GUIDE TO MEASURING NEIGHBORHOOD CHANGE TO UNDERSTAND AND PREVENT DISPLACEMENT

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INTRODUCTION

Cities around the country have seen a resurgence of investments and increased private market interest. Local cross-sector efforts and programs such as federal Opportunity Zones continue to promote the revitalization of areas that have long faced disinvestment. Although these investments promise to generate substantial new resources, many communities are having fierce debates over who will benefit from these investments. Governments, philanthropy, and nonprofits are increasingly focusing on how to prevent residential displacement stemming from these changes, often driven by local organizing and activism. Beyond residents being forced to move, communities are also grappling with cultural or commercial displacement due to changing norms and the loss of cultural institutions and neighborhood businesses.

Despite the increased attention, comprehensive data to directly measure displacement do not exist. Often, people know from lived experience that their neighborhoods are changing but lack the data to quantify displacement. Further, communities may know which neighborhoods are changing in the present but do not have systems to anticipate and get in front of future changes.

Local governments, universities, nonprofits, and research institutions have stepped in to analyze where neighborhood change is happening, what that change looks like, and where it might happen in the future. This guide is designed to support that work, offering a starting point for researchers, policymakers, and organizers interested in analyzing neighborhood change to promote inclusive development strategies, prevent displacement, and ensure that longer-term residents benefit from new investment.

After describing the background for this guide and the value of monitoring neighborhood change, the next section presents considerations for developing an analytical approach. The guide then walks through key indicators of change that analysts should examine. Each topic includes a short discussion of its relevance to a neighborhood change analysis, examples from other studies, and potential data sources.

BACKGROUND

Launched in January 2016, *Turning the Corner: Monitoring Neighborhood Change for Action* piloted a research model in five cities to monitor neighborhood change, drive informed government action, and support displacement prevention and inclusive revitalization. The model sought to combine quantitative and qualitative analysis to provide data and local

context on neighborhood change. The project was incubated by the Federal Reserve-Philanthropy Initiative, a collaboration between the Restoring Prosperity in Older Industrial Cities Working Group of the Funders' Network for Smart Growth and Livable Communities and several Federal Reserve district banks. Urban Institute's National Neighborhood Indicators Partnership (NNIP) managed the project. Turning the Corner was motivated by a desire to understand neighborhood revitalization and related displacement pressures in cities with recovering or moderately strong housing markets. The participant sites were Buffalo, New York; Detroit, Michigan; Milwaukee, Wisconsin; Phoenix, Arizona; and the Twin Cities (Minneapolis and St. Paul), Minnesota.

NNIP consists of independent organizations in more than 30 cities that have a shared mission to help community stakeholders use neighborhood data for better decisionmaking, with a focus on working with organizations and residents in low-income communities. This guide draws from the experiences of the NNIP partners, examples from the Turning the Corner project, and a review of literature and practice. As a companion to this guide, NNIP has compiled a toolkit for qualitative research on neighborhood change, with protocols and materials for communities to adapt. Although this guide focuses on physical displacement, the Turning the Corner project also recognized the importance of other types of displacement, such as cultural displacement. Two briefs and a report that document the local activities and synthesize lessons across sites are available at http://www.neighborhoodindicators.org/turningthecorner.

WHY MEASURE NEIGHBORHOOD CHANGE

The goal of the Turning the Corner project and this guide is to measure change to prevent displacement. For this guide, *neighborhood change* includes past trends, current conditions, and predictions of future change, with a focus on displacement due to rising housing costs. Understanding these dynamics is a critical first step in identifying areas of potential displacement and crafting program or policy responses.

Data are a valuable tool for local actors to document areas with displacement pressures and to advocate for cross-sector action to prevent displacement from future development. Analysis may indicate that change is occurring slower, faster, or at the same rate as residents' perceptions, but either way, having the facts will create a more informed dialogue. For instance, data on evictions may offer numbers to support a community's on-the-ground knowledge that people are being displaced and allow them to better advocate for solutions. Such empirical backing can be especially important in areas with recovering or moderate-strength housing markets, like the Turning the Corner cities. The housing markets in these cities may not display the

same rates of change as the hot-market cities generally associated with displacement. Policymakers or even fellow residents may not believe that housing prices are rising or that displacement is an urgent issue.

Measuring change is also essential to developing and tracking appropriate responses. With relevant data, communities can better understand who is at risk of displacement and the ways a neighborhood is changing. For instance, data can pinpoint how much the home prices in a neighborhood have risen, whether the change is similar in different blocks within a neighborhood, and whether rental vacancy rates indicate similar trends. Being able to articulate such detail in the ways neighborhood change allows actors to better tailor their solutions.

CONSIDERATIONS FOR MEASURING CHANGE TO PREVENT DISPLACEMENT

DEFINING WHAT YOU WANT TO MEASURE

You should begin an analysis by clearly defining the concept being measured. Terms such as gentrification, displacement, mobility, and neighborhood change all hold multiple meanings and often elicit emotional reactions. For example, gentrification may refer to differences in race or ethnicity, class, or both between newcomers and longer-term residents. These concepts do not have to follow any standard definition, but any analysis should set out concrete descriptions of what is being measured to guide selection of indicators and analytic methods; communicate the results to your coalitions, partners, and audiences; and understand what policy strategies are relevant.

Applied researchers have defined the concepts in different ways depending on the inquiry's purpose and local context. For instance, the National Center for Smart Growth at the University of Maryland, College Park, defines displacement in its analysis of gentrification around a new transit line as "an increase in home prices and the population's education level that was greater than the increases that occurred in the region as a whole." This definition does not include racial or ethnic or economic changes. The Institute on Metropolitan Opportunity at the University of Minnesota Law School's report on gentrification in Minneapolis and St. Paul, on the other hand, acknowledges the fluidity of these terms and offers some common elements rather than a strict definition: "Including displacement of lower-income households by higher-income residents, replacement and/or rehabilitation of housing stock, and displacement of racial minorities by higher-income white residents." This definition allows for varying types of change and identifies any displacement (rather than relative increases) as part of gentrification.

