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## Research Article

# Health Effects Associated with Foreclosure: A Secondary Analysis of Hospital Discharge Data

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**Objectives.** The purpose of this study was to assess the health effects of high home foreclosure rates in an area of the United States of America and the utility of hospital discharge data for this purpose. **Methods.** We analyzed hospital discharge data from three postal zip codes using the principal diagnosis for 25 Diagnostic Related Groups associated with stress. Descriptive statistics were used to characterize hospital discharge rates for each condition by year and zip code. To test for differences across time, the Cochran-Armitage trend test was performed. **Results.** Most conditions did not demonstrate a statistical change between 2005 and 2008. There was a marked spike in bipolar and depressive disorders in 2007 in all zip codes. **Conclusions.** The sharp rise for bipolar and depressive disorders in 2007 coincides with the doubling of foreclosure filings nationally. There are many confounding factors affecting hospital discharge data, which limit its specificity for assessing the health effects of foreclosure.

## 1. Introduction

Home loan foreclosures have impacted most parts of the USA, with the most recent yearly statistics revealing that one in every 45 housing units received a foreclosure filing in 2010 [1], exceeding by over four times the number of homes receiving a foreclosure in 2005 (Figure 1). (Foreclosure filings include default notices, scheduled foreclosure auctions, and bank repossessions.) It seems probable that loss of such housing would have negative health effects.

A barrier to assessing the health effects of foreclosure over time is lack of publicly available data on the incidence and prevalence of the conditions most likely to be associated with this stressor. Due to the protracted length of the foreclosure process [2], “home foreclosure can be viewed as a stressful life event of prolonged duration” [3], with the physical and psychological disorders associated with chronic stress. When a body is subjected to chronic stress, there are disturbances in the physiological systems that regulate homeostasis (stability), which may lead to chronic diseases [4]. One study conducted during the marked increase in

foreclosures in 2008 found significantly more hypertension and psychiatric disorders (particularly depression) in Philadelphia residents undergoing mortgage foreclosure as compared to community norms [5]. However, cause and effect cannot be inferred due to the cross-sectional design of the study. A related case-control study of Philadelphia residents undergoing foreclosure found elevated rates of hypertension and renal disease among cases [6]. A more recent study also found an increase in foreclosures in a zip code increased hospital utilization for psychiatric conditions (anxiety and suicide attempts), hypertension, and stress-related physical complaints [7].

Health effects from foreclosure are likely to be similar to those associated with unemployment because both are financial stressors and, in the revised Social Readjustment Rating Scale of stressful life events, “foreclosure of mortgage or loan” ranks as 11th, even higher than “fired at work” at 13th [8]. Unemployment-associated conditions include psychiatric disorders and substance abuse [9, 10]. The most frequent mental health effect associated with unemployment is depression [11, 12]. As unemployed individuals lose

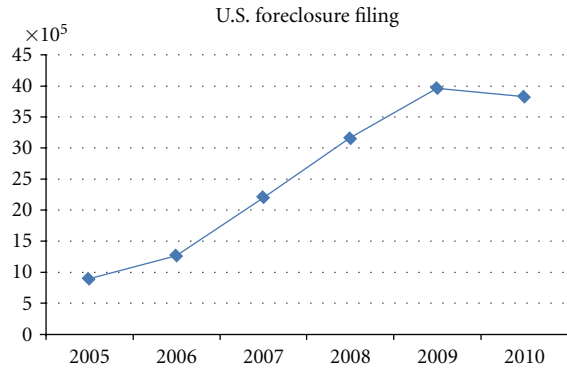


FIGURE 1: Number of Foreclosure Filings in the US, 2005–2010. Data compiled from Realty Trac statistics.

income and assets, their ability to access health care because of loss of employer-based health insurance hinders their ability to receive treatment [10].

Although the US Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing nationwide telephone health survey system that tracks health conditions and risk behaviors [13], its utility for assessing foreclosure health effects is limited. One shortcoming is the relatively small number of conditions it assesses. While the BRFSS does collect data on the number of adults who have been told they have high blood pressure and on the number who are heavy/binge drinkers, data for mental health or abuse of substances other than alcohol are available only as additional modules that are costly for states to purchase. Furthermore, the data are available at the state or metropolitan statistical area (MSA) only, which precludes the ability to select zip codes that have been the most affected by foreclosure.

One approach to assessing foreclosure-related health effects at the level of individual zip codes is to analyze hospital discharge data, which nearly all states collect. These files contain demographic information, such as zip code, as well as diagnoses. Hospital discharge data have been used in many public health applications for disease surveillance, as well as for public health planning and community assessments. Other studies have used this data source to study foreclosure-related health effects in Pennsylvania [6], Arizona, California, Florida, and New Jersey [7]. However, to our knowledge, there are no published studies of the use of hospital discharge data in assessing foreclosure-related health conditions in the state of Nevada.

