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# Can Neighborhood Eviction Filings Explain the Impact of Gentrification on Preterm Birth Among Black Birthing People in the San Francisco Bay Area? A Multi-Level Mediation Analysis

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**ABSTRACT**

Neighborhood inequality contributes to the persistent racial disparity in preterm birth in the United States. Gentrification has received increasing attention in public health literature as a neighborhood change process rooted in inequality. However, current research in this area has produced mixed results. One study found that living in gentrifying neighborhoods increases the risk of preterm birth for Black women. However, another found a protective effect. The purpose of this study was to reconcile these findings by using a robust measure of gentrification and exploring the mediating role of displacement in the relationship. The study used multilevel logistic regression to examine the association between gentrification and preterm birth and mediation analysis to assess the role of neighborhood-level eviction filing rates. The results suggest that residing in low-income neighborhoods with advanced gentrification is associated with lower odds of preterm birth compared to neighborhoods at risk of gentrification. This relationship is mediated by eviction filing rates. The study concludes that neighborhoods undergoing advanced gentrification are "healthier" for Black infants in part because of increased direct displacement in neighborhoods at risk of gentrification.

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Gentrification; eviction; preterm birth; mediation

## 1. Introduction

In recent years, there has been rapid growth in the literature on gentrification and its impact on health. The widespread housing affordability crisis and the renewed focus on inequality within public health disciplines have likely driven this growth. At least five systematic reviews have been published that examine gentrification and health from various perspectives including conceptualization (Bhavsar et al., 2020),

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measurement (Tulier et al., 2019), causal inference (Firth et al., 2020), health impacts (Schnake-Mahl et al., 2020; Smith et al., 2020), and a comprehensive review covering all these aspects (Delong, 2023). The consensus among these reviews is that the findings across different health outcomes and populations are mixed. For example, gentrification is associated with better self-rated health (Gibbons & Barton, 2016) and worse self-rated stress (Gibbons, 2019). It is associated with improved diabetes control (Chen et al., 2023) and poor mental health (Tran et al., 2020) for adults in California. It is linked to lower odds of obesity for adults in Durham, North Carolina (Bhavsar et al., 2022), and higher odds of obesity for children in Manhattan (Zhou et al., 2024).

The available evidence on gentrification's impact on birth outcomes is emblematic of this unclear relationship. On one hand, we should expect that gentrification is harmful for preterm birth outcomes because it is a manifestation of neighborhood inequality. We have several decades of evidence that racialized spatial inequality, such as segregation and concentrated poverty, is associated with an increased risk of preterm birth for Black women (Anthopolos et al., 2011; Bell et al., 2006; Britton & Shin, 2013; Kramer et al., 2010; Kramer & Hogue, 2009; Nyarko & Wehby, 2012). Moreover, the interconnection between economic and racialized exclusion matters for pregnancy outcomes. Black women living in neighborhoods with higher levels of racialized economic polarization have worse outcomes (Chambers et al., 2019; Krieger et al., 2017; Shrimali et al., 2020). And even though neighborhoods change more than these static measures suggest, they can help us understand that struggles over space are inherently struggles over power and resources (Lipsitz, 2007, 2011; Mills, 2011). Thus, gentrification can be situated in this body of work.

On the other hand, some people argue that the changes associated with gentrification could have positive effects on infant outcomes. For instance, it is believed that social interactions, access to healthcare facilities, safety, and walkability may all improve after a neighborhood has been gentrified. Although this idea hasn't been extensively studied in public health literature, evidence suggests that living in well-resourced neighborhoods contributes to better health for pregnant individuals and infants (Bruckner et al., 2019). Whether these neighborhood characteristics and their health benefits can be directly attributed to gentrification remains an empirical question.

It is essential to address the conflicting findings on birth outcomes for the benefit of population health equity. The United States has one of the highest rates of preterm birth in the Global North (Frey & Klebanoff, 2016; Purisch & Gyamfi-Bannerman, 2017), and racial disparities in preterm birth have worsened over the past century (Burris et al., 2019). Babies born preterm face higher risks of mortality before the age of 5 and long-term health issues. Furthermore, preterm birth serves as an indicator of community health. Therefore, studying how gentrification affects this outcome could provide valuable insights for housing interventions that aim to improve birth outcomes for mothers and infants and overall community health.

To untangle the mixed findings on gentrification and health, the field of population health must refine how gentrification is conceptualized and measured in relation to displacement (Cole, 2020). Currently, gentrification is often viewed as a one-time event, rather than a process, and subsequent residential mobility or health-related outcomes are assessed in its aftermath. However, early theories on displacement and

gentrification suggest that these processes are more complex than what is typically considered in current studies.

Nearly four decades ago, Marcuse (1985) distinguished between several types of displacement including direct and exclusionary. Direct displacement is when a household is forced to move from its current housing unit. Exclusionary displacement refers to the inability of a working-class household to move into a unit within a community that has been gentrified. These conceptual distinctions coupled with Neil Smith's rent gap theory (1987) are important to understand the temporal relationship between gentrification, displacement, and health.

The rent gap theory proposes that neighborhoods begin to undergo gentrification when there is the greatest gap between actual land rent and the potential post-reinvestment rent. At this point, landlords, developers, and other parties interested in maximizing profits begin to aggressively displace residents via evictions and other forms of violence. Thus, direct displacement (i.e., formal and informal evictions) happens *before* the housing investments and demographic changes associated with gentrification (Chum, 2015; Ramiller, 2022). Exclusionary displacement, on the other hand, occurs *after* a place has become gentrified and too expensive (Slater, 2009). The rent gap theory is about time as much as it is about economics. It suggests that when we measure direct displacement matters. Early in the process, displacement may look and feel different than later in the process, especially to the most marginalized people. To better understand how gentrification is related to health, research in this area should treat gentrification as a dynamic staged process allowing for comparison across different stages. The limited engagement with early theoretical insights has hindered quantitative research in this area in two main ways, both of which we address in this work (Table 1).