Below are terms that guide the later description of resources, adapted from Zuk et al. (2015):

- **Neighborhood change.** Broad term used to capture the full spectrum of economic, racial or ethnic, and structural changes in a geographic area, both positive and negative. **Neighborhood revitalization** is a related term that implies change viewed as positive, usually accompanied by new public or private investment.
- **Gentrification.** Transformation of areas historically inhabited by marginalized groups, usually racial or ethnic or class groups, into areas used by the dominant class or racial or ethnic group. Usually characterized by increased investments in areas that have seen long-term disinvestment.
- **Displacement.** Forced or involuntary household movement from place of residence. Usually expanded beyond formal forced moves such as evictions to include unaffordable rents or poor living conditions. Displacement is distinct from **residential mobility**, which includes voluntary household movement.

DEVELOPING AN ANALYTICAL APPROACH

Once you have defined what you want to study, the next step is to develop a methodology to measure change. This guide will highlight elements to consider when developing a methodology and gathering your data, provide a framework for thinking through the choices given your definitions of key concepts, the purpose of your inquiry, and local context.

Purpose, Community Involvement, and Audience

This guide focuses on analysis to support planning, advocacy, and decisionmaking, not only as an academic exercise. An analysis may be driven by a desire to estimate the impact of a new large-scale development, to equip community members with information about long-term trends in neighborhood conditions, or to monitor the outcomes of an initiative to improve neighborhood equity. Regardless of the motivation, identify the main stakeholders and audiences for your analysis, and engage them early in the process to guide decisions as the work progresses. If the project is focused on educating policymakers, the methods and format of the products may be different than when the primary goal is resident engagement.

Defining the purpose of your analysis will inform other elements of your research and the audience for your work. An exploration of neighborhood change focusing on long-term trends may take advantage of the indicators available in national longitudinal data. An analysis of the effects of a new public works project would use different indicators and sources, with a focus on short-term impact and more reliance on local data. For example, the 11th Street Bridge Park, a large-scale planned public works project, has developed an Equitable Development Plan to ensure residents are not displaced. The project incorporates administrative and program data to evaluate the initiative's efforts to increase equity in its impact area. Your project may also be directly related to a specific development project, such as a new park or transit extension. If so,

an analysis might use data from before and after the extension or reference comparison sites in other cities.

As documented in Chapple and Zuk's (2016) review of early warning systems focused on gentrification and displacement, the most common approaches for analyzing neighborhood change are retrospective (describing past neighborhood change) or current (analyzing risk factors at the present time). If a project is meant to *predict* where neighborhood change will happen next, or where families will be most vulnerable to displacement, your methodology will need to model or project changing conditions in future time periods. Predicting changes or specific impacts of projects or policies is still challenging because of limitations in data availability and analytic methods. To develop models better equipped to be early warning systems, researchers and cities might increase the amount of open, interconnected data at the local level and integrate administrative data across multiple city agencies.

The Boston NNIP partner Metropolitan Area Planning Council (MAPC) provides one example of predictive analysis to estimate the effects of the proposed extension of the Green Line (Reardon, Martin, and Partridge 2014). They identified four pathways for displacement. The first mechanism was households having to move due to rising rents. They predicted changes in rent prices around the proposed stations by applying the rent premiums found around preexisting stations, along with the extent of cost burden. The others were conversions of rental buildings to condominiums, landlords opting out of federal subsidy programs at the time of expiration; and rising property taxes for homeowners. They examined various data sources related to these issues and projected the potential number of households affected.

Geography

Several design decisions in an analysis relate to geography. One is scale (i.e., what is the geographic unit of the analysis?). The choice will be driven in part by data availability and the accuracy you need. Census tracts are a common choice because they are standard geographies for many national datasets with baseline characteristics. But an analysis using census tracts may not capture changes in smaller areas. One analysis of Minneapolis examined changing racial, education, and income characteristics of residents at the block level from 2009 to 2013, which revealed potential signs of gentrification that earlier census tract-level analysis missed (Matson 2016). For an analysis using estimates at the census block group level, such as the American Community Survey (ACS), margins of error may also constrain what you can confidently conclude about change.

Although these census geographies are natural places to start, it is important to consider how community members view their own neighborhoods. Residents may not see their community as

being bounded by one or more census tracts. Doing research or gathering community feedback on neighborhood boundaries informs whether you need to consider developing custom geographies.

Another geographic consideration is how you will contextualize neighborhood-level change. Having a comparison (either geographic or temporal) will shed light on the significance of any change. Several nonexclusive options exist for geographic comparisons. Most analyses of neighborhood change use a multilevel approach (e.g., including an indicator that compares a census tract with a citywide average). For instance, Rebounding Neighborhoods in Older Industrial Cities compares a neighborhood's score on its neighborhood vitality index to the median for all census tracts in St. Louis.

Alternatively, multiscalar analysis recognizes that neighborhood change does not always comport to defined geographies. Such an analysis might identify a central point of a census tract and analyze change in indicators for rings at several distances, such as 1, 2, 5, and 10 miles out. A multiscalar analysis might find that although an indicator for the census tract is changing at a similar rate to the citywide average, it is changing more rapidly than areas 1 mile out and less rapidly than areas 10 miles away. One example is the recent blog post "Predicting Gentrification using Longitudinal Census Data," which uses the Neighborhood Change Database to develop a predictive model that incorporates spatial lag of housing prices, a tract's proximity to other high-cost tracts, and spatial clustering of high or low housing prices. The drawback of a multiscalar analysis is the difficulty of interpreting the relationships between your indicators and scale. Data limitations may also make multiscalar analysis impractical, so multiscalar geographies appear more rarely in neighborhood change projects.

