations with a before-and-after research design and found no significant evidence of discriminatory siting or demographic change in host census tracts after the siting. Been and Gupta (1997) and Pastor et al. (2001) also conducted longitudinal studies to test these hypotheses – the former with simple analyses, the latter with simultaneous modeling of siting and minority move-in. Both studies found no support for the market dynamics hypothesis and showed ethnically biased siting processes in the U.S. Both studies found significantly more environmental hazards sited near concentrations of Latinos, but not near concentrations of African Americans, suggesting that recency of immigration may be

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an important facet of minority status in biased facility siting.¹ Neither study modeled the site selection process in identifying control locations from which market responses are estimated; the controls should be the set of comparison neighborhoods that are similar to the hosting neighborhoods except they lack a hazardous waste facility. Pastor et al. (2001) include as the comparison group all other census tracts in Los Angeles County that lack toxic storage and disposal facilities. Been and Gupta (1997) acknowledge one should exclude from comparisons locations not viable to host a facility based on “a model of how facilities are sited” (p. 17), but the authors use all non-host census tracts available in a stratified sample across the U.S. We make a new contribution to the EJ literature in this paper with a predictive model of incinerator siting in France, which we use, in turn, to identify comparison locations viable for hosting an incinerator, sites similar to hosts in many aspects, except the control locations never hosted an incinerator.

Empirical tests of the unjust siting process versus market dynamics hypotheses have been insufficient in making causal claims because they fail to control for the possibility of multiple directions of causality both temporally and spatially. Particularly, they fail to account for the narrow set of spatially optimal locations for necessary facilities (for example, if municipal waste processing facilities such as landfills or incinerators are not sited in a community, they need to be sited in another nearby). They also fail to set adequate counterfactuals to assess what would have happened in the absence of facilities. Finally, they consider all toxic sites to be essentially similar and do not assess the type or quantity of emission produced. Yet, differentials in emissions (due to production scale and pollution controls) have the potential to worsen the impacts of unfair siting decisions.

This paper contributes to the literature on the causes of environmental inequalities by proposing a new quasi-experimental matched-sites methodology that accounts for both longitudinal impacts (pre- and post-siting characteristics of communities that received and did not receive polluting facilities) as well as spatially optimal locations from a transport cost-minimization standpoint. It also controls for irrelevant location alternatives that would otherwise confound the siting choice set and hence construction of counterfactuals. A quasi-experimentally identified twin location has similar characteristics to its matched host site and is itself viable to host a facility, except the twin location was not selected as a site for a facility. The twin location thus provides a proxy for observing the contrary-to-fact experience of the host site after the facility siting as if the host site never received the facility. Counterfactuals are essential terms in the calculus of the true impact from an intervention such as a facility on a response such as migration or property value. Last, this paper examines whether the capacity and quantity of emissions from toxic facilities contribute to environmental injustice in addition to the consideration of siting choices and demographic changes.

We examine the performance of the methodology in the context of waste incinerators sited and constructed in towns throughout France between 1965 and 2004. (Towns, or “communes”, constitute a fine level of analysis given that France, which is the size of Texas, has more than 36,000 communes.) This analysis builds on previous evidence of environmental injustice in France (Laurian and Funderburg, 2014; Laurian, 2008a,b). France does not collect data on race, so, as in previous studies, we focus on immigrant (foreign-born and foreigners) populations. Foreigners are recent immigrants not yet naturalized, while foreign-born populations

include a much broader number of immigrants, including many North Africans who immigrated in the 1960s. Both are vulnerable populations whose limited political clout and socio-economic capital reduce both their residential mobility and their ability to successfully oppose polluting facilities. We focus on the location of municipal waste incinerators because incinerators have significant health impacts and because data are available for the location and siting time for all incinerators sited since the 1960s, as well as for the capacity and emissions of incinerators.

We find solid evidence that proximity to foreign-born populations was a significant determinant of incinerator location in France. Incinerators were disproportionately sited in towns with high concentration of immigrants: each additional one percent increase in a town’s foreign-born population increases the odds it has of receiving an incinerator by 29 percent, controlling for other factors affecting costs and benefits varying by location (Laurian and Funderburg, 2014). We find here that concentrations of immigrants also impact the operations of the facilities. By 2008, incinerators in towns with many immigrants had more burners and 71 percent greater capacity and emitted 89 percent more carbon dioxide (CO₂) than towns with low concentrations of immigrants.

We find weak evidence that incinerators subsequently caused demographic shifts or increased local concentrations of immigrants and we find no evidence that the established nonimmigrant population abandoned towns that received incinerators. There is some indication that immigrants were more likely to remain near incinerators: the number of immigrants in towns with incinerators declined significantly less than in comparably small towns serving as controls; small towns with incinerators did not experience the out-migration of foreigners to larger urban areas that towns without incinerators experienced.

The next section summarizes the arguments surrounding environmental injustice with a focus on the hypotheses that test EJ claims. Section 3 summarizes the literature on environmental risk perception and its implications for migration, property values and rents. In Section 4, we present our methodologies for disentangling the complex and reinforcing temporal and spatial processes generating environmental injustice and for testing the different claims. We identify the matched pairs (or twin towns) in Section 5, present our findings in Section 6 and conclude the paper in Section 7.

2. Claims of environmental (in)justice

Over the last 20 years, scholars have contentiously debated the causes of environmental inequality of numerous types of adverse exposure. The boundaries of public moral responsibility in liberal economies derive in some part from a determination of biased intent among decision makers versus a finding of responsibility among the deprived through rational choices, intentional informed tradeoffs of low housing costs for pollution. A category of environmental racism is reserved for cases when privileged actors target exposure based on race or ethnicity (United Church of Christ, 1987; Mohai and Bryant, 1992; Hamilton, 1995). Other scholars discount the importance of determinants, deeming all disproportionate exposure burdening racial or ethnic minorities a form of environmental racism (see Pulido, 2000, for example). The co-concentration of vulnerable peoples with noxious and other undesirable land uses that results, in the U.S., from white flight to the suburbs and disinvestment from central industrial districts, for example, demands a broadening of our public moral responsibility even though behaviors may lack clearly malicious intent. Yet, the causes of unequal distributions of health-harming exposure remain an important research topic because policy solutions often depend on addressing the determinants of inequity.

¹ Pastor et al. (2001) acknowledges recency of immigration as a potential factor in distributional inequality when the authors examine the churning of neighborhoods from predominately African American to predominately Latino.

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