First, most research on gentrification and health assigns neighborhoods to one of three categories: non-gentrifying, gentrifying, or non-gentrifiable. In these studies, neighborhoods designated "non-gentrifiable" are typically not included in the study (Freeman, 2005). Non-gentrifiable tracts are not further examined in previous decades to determine whether they gentrified earlier (for an exception see Ding et al., 2016). However, on the ground, neighborhoods can become increasingly gentrified, increasingly expensive, and increasingly exclusionary at more advanced stages (Lees, 2003). This limitation is compounded by treating all non-gentrifying (but gentrifiable) neighborhoods as the same. Thus, inferences about the "effect of gentrification" hinge on whether there are better or worse outcomes among those living in gentrifying tracts compared to non-gentrifying tracts. However, critical urban scholars have questioned whether this is an appropriate comparison (Newman & Wyly, 2006; Slater, 2009). Not all non-gentrifying neighborhoods have the same potential to gentrify in the future. How these neighborhoods are racialized and otherwise (de)valued by stakeholders may create important differences *among* them (Dantzler, 2021; Rucks-Ahidiana, 2022; Whittaker et al., 2023).

This measurement limitation is even seen in studies with a more complex measure of gentrification. For example, the first study of gentrification and preterm birth was conducted in New York City and found that high levels of gentrification were associated with slightly higher odds of preterm birth among Black women (Huynh & Maroko, 2014). The authors constructed a five-category measure of gentrification

**Table 1.** Types of displacement.

| Type | Description | Theorized stage of neighborhood change | Examples |
|---|---|---|---|
| Direct last-resident displacement | Involuntary residential dislocation or relocation for reasons outside of a household's control (e.g., rent increase, unsafe conditions) | Before influx of middle-class residents | Formal and informal evictions; foreclosures; landlord harassment |
| Direct chain displacement | Involuntary residential dislocation involving more than one household being displaced from the housing unit at different times | Before influx of middle-class residents | Formal and informal evictions; foreclosures; landlord harassment |
| Exclusionary displacement | The inability of a household to occupy a previously obtainable unit due to changes in the cost of rent or amenities | During and after influx of middle-class residents | Increase in average rent and/or housing-cost burden |
| Displacement pressure | The experience of a household living in a neighborhood that will soon become unattainable | During and after influx of middle-class residents | Coping efforts; psychological conditions related to stress |

Adapted from Marcuse (1985). The relationship between displacement and gentrification presents a puzzle for quantitative research because there are different types of displacement that can occur at different stages of the gentrification process.

corresponding to levels ranging from very low gentrification to very high gentrification. This effectively produced a measure of the rate of gentrification. The second study, conducted in the state of California, used several different measures to proxy different types of gentrification; these include socioeconomic gentrification, income gentrification, and gentrification by white, mixed, and non-white populations. They found that gentrification was protective of health with no statistically significant moderation by race. Though these measures add more complexity, they do not capture gentrification stages, which is important to understand its relationship to health.

Here, it is important to distinguish between *rate* of gentrification, *type* of gentrification and *stages* of gentrification. Rate captures the intensity of the demographic change; type simply refers to who is "gentrifying" the neighborhood. Stages of gentrification refer to the temporal histories of displacement, gentrification, and exclusion in neighborhoods. This includes understanding what is happening in neighborhoods at the early stages before new residents arrive. When comparing different levels (i.e., the rate) of gentrification, we see a higher or lower influx of middle-class people. However, when comparing different stages in the gentrification process we may see different types of displacement (Slater, 2009), as well as different types of investment in housing and public works (Zuk et al., 2018).

Second, because of the limited measure of gentrification, we do not have a clear understanding of what, specifically, links the process to health. Scholars have pointed to several mechanisms including access to health-promoting resources, unaffordability, displacement, and exclusion to explain why gentrifying neighborhoods might be protective or harmful for health. But these pathways are usually only discussed and rarely explicitly tested. This common practice hinders the interpretations of findings.

To use one study as an example, Steinmetz-Wood et al. (2017) found that gentrification was positively associated with perceived collective self-efficacy. Specifically, people who moved into gentrifying neighborhoods reported higher self-efficacy than those who moved into non-gentrifying neighborhoods. This finding provides plausible evidence that displacement (i.e., moving into non-gentrifying neighborhoods) was associated with *lower* efficacy. Despite this, the authors' interpretation implies that the mechanism at play has to do with the alleged benefits that high-income people bring to neighborhoods. The authors argue that "gentrification, through means such as increased social mix, will promote collective efficacy" without any evidence of increased social mixing (Steinmetz-Wood et al., 2017, p. 7). The gentrification and health scholarship could benefit substantially by testing mechanistic claims empirically. Understanding the pathways between gentrification and health is important for developing health-promoting interventions (Tulier et al., 2019). With the present example, there would be different intervention implications if the pathway is displacement instead of social mixing.

In this paper, we make two contributions to the scholarship in this area. First, we use a measure of gentrification that differentiates among eight stages of gentrification and exclusion. Importantly, this measure categorizes neighborhoods at risk of gentrification, allowing for a theoretically meaningful comparison aligned with the rent gap theory. Second, we test whether neighborhood-level displacement mediates the relationship with infant health. Neighborhood-level displacement refers to the involuntary residential dislocation or relocation of households in a specific neighborhood. Several qualitative studies have outlined pathways linking gentrification and health, but few have been tested quantitatively (Anguelovski et al., 2021; Iyanda & Lu, 2021; Santos et al., 2024; Versey, 2023).