Time Period

You also need to define the time period for your analysis, including the baseline date from which you will measure change. Neighborhood change can occur slowly over a long period of time or rapidly because of new investment. Using national data sources at the tract level often means accessing data that are several years old or aggregated over multiple years. Many researchers analyzing neighborhood change use data from the decennial census or the five-year ACS because of the national coverage, wide selection of indicators, and ease of access. These provide useful baseline information, but the analyses are limited by the lag in publishing and by the difficulty in discerning recent changes in a five-year average. Local administrative data offer a more up-to-date picture of neighborhood change but need investment of time to access and process. The effort of getting the timelier data may be required to capture rapidly changing conditions or recent shocks.

The Displacement Alert Project in New York, developed by the Association for Neighborhood Housing and Development, collects administrative data on a small set of indicators that are updated frequently, such as property sales from the New York City Department of Finance, which are updated monthly. Community groups in Cuyahoga County, Ohio, use Case Western Reserve University's Neighborhood Strategy Technology tool to make investment decisions on specific properties, so the data must be up to date. The tool's parcel-level data on mortgages, deed transfers, foreclosures, code violations, building permits, and land bank transfers are updated weekly.

Typologies and Indexes

The core part of your analysis of neighborhood change will be the indicators you choose and how those indicators are used to describe the type of change you are measuring (e.g., are you measuring gentrification in neighborhoods or displacement of residents?). The second part of the guide will provide detailed information on indicators and their corresponding data sources. This section will review methods of analyzing the indicators you choose and reporting the results.

The simplest method of measuring neighborhood change is to track relevant indicators over time. The Displacement Alert Project Map tracks loss of rent-regulated units in New York City as an indicator of neighborhood speculation. You would need to determine the time period of the analysis, such as looking at the past five years or the previous quarter. This approach benefits from being easy to interpret and communicate. But neighborhood change involves many interconnected variables. Showing only each individual variable's change over time may not convey the overall story of change.

Indexing multiple measures is one way to give a sense of overall change in a topic area. A housing change index might compile change in median housing costs, share of low-income renters paying more than 30 percent of their income for rent, and number of federally subsidized units per 1,000 households. The measures included in an index might be chosen in several different ways. The report "Mapping Susceptibility to Gentrification" used a regression model to identify factors in the Bay Area that were most associated with gentrification (defined as a central city neighborhood with housing price appreciation above the regional average and household income at or below the 40th percentile of regional household income in the starting year). For their Turning the Corner project, Data Driven Detroit (an NNIP partner) used factor analysis to identify groupings of indicators to include in their neighborhood change index. Other models have used a qualitative approach to survey the community and generate indicators that are most associated with changes in their neighborhood.

Typologies, or classifications based on general types, are another method for capturing the complexity of neighborhood changes. Typologies can show multiple stages and dynamics of neighborhood change and portray the reality that these changes happen differently in neighborhoods even within the same city. Each typology will use certain indicators and criteria to describe where a neighborhood is on the spectrum of change. They can be used in concert with indexes or can be compiled directly from indicators. The Urban Displacement Project's review of the Bay Area separates low-income tracts from moderate- to high-income census tracts based on the share of low-income households. Within these two types of census tracts, the typologies are defined as such:

- Not losing households with low incomes or very early stages
- At risk of gentrification or displacement
- Undergoing displacement
- Advanced gentrification (low income census tracts) or advanced exclusion (moderate and high-income census tracts)

The Bay Area analysis used such factors as the strength of the housing market, presence of transit-oriented development, historic housing stock, loss of market-rate affordable units, loss of low-income households, and population growth. Although this analysis used the values of the indicators directly, it is possible to create typologies based on a neighborhood's score on an index.

A list of prior studies using indices or typologies, and the methodologies used, are included in the Turning the Corner neighborhood change literature catalog on the NNIP website, including the commonly used typology from the City of Portland's Gentrification and Displacement Study (Bates 2013) and the more recent market segmentation analysis from the Mapping Displacement Pressure in Chicago (Institute of Housing Studies 2018).

COMMUNICATING RESULTS

An analysis of neighborhood change is only as useful as the ability of government actors, stakeholders, and community members to translate the findings into action. Being able to communicate results is a two-step process. As mentioned earlier, to make your results understandable, identify your target audience so that you can determine the appropriate length, tone and language. The analysis and its implications will have more impact if they make sense to people who are not familiar with data. Using accessible language, providing accurate labeling for data visualizations, and appropriate context are all important steps for telling a clear story with data. In discussing neighborhood change, addressing the effects of racism, segregation, and disinvestment on neighborhood conditions is critical to accurately communicating how and why neighborhoods are changing. Engaging community members,

translating communications into languages other than English, and being intentional about images used in products are all ways of being thoughtful about the history of structural racism in cities (Brown, Kijakazi, Runes and Turner 2019). Weaving in qualitative data from interviews or focus groups with your quantitative findings can provide context and help resident voices come to the forefront.

The second step is deciding the best formats to communicate your results. Reports may be useful for complex topics, particularly when your audience has technical knowledge. If your audience is broader and less familiar with data or has limited time to digest full reports, infographics and fact sheets are useful ways to communicate important information. The Detroit and Phoenix teams in the Turning the Corner project developed interactive story maps that allow community members to see their neighborhoods and the conditions in their given indexes and indicators.

The analytic team should also involve community members throughout the process to provide context for trends, aid in interpretation, and ground-truth quantitative data (Pettit, Cohen, and Levy 2019). In instances where deeper community connections are a goal, interactive data presentations, such as data walks, can democratize data and bring your findings directly to community members. In Milwaukee's Amani neighborhood, Data You Can Use (an NNIP partner) provided training and prepared visuals for residents themselves to present the findings from an analysis of neighborhood conditions to their neighbors.