The purpose of this study was to assess the health effects of foreclosures by analyzing hospital discharge data about certain diagnoses associated with stress between 2005 and 2008, comparing the years of expanding housing development (2005 and 2006) to the years of rising home foreclosures (2007 and 2008) in zip codes with high foreclosure rates in southern Nevada. These data were collected as part of a preliminary community needs assessment completed in 2009, so there was no analysis of these data after 2008. The second purpose was to assess the utility of hospital discharge data for addressing this comparison.

Of all the US MSAs affected by foreclosure, Las Vegas-Paradise, Nevada, continues to experience the highest incidence rate, with 1 in 9 housing units receiving a foreclosure filing in 2010, almost five times the national average [1]. In this MSA, the City of North Las Vegas (NLV), Nevada has been especially affected by foreclosure activity. Between mid-2005 and mid-2006, NLV was the fastest growing city in the country [14], but its housing bubble deflated as early as 2007 [15, 16]. In 2008, NLV recorded 4,799 completed foreclosures, 7.5% of its total housing units as compared to 1.2% of housing units for the USA as a whole [17]. As a result, NLV has experienced neighborhood destabilization, which involves population turnover, reduction in business investments in the community, and lowered property values, making it difficult for those remaining to sell or refinance their homes [18–20].

Residents in destabilized neighborhoods have less protection from stress [21], are exposed to more violent crime [22], see their property values decline [23], and receive fewer government services [24], even if they are not at risk of losing their own homes. With home prices expected to fall through 2011 [25] and only a slow recovery from the economic recession predicted [26], it is important to identify whether there are adverse health effects associated with the stress of foreclosures on affected communities.

The reasons for homes loss in general are varied, including loans taken out by people who were never qualified to repay, adjustable interest rates that make loan repayment unaffordable, loss of income from unemployment/underemployment [27], or overwhelming debt, often from medical expenses [28]. Job loss was likely an important factor in home loss in NLV, as unemployment in the Las Vegas-Paradise MSA rose sharply from 4.4% in December 2005 [29] to 9.4% in December 2008 [30]. In addition, racial and ethnic minorities are at higher risk for home loss through foreclosure because they more often receive unfavorable or unsustainable mortgages [31–34].

According to NLV housing officials, in 2009 the U.S. Department of Housing and Urban Development (HUD) identified three NLV zip codes (named A, B, and C in this report) as the areas in greatest need of community redevelopment due to high foreclosure rates. At the time of the study, these zip codes had a higher proportion of minority residents (Black or Hispanic) than their representation in the USA population. These areas accounted for 71% of all NLV's 2008 foreclosures, although these zip codes contained only 54% of its population that year.

## 2. Methods

Under Nevada state statute, all nonfederal hospitals are required to provide certain inpatient data to the University of Nevada, Las Vegas (UNLV) Center for Health Information Analysis (CHIA), which collects and analyzes it. The UNLV CHIA makes these data available to institutions for research, public health, or health care operations, after the applicant obtains a Limited Data Set Use Agreement to protect patient privacy. After the study was approved by the UNLV

TABLE 1

Factor	Association
Stress reactions, including negative coping behaviors	Psychiatric diagnoses [9–12, 35–37] Sexually-transmitted diseases [38], alcoholic cirrhosis of liver [37], carcinomas [39]
Lack of access to health resources	Diabetes [40], hypertension, acute myocardial infarction, congestive heart failure, occlusion of cerebral arteries [41, 42]

Institutional Review Board, we used this database to conduct an assessment of Clark County, Nevada, hospital discharge data using the principal diagnosis for 25 diagnostic-related groups (DRGs), based on the International Classification of Diseases, Ninth Revision, Clinical Modification. We limited our assessment to the DRGs associated with stress (primarily psychiatric diagnoses), as well as some of the DRGs associated with lack of access to health resources (resulting in hospitalization for conditions that could have been managed in an ambulatory setting), see Table 1.

We limited the search to patients from the three HUD-designated zip codes in NLV. The numbers of principal diagnoses were aggregated across all years, and proportions were calculated out of all-cause discharges reported for the selected zip codes in the affected city.

Descriptive statistics were used to characterize hospital discharge rates for each condition by year and zip code. To test for differences in coronary heart failure, depressive disorders, or diabetes across time, the Cochran-Armitage trend test was performed for each condition by zip code. The exact two-sided  $P$  value less than 0.05 was considered statistically significant.

### 3. Results

In assessing trends from a time of economic prosperity to a period of economic difficulty (2005–2008), most conditions did not demonstrate a statistical change in hospital discharge rates across time for any respective zip code ( $P > 0.05$ ). However, for zip code A, diabetes showed a significant decline in hospital discharge rate ( $z = -2.08$ ,  $P = 0.04$ ). On the contrary, depressive disorders were borderline in significance for an increased hospital discharge rate ( $z = 1.92$ ,  $P = 0.05$ ). There were no significant trends in either direction for the other two zip codes.