Figure 1 is the conceptual model that guides this study. We take a relational approach in which gentrification is conceptualized as a multi-staged class transformation of space. Relational approaches consider how neighborhoods change over time and how they are related to one another (Cummins et al., 2007). This approach informed our gentrification measure allowing for appropriate comparison between neighborhoods undergoing gentrification and those at risk. Early and later stages of gentrification may have different impacts on the health of residents. While changes in the built and social environment might promote health at later stages, this direct association cannot be fully understood without understanding the mediating effect

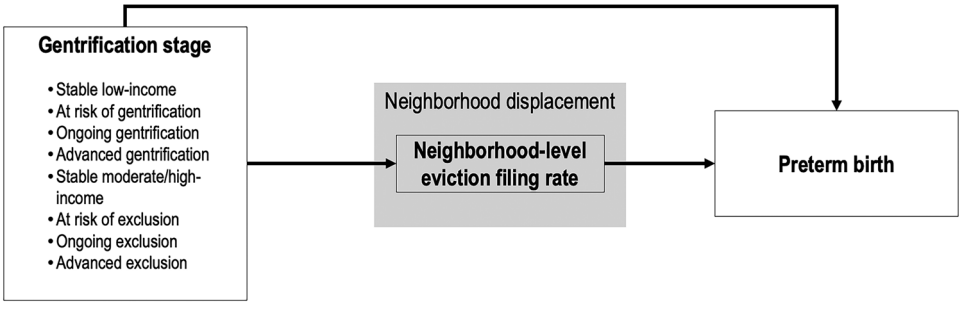


**Figure 1.** Study conceptual model.

of neighborhood displacement. Neighborhood-level direct displacement, operationalized here as eviction filing rate, may happen at earlier stages of the gentrification process. Living in a neighborhood with a high rate of direct displacement could be a source of chronic stress leading to poor pregnancy outcomes.

## 2. Methods

### *2.1. Study Setting*

The setting for this study was the San Francisco Bay Area, an ideal region to study preterm birth among Black birthing people and the processes of advanced gentrification. While preterm birth rates vary across the Bay Area's nine counties, they remain higher for Black birthing people compared to other racial groups (California Preterm Birth Initiative, 2020).

In the 2010s, the Bay Area underwent what is often called the third wave of gentrification—Tech Boom 2.0. This period was marked by a large in-migration of upper-class workers and "creatives," alongside the forced displacement of working-class residents, especially Black workers. According to one estimate, 83,000 Black residents migrated out of the Bay Area's inner region between 2000 and 2014 (Samara, 2016). While this out-migration is neither unique to the Bay Area nor solely a result of gentrification, the region provides a valuable case study for understanding similar patterns in metropolitan areas across the United States.

Gentrification in the Bay Area reflects a broader pattern of regional restructuring. The decades-long movement of Black residents from the "inner" to the "outer" region has been termed the "Black Exodus" (Anti-Eviction Mapping Project, 2019). Scholars have also described this process as "racial banishment" (Roy, 2019) and "racial resegregation" (Samara, 2016; Schafran, 2018). Racial resegregation encompasses more than spatial separation; it refers to the inequitable distribution of land, power, and resources. In the Bay Area and beyond, racial resegregation does not replace older forms of segregation but reshapes them. This contributes to a shifting geography of poverty where new suburban pockets of disadvantage emerge alongside increasingly unequal urban centers. Several push and pull factors explain the region's changing demographics, including neighborhood safety, employment opportunities, and especially housing unaffordability. The rise in housing costs align with typical patterns of gentrification in a US context. In response, housing justice activists, organizations, and scholars in the Bay Area have generated a wealth of data that has not been developed at the same scale in other areas of the country. These data sources, such as the Neighborhood Displacement Typology used in this study, have been underutilized in public health research.

### *2.2. Data Sources*

The outcome (i.e., preterm birth) and control variables come from the San Diego Study of Outcomes in Mothers and Infants (SOMI) database of birth records from all live births in California from the years 2013–2017 (San Diego SOMI, 2024). The SOMI

database consists of birth records from all births in the state of California, which are then probabilistically linked to hospital discharge records maintained by the California Department of Health Care Access and Information (HCAI) for the birthing person in the year before birth, and the birthing person and the infant in the year after birth. In addition, mothers' addresses from birth records were geocoded and linked to US Census data and eviction data.

For the exposure variable, we used the Neighborhood Change Database (NCDB), a longitudinal database that provides long-form US Census data at the tract level for the 1970–2010 Census and the 2006–2010 American Community Survey harmonized to the 2010 census tract boundaries (Tatian, 2013). This prevents the methodological challenges of dealing with inconsistent census tract boundaries, as they have changed over time.

Data for the intervening variable, eviction filing rate, come from the Eviction Lab at Princeton University (Gromis et al., 2022a). The Eviction Lab provides publicly available data on eviction threats, filings, and judgments in jurisdictions across the US. The data were obtained from court records and through a proprietary data purchase from LexisNexis (Gromis et al., 2022b). We used data for the 9-county San Francisco Bay Area for the years that overlap with the birth record data (2013–2017).

The study was approved by the Institutional Review Boards at the University of California Los Angeles and the University of California San Diego.

### 2.3. Sample

The sample is drawn from the records of all births with successful linkage to hospital discharge records in the database between 2013 and 2017 to people residing in one of the nine counties in the San Francisco Bay Area. To be included, mothers had to have reported their race as Black/African American on their infant's birth certificate. The sample includes self-reported multi-racial individuals (n = 1,473) who reported race as Black/African American and some other race/ethnicity. The sample excludes births to multiples (i.e., twins, triplets, etc.) and infants with congenital anomalies because both have an increased likelihood of birth before 37 weeks' gestation. To reduce the selection bias that occurs when people with multiple pregnancies are overrepresented in the sample, we limited the analytic sample to nulliparous births, resulting in a sample size of 7,626 individuals (Platt & Buck Louis, 2011) (Figure 2).

### 2.4. Outcome

*Preterm birth* is a binary variable < 37 weeks' gestation (0 = no, 1 = yes). It was obtained from the birth records from a hierarchy of sources: high-quality clinical estimates from ultrasounds, obstetrician estimates, and last menstrual period. For sensitivity analyses, we also created two additional outcome variables: *preterm birth 32*, a binary variable to differentiate between births before and after 32 weeks' gestation, and a continuous variable: *weeks' gestation*.