INDICATORS AND DATA SOURCES

This guide focuses on existing data that are available nationally or are commonly available from local governments. National datasets provide a wide range of indicators and common set of geographies. But administrative data can provide information that relates to different conditions, can be timelier, and often have address-level records. In many cases, administrative data and national data are used in concert. For instance, Urban Institute's DC Preservation Catalog collects data from the city's Department of Housing and Community Development to track at-risk subsidized housing, in combination with national sources of housing subsidy data.

This section offers helpful notes on sample indicators and how to use each source, but does not go in-depth into the process for collecting, cleaning, or storing data. If the data are administrative or national, they may have already been compiled by a local data intermediary, like an NNIP partner. If a data intermediary is not present in your area or if you need additional data sources, you will need to have in-house capacity or seek out assistance from other local entities, such as applied research centers at local universities.

Household surveys, which are not explored in this guide, can supplement findings from administrative data. The Turning the Corner team in the Twin Cities developed an online survey to capture resident perspectives in their three focus neighborhoods. As another example, the Community Wellbeing Survey, conducted by the NNIP partner DataHaven, has a large-enough sample size to report on all the New Haven neighborhoods.

Two additional overview guides from the Urban Institute can help you identify data sources and develop indicators:

- Using Data to Assess Fair Housing and Improve Access to Opportunity (2017). A guide designed to help community organizations understand types of data and how to think strategically about using data, particularly related to HUD's Assessment of Fair Housing process. The guide provides commonly used data sources and indicators for small geographies.
- Catalog of Administrative Data Sources (2008). This NNIP guide describes 42 commonly available data sources from city and county agencies and gives examples of the indicators that can be constructed from each.

RESIDENT CHARACTERISTICS

Knowing who lives (and has lived) in a neighborhood is the first step in tracking neighborhood change. An understanding of the people and households in the focus area provides a baseline for any analysis and can reveal the potential risk for displacement. Specific groups, such as households with low incomes, renters, elderly households, and people with low levels of formal education, are likely to be at higher risk of being forced to move because of rising housing prices or landlord tactics. Measuring changes in advantaged groups, such as non-Hispanic white households, high-earning households, and people with high levels of formal education, will indicate when the neighborhood composition is changing.

Data from the US Census Bureau, including the Decennial Census and the American Community Survey, are often used to track resident characteristics. But census geographies change. For analyses that track characteristics over multiple decades, three datasets offer decennial census data standardized to the latest tract boundaries: the Neighborhood Change Database, Brown University's Longitudinal Tract Database, and the National Historical Geographic Information System.

The American Community Survey (ACS)

The ACS is one of the most commonly used data sources in neighborhood change analyses because of its breadth of topics (e.g., demographics, housing, education, and income) and national scope. The ACS is most useful in the neighborhood change context for providing a snapshot of conditions in a five-year period, analyzing changes over longer periods (e.g., 2005–15), or identifying areas that might be vulnerable given past conditions.

Despite the survey's size, its estimates have limitations. Though one- and five-year aggregate data are released each year, the five-year aggregation is the only one with estimates for census tracts and suitable for neighborhood analysis. This means data will be averaged over five years, making any rapid change hard to identify. The margins of error for small geographies and subgroups can be quite large when using the five-year data, indicating there is considerable variability around the estimate. When using these estimates, users should be cautious about comparing census tracts at a point-in-time or interpreting trends. The margins of error should be accounted for when comparing any two estimates. For example, if a 2015 estimate plus or minus its margin of error overlaps with the corresponding 2014 estimate and its margin of error, you cannot conclude that those two estimates are different. In other words, the difference is not statistically significant (see the instructions on statistical testing noted below). The Census Bureau has released a tool for statistical testing.

American Community Survey data can be accessed through American Fact Finder or downloading comma-delimited file from the US Census Bureau's website. The National Historic GIS (NHGIS) website also has an easy-to-use query system to extract select tables or geographies.

Race and Ethnicity

Racism is inextricably tied to the history of housing in the US. Restrictive covenants, redlining, and violence were all used to prevent people of color from building wealth or living in areas of opportunity. Current racial inequities in housing, income, and access to high-quality education all prove that racism is not just a historical issue. Race or ethnicity should be incorporated into any analysis of neighborhood change. Changing racial or ethnic compositions may displace communities culturally as well as physically. As consumers of different races move into an area, businesses that cater to newcomers may displace longer-term establishments with connections to longer-term residents. Cultural practices and connections may falter as communities become dispersed and new residents with different practices replace them.

Most definitions of gentrification include a racial or ethnic component where white households replace households of color. Data on race or ethnicity usually come from the ACS, which includes variables that track race, ethnicity, and country of origin. The Los Angeles Index of

Neighborhood Change uses ACS data to track percentage change in non-Hispanic white residents as one of six demographic indicators to measure change.

In addition to the ACS, two other national small-area data sources can provide insights on the changes in the racial or ethnic composition. The Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) has block-level data on race and ethnicity of most workers from 2002, but the data are lagged by several years (latest year at the time of publishing is 2015). Data available nationally from the Home Mortgage Disclosure Act also enable tracking census tract–level changes in race or ethnicity for owner-occupants who purchase their homes with a mortgage in a given year.

Home Mortgage Disclosure Act (HMDA) Data

HMDA requires most mortgage lending institutions in metropolitan areas to disclose data about loan applications and approvals. The data include individual loan application records, including property census tract, loan amounts, approval or denial status, and borrower and lender characteristics. HMDA indicators should be viewed with caution in places with significant shares of cash sales. This source is also most useful in areas with substantial shares of condominium buildings or single-family homes.

Indicators about owner-occupant borrowers can help suggest trends in the race, ethnicity, and income of new homebuyers. Looking at the median home loan amount or categories of amounts can show trends in home values. Finally, the share of investor-owned homes can be one sign of increased market interest or expectations of rising values. For more information, see Urban Institute's *Guide to Home Mortgage Disclosure Act Data* or the FFIEC website.

