Preventive Medicine 118 (2019) 23–29

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Foreclosures and weight gain: Differential associations by longer neighborhood exposure

Ana Clara Duran[a,b,*], Shannon N. Zenk[a], Elizabeth Tarlov[a,c], Sarah Duda[d], Geoff Smith[d], Jin Man Lee[d], Michael L. Berbaum[e]

[a] Department of Health Systems Science, University of Illinois at Chicago, Chicago, IL, USA
[b] Center for Food Studies, University of Campinas, Campinas, SP, Brazil
[c] Center of Innovation for Complex Chronic Healthcare, Edward Hines, Jr. VA Hospital, Hines, IL, USA
[d] Institute for Housing Studies, DePaul University, Chicago, IL, USA
[e] Institute for Health Research and Policym, University of Illinois at Chicago, Chicago, IL, USA

ARTICLE INFO

Keywords:
Neighborhood
Body mass index
Obesity
Housing
Socioeconomic
Factors

ABSTRACT

While home foreclosure can lead to mental and physical health declines in persons experiencing the foreclosure, whether neighborhood foreclosures can affect the health of other residents is debatable. Using a racially/ethnically diverse sample of Chicago metropolitan area residents linked to foreclosure data from 2008 to 2014, we assessed whether exposure to neighborhood foreclosure fillings was associated with changes in objectively measured body mass index (BMI) over time. Using a retrospective longitudinal design, we employed fixed-effects regression models that controlled for individual- and neighborhood-level covariates to test the association of neighborhood foreclosures and BMI in > 60,000 individuals and for individuals who did not move during the follow-up period. We also adjusted for the non-linear association of age and BMI and comorbidities and employed a series of sensitivity analysis to test for robustness. In fully adjusted models, a standard-deviation increase in neighborhood foreclosure filings within 500 m was associated with increases in BMI for individuals who did not move (nonmovers) (mean = 0.03 BMI units, 95% confidence interval: 0.01, 0.06). Neighborhood foreclosure rates were not associated with changes in BMI for the full sample. Given the potential deleterious effects of neighborhood foreclosure on individuals with longer exposure to the local vicinity, clarifying the potential health effects of neighborhood foreclosures would help policymakers when planning actions to prevent home losses, predatory home loans, and that aim to more efficiently return foreclosure properties to productive uses.

1. Introduction

The role of home foreclosures in health outcomes, including obesity, has only recently been explored as a potential social determinant of health (Arcaya et al., 2014; Arcaya et al., 2013; Pollack et al., 2011; Pollack and Lynch, 2009; Houle and Keene, 2015; Houle and Light, 2014; Houle, 1982; Currie and Tekin, 2015; Downing, 1982). During the last economic recession in the United States (2007–2012), 12.5 million homes were involved in foreclosure (Center for Responsible Lending, 2013). Similar problems are seen in other countries, such as Spain, where thousands of families were evicted from their homes (Vasquez-Vera et al., 2016). Evidence on the spillover effects of nearby foreclosures on weight gain, specifically, is limited and provides mixed results (Arcaya et al., 2013; Christine et al., 2017; Downing et al., 2016).

Living in neighborhoods distressed by higher rates of foreclosure may contribute to weight gain by reducing neighborhood-based physical activity and stress, two well-established risk factors for obesity (Chang et al., 2009; World Health Organization (WHO), 2004). First, neighborhood foreclosures may reduce neighborhood-based physical activity by increasing neighborhood deterioration and crime. Foreclosed residential units often sit vacant for extended periods and high neighborhood foreclosure rates can result in a lower neighborhood tax base, reducing local resources devoted to neighborhood upkeep. Ensuing unappealing aesthetics (e.g., poorly maintained buildings and lawns, litter) (Cui and Walsh, 2014; Payton et al., 2015; Arnio et al., 2012) may deter residents from engaging in physical activity in their neighborhoods (Evenson et al., 2012). Neighborhood deterioration also

* Corresponding author at: Department of Health Systems Science, University of Illinois at Chicago. 845 S Damen Ave., Chicago, IL 60612, USA.
E-mail address: anaduran@unicamp.br (A.C. Duran).

https://doi.org/10.1016/j.ypmed.2018.07.009
Received 20 April 2017; Received in revised form 7 July 2018; Accepted 16 July 2018
Available online 17 July 2018
0091-7435/

contributes to fear and perceived risk of crime (Perkins and Taylor, 1996). Second, neighborhood foreclosures can lead to declines in nearby property values, resident displacement, higher residential turnover, and deterioration, which may increase stress and repeated activation of response to stress among residents (Immerglucka and Smith, 2009; Kuo et al., 2008). Chronic exposure to stress can lead to physiological consequences that promote fat accumulation (Sinha and Jastreboff, 2013; Born et al., 2005). In addition, while some people eat less in response to stress, it can also lead to increased consumption of energy-dense food (Sinha and Jastreboff, 2013; Born et al., 2005; Tryon et al., 2013; Mozaffarian et al., 2011).

Moreover, effects of distressed neighborhoods on health can undoubtedly accumulate with long-term residence (Diez Roux and Mair, 2010). The relationship of collective measures with neighborhood ties are well established (Taylor, 1996; Keene et al., 2013). However, characteristics of community residents such as their length of residence and home ownership also contribute with building those ties (Keene et al., 2013).