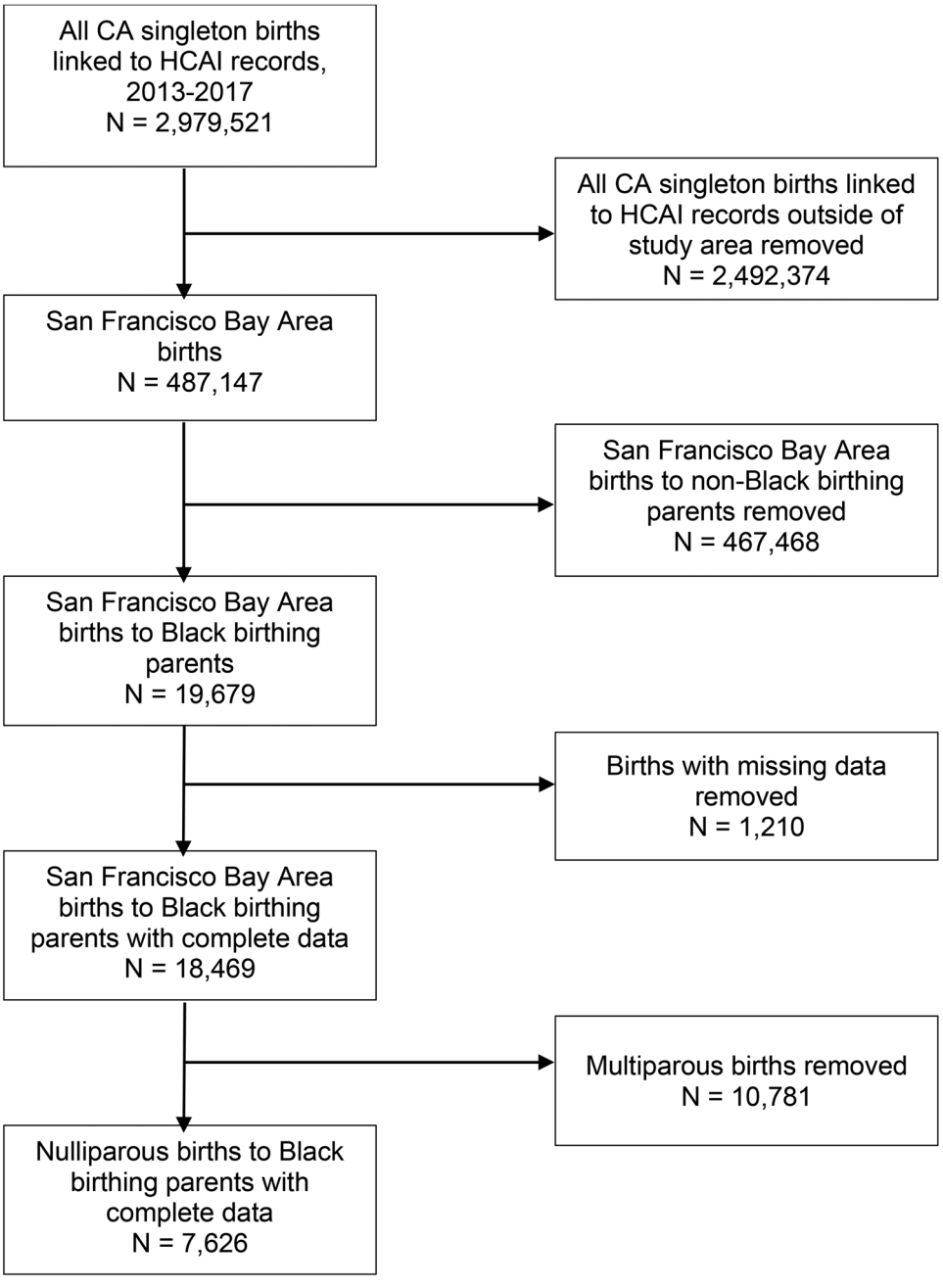


**Figure 2.** Sample derivation flow chart.
CA = California; HCAI = Department of Health Car Access and Information.

### *2.5. Gentrification Stage*

For the main exposure, *gentrification stage*, we used the 2013 and 2015 neighborhood displacement typology methodology developed by the Urban Displacement Project (UDP, 2020; Zuk, 2015). This method draws on three previous methods to categorize

census tracts within the nine-county San Francisco Bay Area region. To designate displacement typologies, tracts were divided into two categories (low income and moderate to high income) based on the proportion of low-income households within them. Households were defined as low-income if they earned less than 80% of the county median income. Low-income tracts were defined as those with 40% or more low-income households. Moderate- to high-income tracts were defined as those with less than 40% low-income households. After designating tract income, tracts were characterized by the housing market, demographic change (i.e., in-migration and out-migration of low-income households), level of municipal investment (e.g., whether the tract is in an opportunity zone), and whether a tract gentrified in previous decades. The final typology has eight stages of gentrification and exclusion which we linked to birth record data based on maternal residence at birth. For a more detailed description of the UDP methodology, see Zuk (2015). Table 2 summarizes the eight typologies based on the UDP's 2015 methodology.

### *2.5.1. Alternate Measures of Gentrification*

We additionally used a more common measure of gentrification put forth by Ding et al. (2016) for the sake of comparison to other studies. The Ding measure first classifies neighborhoods as eligible or ineligible to gentrify at time 1. Census tracts with a median household income below the city-wide median are considered eligible. Then, to be considered gentrifying between time 1 and time 2, tracts had to have an increase in median housing costs (home value or rent) *and* an increase in college-educated residents above city-wide medians. We provide results for the Ding measure in Supplementary Table 5.

Ultimately, we put more weight on the UDP measure, for several reasons. First, the UDP measure is contextually relevant. The Ding measure was created for an analysis of Philadelphia which has a very different demographic make-up than the Bay Area. The Bay Area, despite having a high proportion of college-educated residents, has

**Table 2.** Urban displacement project displacement/gentrification typologies.

| Low-income tracts | Moderate- to high-income tracts |
|---|---|
| Stable low-income<br>• None of the below characteristics | Stable moderate/high-income<br>• None of the below characteristics |
| At risk of gentrification<br>• Strong housing market<br>• In transit-oriented development zone<br>• Old/historic housing stock<br>• Losing affordable housing units<br>• Employment center | At risk of becoming exclusive<br>• Strong housing market<br>• In transit-oriented development zone<br>• Old/historic housing stock<br>• Losing affordable housing units<br>• Employment center |
| Undergoing gentrification<br>• losing low-income households<br>• losing naturally affordable housing<br>• decrease in low-income in-migration<br>• population size is growing or stable | Undergoing exclusion<br>• losing low-income households<br>• decline in naturally affordable housing or low-income in-migration<br>• population size is growing or stable |
| Advanced gentrification<br>• gentrified between 1990–2000 or 2000–2013 based on gentrification criteria:<br>○ vulnerability<br>○ demographic change<br>○ real estate investment | Advanced exclusion<br>• very low proportion of low-income households<br>• very low in-migration of low-income households |