Local data also include race and ethnicity for certain groups. Trends in the racial or ethnic composition of births by neighborhood can be obtained via vital statistics, as described in a NNIP guide. Public school enrollment data offer a way to view changes in the race or ethnicity of children enrolling over time. Data should be ideally summarized by the child's home address, particularly in jurisdictions with school choice. The Institute of Metropolitan Opportunity at the University of Minnesota's analysis of gentrification used flat school enrollment by non-Hispanic white students to argue against the notion of significant gentrification in target neighborhoods.

Although these data sources may offer more precision than the ACS, they may be lagging indicators of neighborhood change. Neither vital statistics nor school enrollment data capture changes in young, childless adults, the population often assumed to be among the first people to gentrify an area. Data on home sales may not capture changes in renter populations that are more mobile and more likely to be vanguards of neighborhood change.

- Data Sources
    - American Community Survey and decennial census data
    - Home Mortgage Disclosure Act data
    - Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics
    - Urban Institute's public-use LODES data (census tract summaries)
    - Local vital statistics data
    - Local school enrollment data

Income

Income measures are essential to fully understanding how a neighborhood is changing and identifying households with low incomes who are most vulnerable to displacement from rising housing costs. You should consider which income measure fits your analysis, whether for individuals, families, or households, and whether it is measured in absolute dollars, relative to a regional median, or by poverty status. Indicators of per capita income can establish whether a neighborhood overall is thriving or struggling economically, while the poverty rate or share of households earning below 30 percent of the area median income helps you understand economic hardship or stratification. A gentrifying central city area may see a faster rise in household or nonfamily income, as new residents may be more likely to cohabitate with unrelated adults.

Often, income data come from the ACS, but the Internal Revenue Service provides zip code–level summaries of tax filings by income bracket. HMDA data also include borrower income for each loan that can be used to track census tract–level changes in income for owner-occupants who purchase their homes with a mortgage.

Local administrative data include indirect signs of income composition, such as receipt of food stamps or other public assistance. The interpretation of changes in the prevalence of public assistance will require local knowledge if there have been changes in policy or practice that may have affected any trends.

There are many examples of income being used as an indicator in studies of neighborhood change. The Rebounding Cities analysis by the University of Missouri–St. Louis used per capita income as one of three measures of a neighborhood vitality index using data from the Neighborhood Change Database. They used the index to identify census tracts that had rebounded (tracts that were once below the median of all tracts and had increased from 1990 to 2000 or from 2000 to 2010). Income data can also be readily combined with data on other costs, such as housing. Measures of population by income bracket can be used to identify the share of people who can afford the area's median rent.

- Data Sources
    - American Community Survey
    - Home Mortgage Disclosure Act data
    - Internal Revenue Service Individual Income Tax ZIP Code data
    - Tax Policy Center Earned Income Tax Credit Interactive Database (query system for downloading ZIP code data)
    - Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics

Education, Age, and Household Type

Gentrification is often defined as having a class component as well as a racial or ethnic one. In addition to income, indicators of education level, age, and household type are common measures of how new households may have different backgrounds and structures than longer term households. The first groups to gentrify an area are thought to often be young, childless, well-educated adults. With the influx of households that do not have children, neighborhood culture can change. Amenities directed toward families may be replaced with bars, retail, and nightlife that appeal to young adults. An influx of people with higher levels of formal education can both signal that increasing investments in an area as well as changes to neighborhood culture.

The ACS is the most common data source on population characteristics by education, age, and family size. Changes in adults with college degrees, neighborhood age distribution, and household size are usually presented alongside other indicators to show demographic change. The Philadelphia Research Initiative primarily defines gentrification by income changes but presents changes in residents with bachelor's degrees as an indicator of interest in its report on neighborhood change in the Philadelphia area. LODES data also provides data on one segment of the population: resident workers by age or by education level summarized at the block level.

Data from the school system also can reveal trends on neighborhood children. In a study of neighborhoods in Washington, DC, researchers linked new home sales to student records to document that new movers in gentrifying neighborhoods had fewer schoolchildren and how that varied for single-family homes, condominiums, and multifamily rental buildings (Turner et al. 2006).

- Data Sources
    - American Community Survey and decennial census data
    - Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics
    - Local vital statistics data
    - Local school enrollment data

Tenure

Tenure, the distinction between renters and homeowners, has several uses in a neighborhood change analysis. Tenure in combination with low incomes and high housing burden indicates the specific risk of displacement. Renters with low incomes are less able to afford rent increases. Homeowners with low incomes may struggle to pay increased property taxes as home values rise. In addition, changes in tenure can be used to identify housing market changes. Increases in the share of homeowners may reflect wealthier residents with higher levels of formal education moving into the neighborhood and purchasing homes. This may contribute to displacement risk by reducing the amount of available rental housing.

The ACS and decennial census data include data on homeownership. HMDA can also provide trends in the ratio of owner-occupied mortgage loans and investor ones. Some local governments have differential tax rates or abatements for homeowners, so there may be a field indicating ownership in the real property data. This should be evaluated with caution, knowing not all homeowners will take advantage of the credit and some investors not living in the home will have the financial incentive to claim the credit.

In the Gentrification and Displacement Study of the city of Portland, change in the share of homeowners was used alongside change in the share of adults with bachelor's degrees or higher, and the white population share was used to represent the demographic dimension of neighborhood change. The work of the Southwest Boston Community Development Corporation and Tufts University in measuring displacement in Southwest Boston illustrates the use of tenure as a risk indicator, including renter housing cost burden and share of renters as two factors for measuring displacement risk.