We, therefore, examined the longitudinal associations between neighborhood foreclosure filings and weight gain, measured using body mass index (BMI), in a racially/ethnically diverse sample of individuals living in a large metropolitan area and who were served by a large integrated healthcare delivery system. We hypothesized that living in a neighborhood with greater exposure to foreclosed properties would lead to higher BMI change, and that such associations would be stronger among those with longer exposure to their neighborhood.

2. Methods

2.1. Design

The study employed a 6-year retrospective longitudinal cohort design linking electronic health record data to foreclosure fillings.

2.2. Setting

We studied individuals living in 6 counties in the Chicago metropolitan area between 2009 and 2014. The annual county-level rate of foreclosures in this region reached its peak in 2010 (3.1 foreclosures filings/100 residential parcels), and had the lowest rate (1.1 foreclosures filings/100 residential parcel) in 2014.

2.3. Sample

This study drew on data of the Weight and Veterans' Environments Study (WAVES) (Zenk et al., 2018). The sample comprised individuals receiving primary health care in a Veterans Health Administration (VA) facility and therefore enjoyed healthcare access through a federal government system. The VA is the largest integrated health care system in the United States, providing care at 1245 health care facilities (170 VA Medical Centers and 1065 outpatient clinics), serving > 9 million individuals each year (Veterans Health Administration, 2017). Once enrolled for VA care, individuals generally remain enrolled over their lifetime. Sample inclusion criteria were aged 20–80 years at baseline, residence in six counties in metropolitan Chicago (Cook, DuPage, Kane, Lake, McHenry, and Will) between 2009 and 2014, at least one height and two weight measurements during the study period, and at least one VA healthcare encounter in the two years prior to baseline year (2009 or first year in which the individual met study eligibility criteria). Residence in the 6-county area was determined by individuals' geocoded addresses. Exclusion criteria included long-stay nursing home residence at baseline (0.11% of the nationwide sample of VA users from which our sample was drawn), and no home address, PO Box address, or address that was non-geocodable to the street or ZIP + 4 level. In addition, 5% of individuals had implausible BMI values ($< 15.0\,kg/m^2$ or $> 75.0\,kg/m^2$) and were excluded from the analysis.

2.4. Outcome

BMI was measured based on height and weight assessed during healthcare encounters and obtained from the VA Corporate Data Warehouse, a repository of clinical and administrative data from the electronic health record and other sources. We used the most frequent height value measured in all available study years to calculate BMI. For each year (2009–2014), we averaged individuals' weight values obtained during encounters in the second half of the calendar year (July–December). If no weight measurements were available for that timeframe, we took the average weight value for the first half of the calendar year. We prioritized the second half of the calendar year (July–December) because of the timing of home address information updates (September 30 of each year).

2.5. Exposure

We used data on all address-level foreclosure filings in the six-county region from July 2007 to June 2014. Foreclosure filings data, including geographic coordinates of properties, were provided by the Institute for Housing Studies (IHS) at DePaul University and were collected from County Circuit Courts and County Assessor's Offices by Property Insight and Record Information Services. We opted for foreclosure filings to capture the overall distressed housing market, and each deed's filing was used to construct time-varying measures of exposure to neighborhood foreclosure activity. Because a property can have multiple filings for the same foreclosure event, properties with multiple filings within a year were counted once. We constructed four individual exposure variables: number of foreclosure filings within 100, 200, 500, or 1000 m of individual's home location in the 12 months preceding the BMI measurement. For instance, 2009 mean BMI measures were examined in relation to foreclosures filed between July 2008 and June 2009. We selected different distances based on previous studies (Arcaya et al., 2013).

2.6. Covariates

Individual-level covariates included time-constant gender, age at baseline and race/ethnicity, and time-varying marital status and comorbidities that, based on previous studies (Downing, 1982; United States Census Bureau, 2011), would potentially confound the association of neighborhood foreclosure filings and BMI. VA Corporate Data Warehouse provided those data.

Neighborhood-level covariates included census tract socioeconomic characteristics (median household income and percent home ownership) and population density (number of residents). Data were based on 5-year estimates of the American Community Survey (ACS) (United States Census Bureau, 2011). Given the delay in annual releases of 5-year ACS estimates, a 2-year lag based on the ACS 5-year midpoint for linking patient measures to ACS measures was used (e.g., 2009 patient BMI linked to 2005–2009 ACS data, midpoint 2007; 2014 patient BMI linked to 2010–2014 ACS data).

3. Statistical analysis

In the first set of analyses we described individual- and neighborhood-level covariates of the full sample living in the study area and the group of individuals who lived in the same location during the 6 years of follow up. We also described trends in foreclosure filings in the Chicago metropolitan area between 2009 and 2014 using foreclosure rates per 100 residential parcel (calculated as an absolute number of foreclosures in the area per 100 residential parcel) and foreclosure filings around participants' homes.

We then employed regression models with time- and person-fixed effects with annual BMI measures nested within individuals. We accounted for the clustering of individuals in census tracts of residence at