Table adapted from Zuk (2015).

extreme income inequality, rendering the measure of gentrification eligibility in the Ding measure less than ideal. For instance, using the Ding measure, 52% of the most deprived census tracts—as defined by the Index of Concentration at the Extremes (Krieger et al., 2018)—were classified ineligible to gentrify, raising concerns about misclassification (see Online Appendix A for a comparison of measures). Second, the UDP measure uses an expectations-based indicator (e.g., opportunity zone designation) to determine risk for gentrification—offering a more dynamic perspective on neighborhood change. Third, the UDP measure was validated by community members, lending it greater face validity and alignment with on-the-ground knowledge of local conditions (Chapple & Zuk, 2016).

## 2.6. Mediating Variable

### 2.6.1. Eviction Filing Rate

At the neighborhood level, the eviction filing rate was calculated as the ratio of the number of renter-occupied households in the tract with an eviction filed against it divided by the number of renter-occupied homes in that tract. We used the original non-rounded values to calculate the eviction filing rates to prevent inflation of the estimates and represent the number of eviction filings per 100 renter-occupied homes. Because landlords use several informal processes to threaten or remove tenants before the court-ordered judgment, we used eviction filings instead of eviction judgments. Though both measures underestimate the number of informal evictions, the judgment rate may underestimate this number to a greater extent (Sealy-Jefferson et al., 2021).

## 2.7. Control Variables

We included control variables that are known to influence preterm birth. *Maternal age* is age at the time of giving birth. *Insurance payor* is a categorical variable (private, public, none). *Maternal birthplace* is a binary variable (born in USA or not). *Maternal education* is a categorical variable of the mother's highest level of education. Categories include less than high school, high school or equivalent, and more than high school. Smoking is a binary variable that indicates whether an individual smoked at any point during the pregnancy. Participation in the Special Supplemental Nutrition Program for Women, Infant, and Children (*WIC*) was a binary variable. *Adequacy of prenatal care* was measured by the Kotelchuck index which combines two indicators—prenatal care initiation and number of prenatal visits—into a summary score that captures the discrepancy between an individual's actual and expected number of visits based on their other numbers (Kotelchuck, 1994). The expected number of visits is based on the American College of Obstetricians and Gynecologists' standards for prenatal care utilization for uncomplicated pregnancies (Kilpatrick & Papile, 2017).

We additionally controlled for *county-level health expenditures*. We calculated the annual county per capita health spending by averaging two fiscal years (FY; July–June) of data for each birth (year of birth and year before giving birth). Data for this variable is provided publicly by the California State Controller's Office which provides

open-access data on California's expenditures by county dating back to FY 2002–2003 (California State Controller's Office, 2022a, 2022b). For each county and San Francisco, we added spending from four categories: total public health, mental health, medical care, and drug and alcohol abuse services.

### 2.8. Statistical Analysis

First, we described the sample's demographic, healthcare, and neighborhood characteristics including age, education, marital status, insurance status, prenatal care, housing stability, and gentrification stage.

We then used multilevel logistic regression with clustering at the hospital to estimate the cross-sectional statistical association between gentrification stage and preterm birth. Odds ratios (ORs) and 95% confidence intervals (CIs) compared individuals living in census tracts at risk of gentrification to those living in all other neighborhood types. In this model, we adjusted for variables known to impact preterm birth included in Section 2.7.

Finally, we used a mediation analysis technique described by Buis (2010). This method uses a counterfactual approach to decompose direct and indirect effects in a logistic regression model. Specifically, this method (ldecomp in Stata) computes the direct effect by comparing the predicted probabilities of preterm birth across categories of neighborhood types, holding the probability of eviction filing rate constant. The indirect effect is then estimated by comparing the predicted probabilities of preterm birth within one neighborhood type with the probabilities of preterm birth for the same group but assuming that the probabilities of neighborhood eviction filing rate are those of another neighborhood type.

## 3. Results

Table 3 displays the demographic characteristics of the sample. About 86% of the sample is between the ages of 18 and 34, which is considered a healthy age range in perinatal epidemiology (Cnattingius et al., 1992; Fraser et al., 1995; Jacobsson et al., 2004), while 11% of the sample is aged 34 and older, considered a geriatric pregnancy. Just under 3% were under the age of 18. Most of the sample (85.8%) was born in the United States, and 80.7% categorize themselves as only Black. The sample is highly educated, with 62.4% having more than a high school diploma. Over 50% of the sample was receiving the Supplemental Nutrition Program for Women, Infants, and Children (WIC) at the time of giving birth and 40% received public health insurance. Regarding prenatal care, 35% of the sample had less than adequate prenatal care, 24% had intermediate care and 12% had inadequate care. Less than 6% of the sample smoked tobacco at any point during their pregnancy.

Figure 3 and Table 4 display the unadjusted and adjusted ORs for preterm birth by gentrification stage. Black birthing parents living in neighborhoods undergoing advanced gentrification have lower odds (OR = 0.642; 95% CI = 0.433,0.951) of preterm birth compared to those in neighborhoods at risk of gentrification, adjusting for maternal characteristics.