- Data Sources
    - American Community Survey and decennial census data
    - Real property assessor's data

HOUSING MARKETS AND CONDITIONS

As newer residents with higher incomes move into a neighborhood, they signal that the market values housing at higher price points. This can trigger higher housing sale prices, rising rents, and pressure from landlords aiming to redevelop. All of these can contribute to residents with low incomes being pushed out of the neighborhood. Fewer subsidized housing units, widespread evictions, and increased tax foreclosures are some of the conditions associated with gentrification and displacement from neighborhood change. While these data sources are listed individually below, they can reveal further insights when linked at the individual property

level and analyzed over time (Treuhaft and Kingsley 2008). A forthcoming NNIP guide will offer technical guidance on different types of local property data sources (Pettit et al., forthcoming).

Home Values and Sales

Renters are more vulnerable to displacement arising from gentrification, but homeowners are often affected, too. Homeowners face pressure from tax increases because of higher property value assessments, and the potential for changing norms around beautification or upkeep may generate additional costs. Neighborhood change may also bring increased incentives to sell to speculators and higher risk of housing scams. These pressures can accelerate the loss of homeowners with low and moderate incomes from revitalizing neighborhoods.

The ACS provides owner-reported information on median home value and categories of home value. Other than the ACS, indicators based on home sales data are most commonly used to capture the status of a housing market. An increase in the number and price of home sales can indicate an accelerating housing market. This can increase pressure on homeowners with low-incomes and reduce the amount of housing available for renters. Home sales and prices are generally available from city or county assessor's offices. Data on sales and prices can also be downloaded from commercial real estate firms. For instance, Zillow provides data on home sales, indexes of home value, and sale price. Trends in the number and amount of home mortgage loans, even though they only represent a subset of the total home sales, can be other useful indicators of the neighborhood housing market (see HMDA box on pg. 15)

Changes in home prices might be used in more forward-looking analysis. A recent analysis on predicting gentrification using longitudinal census data in 29 cities used home prices as a dependent variable for a predictive model of neighborhood change.

- Data Sources
    - American Community Survey
    - Home Mortgage Disclosure Act data
    - Local real property sales data
    - Private-market real estate listing

Rents

Many analyses of neighborhood change include tracking rent prices in the focus area. Rises in rental prices are early indicators that there is increasing demand from households with higher incomes. Because renters tend to be less financially stable than homeowners and are subject to landlord decisionmaking, renters with low-income are particularly vulnerable to displacement from gentrification.

The ACS publishes median rents and categories of rental costs for census tracts and is the most common data source on rental prices. Proprietary firms catering to the developers may conduct periodic rental surveys to publish ZIP code level data. These sources potentially only cover rents in a subset of the market such as larger buildings or focus on high-end market.

Real-time rental listing websites offer the potential for updates on the prices that households are seeing on the ground. (A note that it is against the current terms of service to aggregate data from the most common online source, Craigslist.) Zillow publishes median rent list price and a Zillow Rent Index for neighborhoods and ZIP Codes. Users need to use local knowledge to interpret the data since Zillow listings are not a complete view of the market, but trends over time can be one input in an analysis. Other local listing services, such as PadMapper, have been used to compile data on rental prices. Rent aggregators may represent specific segments of the rental market, and there is likely to be some bias that should be accounted for. MAPC in its Dimensions of Displacement report used point data from 2011 and 2013 listings of PadMapper in several analyses, including developing a methodology for calculating rent premiums associated with proposed transit stations. In some communities, the growth of Airbnb short-term rentals may also be affecting the supply and costs in the rental market, contributing to displacement pressures.

- Data Sources
    - American Community Survey
    - Private-market rental listing aggregators
    - Airbnb rental listings

Vacant and Blighted Properties

Local context is critical to interpreting indicators of vacancy and blight. Increases in these indicators can reflect long-term disinvestment through abandoned housing and deteriorating physical conditions due to lack of upkeep. Or increases can indicate renewed interest in an area if many previously-occupied buildings are in the midst of being gutted for renovation and changing norms led to increased code enforcement.

This fact is complicated by the ways that vacancy and blight might be measured. National-level sources include US Postal Service data on addresses where mail is or is not being delivered. The US Department of Housing and Urban Development publishes tract-level data quarterly for use by nonprofit organizations and public agencies. Direct marketing companies, such as Valassis, repackage and sell the address-level records. These data can be used to approximate vacant or blighted homes, illustrated by a report by the Data Center on blight in New Orleans using estimates based on US Postal Service data. A report by Capital Impact Partners also used

Valassis to identify occupied addresses and the number of households at risk of displacement in the revitalizing Midtown neighborhoods.

Data on blight are not available for the nation but can be obtained through local data on code violations or 311 calls and reports. Utility data, while hard to obtain, can provide detail on occupancy trends. In practice, however, data such as water shutoffs are messy and difficult to interpret. Data Driven Detroit's Turning the Corner work included several indicators of vacancy and blight in its index of social advantage. Neighborhood context is important, as high rates of 311 calls might reflect a disinvested neighborhood or new wealthy residents making increasing numbers of calls. For instance, a study of 311 calls found that service requests occur more frequently in fuzzy ethnic and racial boundaries than at more polarized borders (Legewie and Schaeffer 2016)

Many places have also conducted visual surveys to gather up-to-date data on property or neighborhood conditions. Although these surveys have generally been used to track abandonment or other signs of housing distress, tracking these indicators could also show signs of a stronger housing market and of owners' investment. The Buffalo research team in Turning the Corner conducted a block-by-block survey to document housing types, commercial properties, and new development; guidance can be found in Silverman (2015). The NNIP partner organization at the University of Pittsburgh also published their protocol and training for others to adapt and use. Motor City Mapping, a project from 2013 to 2017 that surveyed all residential properties in Detroit, is another well-known example.