From 2005 to 2008, the top three principal diagnoses by percent of all discharges in all three zip codes were bipolar and depressive disorders, congestive heart failure, and diabetes (with ranks varying among and within zip codes), see Table 2. There was a marked spike in bipolar and depressive disorders in 2007 in all zip codes (Figure 2).

### 4. Discussion

The sharp rise in all zip codes for bipolar and depressive disorders in 2007 coincides with the doubling of foreclosure filings nationally and an increase in unemployment in the Las Vegas-Paradise MSA, consistent with the expected rise in mental health disorders associated with stress. This is consistent with the findings of a 2009 survey of 388 residents



FIGURE 2: Bipolar/depressive disorder discharge diagnosis percent of total selected diagnoses by zip code.

in two California neighborhoods negatively affected by foreclosures that found that 44% of respondents affected by foreclosure reported problems with stress, depression, or anxiety over the past month, compared to 20% of respondents unaffected by foreclosure [34]. The decline in bipolar and depressive disorders in all zip codes in 2008 may be related to loss of health insurance due to rising unemployment or to other factors, such as relocation from the zip codes of interest due to home loss. However, the actual cause of the decline is unknown.

The top three diagnoses did not vary over time or by zip code (other than by relative rank), indicating the need for further research to determine the health effects of home loss in these geographic areas. When compared to the most recent data (2006 and 2007) from the National Hospital Discharge Survey, which uses a methodology different from the state database, percentages of first-listed diagnoses for diabetes and depressive disorders were similar, but the local data for CHF was slightly lower than national data [43, 44].

### 5. Limitations

There was no comparison group of zip codes less affected by foreclosure. The data are not stratified by either age or gender. We were unable to calculate DRG incidence rates per unit of population because we did not have accurate population estimates for each of the zip codes, one of which was created subsequent to the 2000 Census. It is

TABLE 2: Top three principal hospital discharge diagnoses (frequency and hospital discharge percent).

		Year					
2005		2006		2007		2008	
Zip code A							
(N = 5,265)		(N = 5,504)		(N = 5,382)		(N = 6,068)	
CHF (74)	1.41%	CHF (99)	1.80%	CHF (70)	1.30%	CHF (99)	1.63%
Diabetes (77)	1.46%	Diabetes (79)	1.44%	Diabetes (51)	0.95%	Diabetes (70)	1.15%
Depressive disorders (58)	1.10%	Depressive disorders (80)	1.45%	Depressive disorders (130)	2.42%	Depressive disorders (80)	1.32%
Zip code B							
(N = 3,795)		(N = 4,064)		(N = 3,797)		(N = 4,367)	
CHF (75)	1.98%	CHF (80)	1.97%	CHF (81)	2.13%	CHF (97)	2.22%
Diabetes (48)	1.26%	Diabetes (50)	1.23%	Diabetes (67)	1.76%	Diabetes (66)	1.51%
Depressive disorders (47)	1.24%	Depressive disorders (61)	1.50%	Depressive disorders (80)	2.11%	Depressive disorders (67)	1.53%
Zip code C							
(N = 666)		(N = 1,342)		(N = 1,729)		(N = 2,341)	
CHF (8)	1.20%	CHF (20)	1.49%	CHF (29)	1.68%	CHF (35)	1.50%
Diabetes (7)	1.05%	Diabetes (20)	1.49%	Diabetes (20)	1.16%	Diabetes (36)	1.54%
Depressive disorders (7)	1.05%	Depressive disorders (19)	1.42%	Depressive disorders (54)	3.12%	Depressive disorders (37)	1.58%

likely that some cases were not included in the data, as hospital discharge databases exclude federal facilities, such as the hospitals operated by the U.S. Department of Veterans Affairs. In addition, we limited our study to facilities in Clark County, Nevada, while residents may have been discharged from facilities outside this area.

## 6. Conclusions/Recommendations

There are many confounding factors, such as employment-based health insurance, affecting hospital discharge data, which limit utility for assessing the health effects of foreclosure. Another consideration is that state data are not limited to unique patients, so this data source can include multiple hospital admissions/discharges for a single patient, skewing results. Although it is likely those who lost homes in the studied zip codes experienced negative health effects similar to those found in other geographic areas, this study was unable to identify them but might have with the calculation of rates and comparison to zip codes less affected by foreclosure.

## Disclosure

This information is from the records of the Nevada Division of Health Care Financing and Policy (DHCFP) and was released through the Center for Health Information Analysis the University of Nevada, Las Vegas (UNLV). Authorization to release this information does not imply endorsement of this study or its findings by either DHCFP or UNLV.

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