**Table 3.** Distribution of maternal characteristics among Black birthing parents by preterm birth, San Francisco Bay Area, 2013–2017, N = 7,626.

| | All live births | | Preterm birth | |
|---|---|---|---|---|
| Characteristic | n | % | n | % |
| Age | | | | |
| <18 | 225 | 2.95 | 21 | 3.30 |
| 18–34 | 6,556 | 85.97 | 515 | 80.85 |
| >34 | 845 | 11.08 | 101 | 15.86 |
| Birthplace | | | | |
| USA | 6,539 | 85.75 | 561 | 88.07 |
| Outside USA | 1,087 | 14.25 | 76 | 11.93 |
| Racial self-ID | | | | |
| Black alone | 6,153 | 80.71 | 543 | 85.24 |
| Black multiracial | 1,473 | 19.32 | 94 | 14.76 |
| Insurance payor | | | | |
| Private | 3,961 | 51.94 | 339 | 53.22 |
| Public | 3,096 | 40.60 | 237 | 37.21 |
| None/self-pay | 82 | 1.08 | 12 | 1.88 |
| Other | 487 | 6.39 | 49 | 7.69 |
| Education | | | | |
| Less than HS | 717 | 9.40 | 65 | 10.20 |
| HS or equivalent | 2,153 | 28.23 | 163 | 25.59 |
| Greater than HS | 4,756 | 62.37 | 409 | 64.21 |
| WIC participation | 4,094 | 53.68 | 282 | 44.27 |
| Any smoking during pregnancy | 452 | 5.93 | 55 | 8.63 |
| Adequacy of prenatal care | | | | |
| Adequate plus | 1,465 | 19.21 | 281 | 44.11 |
| Adequate | 3,442 | 45.14 | 235 | 36.89 |
| Intermediate | 1,845 | 24.19 | 55 | 8.63 |
| Inadequate | 874 | 11.46 | 66 | 10.36 |

Figure 4a–c displays the spatial distribution of neighborhood displacement typology index, the preterm birth rate, and the eviction filing rate. Table 5 displays analysis of variance (ANOVA) results assessing the relationship between neighborhood displacement type and eviction filing rate. Eviction filing rate was higher in neighborhoods at risk of gentrification compared to all other neighborhood typologies except for stable low-income neighborhoods.

Table 6 displays the mediation analyses which used a counterfactual approach to estimate the indirect and direct effects of gentrification stage on preterm birth through the neighborhood-level eviction filing rate. The neighborhood-level eviction filing rate mediated the relationship between advanced gentrification and preterm birth ($OR_{indirect}$ = 0.961, $p = .048$). The mediation analysis demonstrated that neighborhood eviction filing rate explained 9.15% of the relationship between gentrification and preterm birth.

We conducted several sensitivity analyses to assess the robustness of the findings. To address the concern that logistic regression may overestimate effect size, we used multilevel ordinary least squares (OLS) regression with a continuous outcome variable (weeks' gestation). To address potential selection bias induced by excluding individuals with more than one birth in the dataset, we reran the analyses including multiparous individuals (Platt & Buck Louis, 2011). Finally, we included an additional measure of neighborhood spatial inequality, the index of concentration at the extremes for race and income. These analyses did not change the findings significantly (Supplementary Tables 1–4).

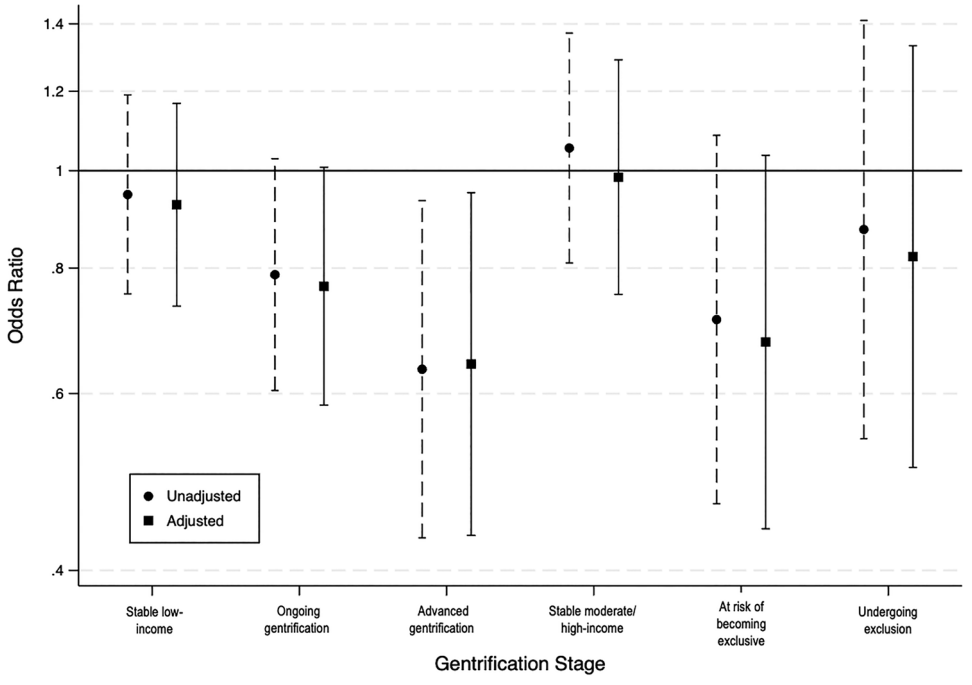


**Figure 3.** Odds ratios and 95% CI.
Note. At risk of gentrification is the referent stage Advanced exclusion is not included due to wide CI.

**Table 4.** Preterm birth as a function of gentrification stage and covariates.

| | Multilevel logistic regression, n = 7,626 | | | |
|---|---|---|---|---|
| | Unadjusted | | Adjusted | |
| | OR | 95% CI | aOR | 95% CI |
| Gentrification stage | | | | |
| Stable low-income | 0.947 | [0.754,1.189] | 0.925 | [0.733,1.167] |
| At risk of gentrification | | (ref) | | |
| Ongoing gentrification | 0.788 | [0.604,1.028] | 0.767 | [0.584,1.008] |
| Advanced gentrification | 0.634* | [0.431,0.934] | 0.642* | [0.433,0.951] |
| Stable moderate/ high-income | 1.053 | [0.809,1.371] | 0.985 | [0.753,1.289] |
| At risk of becoming exclusive | 0.711 | [0.466,1.085] | 0.675 | [0.440,1.036] |
| Ongoing exclusion | 0.874 | [0.541,1.411] | 0.821 | [0.506,1.332] |
| Advanced exclusion | 1.322 | [0.454,3.849] | 1.176 | [0.400,3.457] |

*<.05, **<.01, ***< .001.
Adjusted model controls for maternal age, education, insurance payor, smoking, maternal birthplace, infant sex, WIC participation.