- Data Sources
    - HUD aggregated USPS data on vacancies
    - Private direct marketing companies
    - Local 311 data
    - Local utilities
    - Local code enforcement records

Public and Subsidized Housing

The presence of subsidized housing can be an indicator of a neighborhood's resiliency to displacement, and the rates at which such housing are lost can be an indicator of an increasingly strong housing market. Any analysis needs to separate out public housing, privately owned subsidized housing, and housing choice vouchers (which are connected to the household, not the unit). As a neighborhood gentrifies, private owners of subsidized housing have a greater incentive to sell their property or convert it to market-rate housing. The housing authority may also consider redeveloping public housing as mixed-income projects. A reduction in the number of households with housing choice vouchers could indicate that rents have risen above the allowed amount or that landlords are less willing to accept households with vouchers.

On the positive side, subsidized housing can maintain affordability in the face of rising rent prices, and increasing the amount of subsidy spent on affordable housing is often cited as a strategic policy to combat displacement.

The National Preservation Database offers data on subsidized housing from several national sources, including A Picture of Subsidized Households, the Multifamily Assistance and Section 8 Contracts Database, the Low-Income Housing Tax Credit Database, and the US Department of Agriculture Rural Housing Data. The National Preservation Database offers the most comprehensive national source of subsidized housing data and is updated three times a year. For an analysis that requires more frequent updates (for instance, the Section 8 data updates monthly), it is also an option to access these data sources individually, including A Picture of Subsidized Housing, Low Income Housing Tax Credit data, and the Section 8 and Multifamily Database. These national data can also be linked with data on local housing subsidies to create a fuller picture of subsidized housing.

To assess the risk of losing subsidized units, it is common to look at the number of units expiring in the short term. The MAPC analysis identified expiration of subsidized housing units as a displacement risk and reported on the number of housing units set to expire within 1, 6, 11, or more than 11 years. As acknowledged in the MAPC report, this provides only a measure of potential units lost from the affordable housing stock, as units with expiring subsidies may become affordable at a market rate or may have their subsidy renewed.

- Data Sources
    - National Housing Preservation Database
    - Section 8 and Multifamily Database
    - A Picture of Subsidized Housing
    - Low Income Housing Tax Credit
    - Local housing agency
    - Local housing authority

Evictions and Foreclosures

Though evictions are a tangible form of displacement, they can be difficult to track. Using evictions as a measure of gentrification is complicated by the task of discerning which evictions are caused by rising housing prices or landlord tactics versus a change in family income. Additionally, an eviction can displace a family from its current housing unit but does not necessarily mean displacing that family from the neighborhood.

Historically, nationally available eviction data have been nonexistent, and most analyses relied on local data obtained from the court system. In 2018, the Eviction Lab released a national dataset of evictions. But the data quality is still a work in progress for some areas of the country. There are many instances of local organizations collecting data on evictions, such as the

University of North Carolina at Charlotte Urban Institute's report on evictions in Charlotte-Mecklenburg.

Because of the difficulty obtaining the data, eviction indicators have rarely been used in analyses of neighborhood change. Additionally, eviction data can be tricky to interpret. A traditional assumption might be that increases in income in an area would increase evictions, but it is possible that in hot-market cities, gentrification might be correlated with a drop in evictions as wealthier households move in. Though there may be difficulties in interpretation, community input may add clarity and these data are salient in policy conversations for many cities.

Mortgage and tax foreclosures share similarities to evictions within the context of measuring neighborhood change. Residents feel the effects, but it can be difficult to attribute the effects to changes in the neighborhood housing market. Although the Eviction Lab provides a national dataset for evictions, data on neighborhood-level foreclosures still must be obtained from local or proprietary sources. The Woodstock Institute's data portal has data on foreclosure filings and auctions by community area pulled from Record Information Services, a private-sector firm. The University at Buffalo analyzed the patterns of city tax foreclosures in three neighborhoods at risk of displacement, concluding that city actions accelerated the loss of people of color with low and moderate incomes.

- Data Sources
    - Local recorder of deeds
    - Local real property data and tax assessments
    - Eviction Lab
    - Local housing court

ECONOMIC ACTIVITY AND INVESTMENT

Although most research on displacement focuses on housing, economic conditions play a significant role in neighborhood change. Changes to the built environment through the addition of new buildings and businesses may accelerate demographic change. Increases in business activity and capital investments signal changes that may endanger or present opportunities for longer-term, small business. These changes may also affect how remaining longer-term residents experience the neighborhood. Even if these residents are not displaced, the neighborhood they were accustomed to may become increasingly unfamiliar.

Business activity

Changes in business activity can be an early indicator of changes in neighborhood culture. As new residents move in, new establishments arise to meet new demand, increasing costs of

commercial rent. Simultaneously, long-term businesses may lose the clientele they relied on as people are displaced. They are forced to either adapt to the new population or close. This can also contribute to longer-term residents' sense of cultural displacement (Cohen, Pettit, and Levy 2019).

Research by Bajaj, Kingsley, and Pettit (2005) suggested that ZIP code business pattern data could be used to analyze the availability of resident services in a neighborhood. Similar methodology could be used to track change in the number and types of businesses offering residential services. Local and state requirements for licensing of different business types vary, but the data often are publicly available.

In addition, several proprietary data sources provide lists of businesses. As one illustration of using proprietary data, Karen Chapple purchased the National Establishment Time Series data to analyze the causes of commercial gentrification. In general, it is difficult to ascertain data quality of proprietary sources, and they are likely better at adding new businesses than removing closed ones. The Roadmap for Inner City Business Data Collection from the Initiative for a Competitive Inner City compares proprietary data sources and walks through an example in Boston that combines proprietary data with primary data collection.

Business changes and commercial gentrification remain areas of vast potential for future research as online data sources, such as Yelp, that track businesses refine their data-sharing practices. They may become a significant source of data on businesses. Such data could allow real-time tracking of business closings or openings, classified by the services they offer and the clientele they serve. The Phoenix Turning the Corner project illustrates why such data could be valuable. They conducted a survey of businesses in Phoenix with Google Street View and found that the Maricopa Association of Governments data, which reported only on businesses with more than five employees, left out, in some neighborhoods, more than half the area businesses.

- Data Sources
    - Local or state business licenses
    - Proprietary sources, such as InfoUSA or Dun and Bradstreet
    - Yelp

Building and Demolition Permits

Building permits include requests for city permission for new construction or renovation and can be a telling indicator of development. Demolition permits may also provide useful information, depending on the context of a city, on which communities have faced long-term disinvestment or where revitalization is occurring. The data are generally considered nonconfidential and are increasingly available on cities' open data portals.

The Displacement Alert Project uses number of permits for renovation, new construction, and demolition filed in buildings with at least one rent-controlled unit as one of three indicators of displacement risk. Building permits in these buildings are used to track potential renovations or additions that might push longer-term residents out. The Data Driven Detroit Turning the Corner project used both demolition permits and construction permits for building improvements as inputs to their indexes of social advantage and protective activities, respectively. Demolitions in a census block were used as an indicator of long-term disinvestment. They also note that in their original plans for creating a predictive model, they thought building permits might be a viable dependent variable. They eventually found it unworkable because it would have yielded a building-level predictive model rather than a neighborhood-level one, and there were too few permits at the parcel level for a regression model. This suggests such a model might be viable as a building-level early warning system in a hot-market city with more permits.

- Data Sources
    - Local building permit data
    - Local demolition data

Public and Private Capital Investment

Local governments and private actors invest in neighborhoods in a variety of ways through infrastructure investments, community facilities, and housing and business loans. Tracking these investments can help identify which neighborhoods are seeing an increase in resources. Combining this investment data with local context may help create an early warning about which neighborhoods may facing significant change.

The Urban Institute did an analysis on racial segregation and capital flows in Baltimore, mapping various sources of neighborhood capital flows along with the racial composition. They also published a guide to measuring capital flows and gaps, with an appendix listing many public and proprietary data sources. Accessing and cleaning some of the data sources can be costly and time-intensive, but others are more manageable. Local data sources can give you another place to start. As part of the Turning the Corner project, the University of Buffalo analyzed the city's local investment data on facilities, parks, and streets and from HOME and the Community Development Block Grant (CDBG), and a targeted local homeowner tax abatement program.

- Data Sources
    - HMDA Community Reinvestment Act data
    - Small Business Administration Loans
    - Local expenditure data from federal CDBG and HOME programs
    - Various proprietary sources (see Theodos et al. 2018)

NEIGHBORHOOD CONDITIONS

Changes in neighborhood conditions can drive demographic, housing and economic change. Availability of transit, reported crime rates, and perceptions of safety are often major considerations for wealthier, mobile households. The possibility of transit to drive new investments in neighborhoods and potentially creating displacement effects has become a focus for many cities. Understanding how these conditions interact with larger population trends can help provide context for the underlying drivers of neighborhood change.

Transit Access and Use

Transit infrastructure may make a neighborhood more desirable, increasing housing costs for existing residents and accelerating displacement. These effects likely differ across neighborhoods within the same city.

Transit can create context for other indicators. The University of Maryland developed a gentrification index using tract-level median household income increases from 2000 to 2014. Then, stops along the Purple Line were superimposed over the map of the index indicating whether the nearby tracts were at high risk for gentrification. Fare data can be used to analyze station use patterns, as in the study of this New York City transit system. Station use patterns can be a more direct indicator of neighborhood change. Newer forms of transit, such as bikeshare, may also provide data on access and use. Any analysis of these data should consider how people of different race, ethnicity, and income are likely to use a given mode of transportation.

- Data Sources
    - Local station use data
    - Local bikeshare data

Crime and Safety

Though public safety and perceptions of neighborhood safety affect neighborhood change, it can be difficult to untangle the relationships between reported crime rates, feelings of safety, and neighborhood change. Crime rate data are commonly used to indicate a neighborhood's relative safety. But, as highlighted in the Turning the Corner thematic cross-site brief, public safety encompasses more than crime data. Public safety also is affected by relationships with neighbors, policing, and feelings of belonging. (Cohen, Pettit and Levy 2019b).

Many local police departments make data on reported crime available online through open data portals. These can be used to construct crime rates and show changes over time. Experiences from the Turning the Corner sites illustrate the need to look beyond the total rates to rates of specific types of crime, which may shift due to new residents or changing businesses

(Cohen, Pettit and Levy 2019b). People should take care in interpreting trends in crime rates because it can be difficult to discern causality, reported crime might fluctuate due to policy or enforcement changes, and imprecise analysis can further stigmatize disinvested neighborhoods. Historic racism and denial of economic opportunity, changes in neighborhood norms, and policing of neighborhoods that are experiencing gentrification make it essential to contextualize quantitative data on crime.

Other potential data sources on safety, such as 911 or 311 calls, offer useful information for capturing other aspects of public safety, but suffer from similar issues of interpretation as reported crime. Changes in the number of calls may be a result of changing neighborhood conditions, new residents, or changing norms around reporting issues.

- Data Sources
    - Local 311 and 911 data
    - Local reported crime

CONCLUSION

The study of neighborhood change is constantly evolving. This guide is a starting point for those interested in beginning to analyze this change. There are indicators that have not been explored here that might be relevant to a specific city or neighborhood. As the data available from technology, social media, and smartphones increase, they may yield indicators that are helpful to predicting neighborhood change. The NNIP network is always looking for new ideas, new data sources, and new ways to increase community access to data. As you develop your work, feel free to reach out to the National Neighborhood Indicators Partnership at nnip@urban.org to suggest additional data sources or to share examples of analyzing data to prevent displacement.

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NNIP is a collaboration between the Urban Institute and partner organizations in more than thirty American cities. NNIP partners democratize data: they make it accessible and easy to understand and then help local stakeholders apply it to solve problems in their communities.

For more information about NNIP, go to www.neighborhoodindicators.org or email nnip@urban.org.