## Discussion

In this study, we examined the relationship between gentrification and preterm birth among Black birthing people in the San Francisco Bay Area. We found that living in a neighborhood undergoing advanced gentrification was associated with lower odds of preterm birth compared to living in a neighborhood at risk of gentrification. However, this association was partially explained by neighborhood-level eviction filings. Neighborhoods in the later stages of gentrification tend to have lower eviction rates,

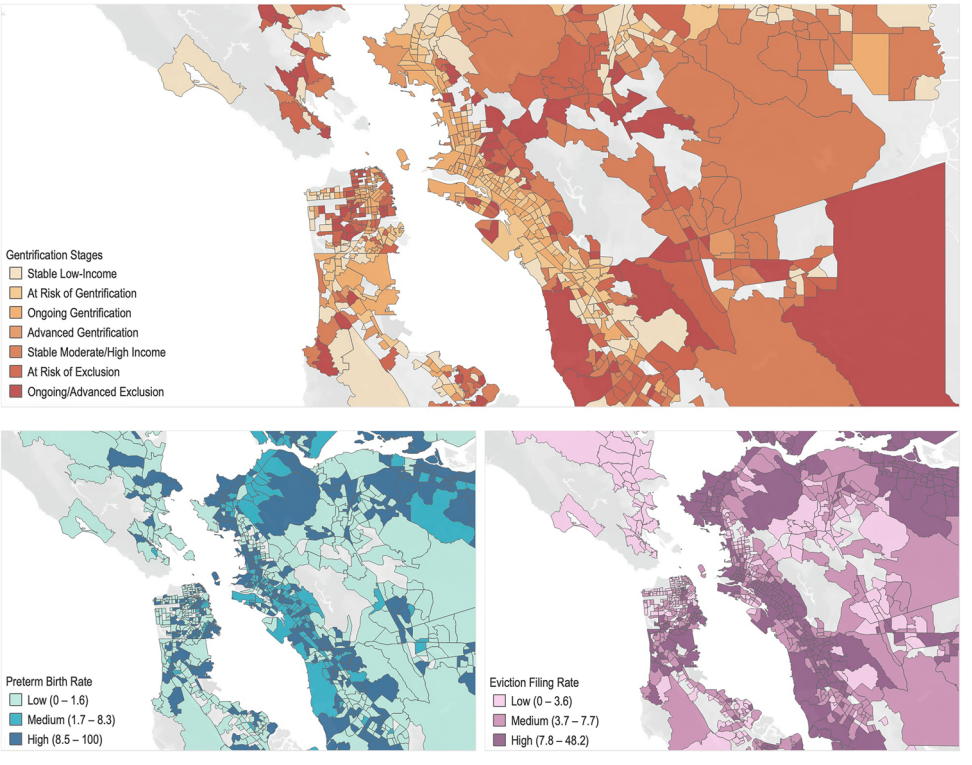


**Figure 4.** Gentrification stage, preterm birth rate, and eviction filing rate by census tract in the San Francisco Bay Area 2013–2017.
Note. Gentrification stages "ongoing exclusion" and "advanced exclusion" were combined for visualization.

**Table 5.** Bivariate analysis gentrification stage with preterm birth rate and eviction filing rate.

| Gentrification stage | Live births | | PTB rate | Eviction filing |
|---|---|---|---|---|
| | n | % | | Rate |
| Stable low-income | 2,011 | 26.37 | 8.16 | 9.51 |
| At risk of gentrification | 2,078 | 27.25 | 9.24 | 7.64 |
| Ongoing gentrification | 1,163 | 15.25 | 7.57 | 6.42 |
| Advanced gentrification | 514 | 6.74 | 6.42 | 4.75 |
| Stable moderate/high-income | 1,189 | 15.59 | 9.00 | 5.80 |
| At risk of becoming exclusive | 386 | 5.06 | 7.25 | 2.84 |
| Ongoing exclusion | 253 | 3.32 | 8.30 | 5.04 |
| Advanced exclusion | 32 | 0.42 | 12.50 | 5.13 |

Note. Preterm birth ANOVA $F(7, 7618) = 1.09$, $p = .3635$.
Eviction filing rate ANOVA $F(7, 7618) = 89.44$, $p < .001$.

which may contribute to better infant health outcomes. This study advances gentrification and health research in two ways. First, by using a measure that differentiates between stages of gentrification, we were able to establish a theoretically meaningful comparison neighborhood. Second, by testing eviction filings as a mediator, we demonstrated their role in shaping the observed association. These findings have important implications for quantitatively studying the health implications of racialized spatial inequality. The seeming protective effect of gentrification is consistent with other studies of gentrification and health (Beck et al., 2023). However, we should not

**Table 6.** Decomposition of the effect of advanced gentrification on the odds of preterm birth, 2013–2017, N = 7,626.

| | OR | Bootstrap SE | *p* |
|---|---|---|---|
| Advanced gentrification | | | |
| Total | 0.650 | (0.136) | 0.039 |
| Indirect (via eviction filing rate) | 0.961 | (0.019) | 0.048 |
| Direct | 0.676 | (0.142) | 0.062 |
| % Mediated by eviction filing rate | 9.15% | | |

Note. Odds ratios with standard errors (SE) in parentheses. Based on Table 3, model 2. Referent group = individuals residing in low-income census tracts at risk of gentrification.
Decomposition model controls for age, birthplace, education, receipt of women infant and children (WIC) assistance, insurance type, smoking, infant sex, and per capita county health expenditures.

take unmediated associations for granted before examining comparison neighborhoods. Using a relational approach emphasizes how neighborhoods are connected to each other (Jones, 2009; Lawton, 2020). Regression analyses require that we make so-called non-gentrifying neighborhoods the reference and compare them to those undergoing gentrification. The assignment of treatment and control neighborhoods for statistical purposes does not mean the process of gentrification does not impact "control" neighborhoods. This study supports the narrative that direct displacement is more likely to happen at earlier stages of the gentrification process (Chum, 2015; Ramiller, 2022), thus complicating the popular claim that "gentrification does not cause displacement" (Davidson, 2019) by suggesting that displacement makes way for gentrification.

Our findings suggest that eviction filing rates drive higher odds of preterm birth in neighborhoods at risk of gentrification, making it appear that gentrification has a protective effect. In this study, we use eviction filings as a proxy for direct displacement, which is more prevalent at earlier stages in the gentrification process. Although this analysis did not examine whether the individuals in the sample experienced eviction, prior studies have shown spillover effects of neighborhood-level evictions and eviction filings on health outcomes (Freedman et al., 2022; Hazekamp et al., 2020; Sealy-Jefferson et al., 2021). For example, living in a neighborhood with medium or high rates of eviction filings before or after conception is associated with a 2- to 3-fold increase in the odds of preterm birth for Black women (Sealy-Jefferson et al., 2024).

Schwartz et al. (2024) describe four pathways through which eviction might impact health at the community level: first through changing health behaviors and increasing risk for communicable disease; second, by dissolving social cohesion; third, by straining social networks when evicted community members are forced to rely on their friends, family, and neighbors for shelter and other resources; and, fourth, by increasing the perception of eviction risk for other community members. This fourth pathway may be especially relevant for understanding the relationship to preterm birth. The stress associated with the perceived threat of eviction could plausibly impact pregnancy outcomes. High eviction filing rates may signal the exploitative power dynamics between landlords and tenants. Research shows that landlords use serial eviction filings as a method to collect late rent payments and additional fees, not necessarily with the intent to remove tenants (Garboden & Rosen, 2019; Watson et al., 2023). However, tenants likely perceive their own and their neighbors' eviction filings as

legitimate displacement threats. Thus, this practice could have detrimental effects on the mental and physical health of already vulnerable tenants (Khadka et al., 2020; Leifheit et al., 2020).

The findings should be considered in light of several limitations. Because the study was cross-sectional, findings should be interpreted as associational, not causal. In addition, because we used administrative data, we cannot determine how long individuals have been living in their neighborhoods nor could we measure mobility in and out of neighborhoods, both of which could influence the observed associations. Furthermore, there could be selection bias due to the deterministic linkage strategies as 91.3% of the births in the state are linked to hospital discharge records and included in the database, leaving over 8% of the births unanalyzed (Baer et al., 2022). Finally, we used data from the Eviction Lab to proxy neighborhood-level displacement, which likely underreports the number of eviction filings in the Bay Area region (Aiello et al., 2018). Future research should consider using eviction notices—written warnings from landlords of a lease violation—to estimate eviction threats. Eviction notices are substantially higher in number than eviction filings which are legal documents. However, many municipalities do not publicly provide eviction notice data. Therefore, data collection efforts may need to be community-based.

Another point to consider is that these findings are consistent with other studies of neighborhood exclusion that suggest living in exclusive neighborhoods is associated with better health outcomes (Cross et al., 2023). This also represents a selection bias issue because people exposed to neighborhood exclusion, by definition, do not live in the neighborhood where the exclusion is being measured. As a neighborhood becomes exclusive through gentrification or housing discrimination, the people who can afford to live there have different experiences than those who cannot afford to live there. In other words, what is really being measured is the health of people who have managed to avoid the exclusionary actions. This poses a challenge to quantitative researchers doing relational studies of inequality because the people exposed to the harms of gentrification, namely displacement, may have already been displaced by the time we are measuring health in the gentrified neighborhood. Longitudinal studies can avoid this temporality issue. One such study found that people experience health benefits as the duration of their "exposure to gentrification" increases. In other words, the longer they remain in their neighborhoods, the better their self-reported health (Agbai, 2021).

This is the first study, to our knowledge, to statistically test a mediator in the association between gentrification and birth outcomes. In doing so, it highlights the importance of using theory-informed methodology to study complicated neighborhood processes such as gentrification. The mediation findings also have important housing policy implications, as there are multiple strategies to mitigate evictions and housing insecurity. Because evictions are rooted in racialized economic inequality, eliminating them entirely would require fundamental societal changes. However, a combination of policies could help reduce evictions and, in turn, lower preterm birth rates among Black birthing people. First, rent stabilization (often referred to as rent control) limits how much landlords can increase rents. However, in California, landlords can circumvent rent control through policies like vacancy decontrol, which allows them to reset rent to market rates after a tenant leaves, incentivizing evictions (Gardner & Asquith, 2025). Another loophole is condo conversions, where landlords remove entire buildings

from the rental market, displacing tenants in the process (Maharawal & McElroy, 2018). Second, housing vouchers could theoretically reduce evictions by helping tenants cover rent and avoid nonpayment, the leading cause of eviction. However, evidence on their effectiveness in preventing evictions remains limited. Third, place-based rental subsidies, including public housing and project-based rental assistance programs, show promise in reducing evictions (Harrison et al., 2021; Lundberg et al., 2021; Preston & Reina, 2021). While public housing has largely been phased out in favor of other models, expanding place-based subsidies may help stabilize neighborhoods with high rates of displacement. Although no single policy is sufficient on its own, implementing these measures in combination could improve housing stability and community health, particularly in communities experiencing the early stages of gentrification.

## 5. Conclusions

This study found that eviction filing rates explain a small portion of the association between advanced gentrification and preterm birth. The findings suggest that relational approaches to studying neighborhood inequality may yield a more nuanced understanding of quantitative results. Future research in this area should continue to explore pathways linking gentrification and health using mediation analysis. Qualitative and mixed-method approaches are also needed to examine neighborhood-level dynamics that shape health. Studies that identify specific mechanisms can be used to inform health-promoting interventions better than associational analyses alone. The findings from this study suggest that efforts to reduce evictions may also improve Black infant health in unequal cities. Future work should incorporate other forms of displacement—such as exclusionary displacement and displacement pressure—as potential mediators. Quantitative scholars could draw on the rich qualitative literature in this area to develop new measures (Arcaya et al., 2020; Westbrook, 2024; Williams et al., 2022). Such measures would support testing the hypothesis that different types of displacement occur at different points of the gentrification process. These measures would additionally enable study displacement outside of the context of gentrification to better understand its relationship to health inequities and urban inequality more broadly.

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