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Title: A Call to Engage: Considering the role of gentrification in public health research

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Abstract

As interest in incorporating gentrification into public health research grows, so too does the need for developing conceptual models and methods for understanding the role of dynamic processes such as gentrification in assessing neighborhood effects on health. This requires public health researchers to engage in ongoing active debates within the social sciences on the definition, causes and consequences of gentrification, going beyond the simple application of measurements borrowed or adapted from the social sciences. Having a stance on gentrification informs measurement, the research question, study design and the role of gentrification in quantitative models employed by public health researchers.

Keywords: Gentrification, neighborhoods, urban health, cities

Introduction

Strengths of epidemiologic and public health research include a concern for using valid and reliable measures of constructs, and in formulating clear and straight-forward research questions and hypotheses. Public health researchers also pay careful attention to study design, and carefully weigh the pros and cons of design options when analyzing data and reporting results, being particularly careful to follow strict guidelines and to air on the side of caution when making causal claims. This pragmatic approach is often driven by a desire to translate study results into action by developing evidence-based policies or other interventions to improve population health and health equity. At the same time, perhaps stemming from the relative unknown nature of the causes of disease (as we see in the black-box epidemiology strategy), we tend to be weak in developing and utilizing social theory. Our concern for precision and clarity lead us away from more complex understandings of the realities in which people live and in which health outcomes are produced. Yet over time, particularly as a focus on health equity and the social determinants of health has emerged, and as efforts to control and treat non-communicative disease via policy and interventions focused on health-related behaviors fail, the importance of conducting analyses that place our straight-forward questions within the more complex social, political and economic reality, harnessing a transdisciplinary approach, has become clear. Delving into the myriad of complex social constructs that start to get at this reality, such as gentrification, maintaining our concern for valid measurement and study design, we must also figure out how to incorporate such constructs. For example, in typical public health research design, when studying the potential impact of gentrification on health, we must decide not only how best to measure gentrification, but also whether gentrification is a direct exposure, an effect measure modifier, or a mediator, and base these decisions on a clear theoretical argument of how it relates to other variables in our study. To do so adequately requires us to engage with existing social science literature on the topic and to reflect our positions on the various existing arguments and debates in our analytic and methodological decisions.

Gentrification is defined as a process of neighborhood change through which the demographic, real estate, and business characteristics of a place reveal a transition towards a more educated, wealthy, whiter population, able to afford new or renovated, more expensive homes while also fomenting new cultural and consumption practices.[1–3]

Much research focuses on how long-term residents of gentrifying neighborhoods, particularly residents who are likely to be marginalized experience gentrification and what impact this process has on the livelihoods and social outcomes of marginalized residents. Although gentrification has been a topic of debate and research in the social sciences since it was coined by Ruth Glass in 1964,[4] the topic has only recently gained attention in public health research, responding in part to growing public concern, and discussion as this process becomes more widespread and acute. Meanwhile, key debates among gentrification scholars continue, questioning for example, whether gentrification is indeed responsible for the forced displacement of middle- and lower-class residents,[5,6] and whether displacement, or social/cultural exclusion in which residents remain but the cultural and social environment no longer reflects long-term residents' own values, leads to worse life chances and well-being for lower class long-term, or displaced residents.[7] Debates continue also about the definition and best measurement practices for gentrification.[8] Given the growing awareness of gentrification in recent years, particularly among urban residents, it is thus not surprising that the field of public health has shown a recent interest in accounting for gentrification in quantitative research.[9–14] However, to date, public health scholars have engaged little with the social science literature and debates on the topic, opting instead to adopt or adapt the quantitative measurements from past research often without a clear theoretical framework.[15] Clear and transparent positions on these debates, and the rationale behind decisions that inform the approach, theory and analysis undertaken would strengthen public health research on this topic.

Since its origins in early public health research and activism, such as the work of John Snow, the "father of epidemiology", the study of neighborhood environments and health has evolved. Initial importance of the physical aspects of ones' living environment such as basic sanitation, have grown to incorporate aspects of the social environment such as neighborhood-level poverty and neighborhood racial or social segregation.[16] Moving forward, researchers focusing on neighborhoods and health are currently making efforts to incorporate the complexity of neighborhoods, highlighting the importance of developing conceptual models for our understanding of the causal pathways by which neighborhoods may affect health, and including dynamic processes such as gentrification.[15–17] Further, many argue that taking a systems approach that incorporates the dynamism and complexity of cities is necessary,[18,19] taking into account the possibility for non-linear or dual directional causal relationships between

the political, social and economic forces that govern neighborhood environments. This shift toward a systems approach better reflects the reality of neighborhood environments, which are not static as many quantitative models would imply, but constantly evolving.

As with other social determinants of health, neighborhood social and physical environments also have political and economic causes, consequences, and dimensions, falling outside of the realm of quantitative models used to study epidemiologic relationships, but with important implications for the health effects of neighborhood and urban environments. For instance, considering histories of and policies that have led to uneven urban development in cities greatly informs how and why the health of marginalized residents of a disinvested, segregated urban neighborhood may be worse than the health of privileged residents of a wealthy suburban development, in addition to the health effects of individual and institutionalized racism and classism (often included in public health analyses by adding an individual's social class, race and other personal characteristics to analyses). Living in a disinvested neighborhood, particularly as a member of a marginalized group, means greater exposure to environmental hazards, access to fewer health-promoting resources (health care, healthy food options, etc.), and greater risk of experiencing stress and/or physical harm due to violence, all leading to worse health outcomes. Without considering the layered experiences of marginalized residents, testing the effect of various aspects of the neighborhood environments on health, such as the direct relationship between neighborhood-level poverty and general physical health, will fall short of supporting progress toward creating healthier cities and communities.

One recent systematic review found that among articles published using quantitative methods to study the relationship between gentrification and health in public health journals, none included a specific theoretical or historical framing for why gentrification may affect health.[15] Omitting such a framing, as well as not engaging purposefully in existing debates on gentrification, may lead to misleading results as without this, there is often no way to distinguish between the effects of gentrification and those of urban renewal and other related processes which may be measured with the same quantitative measurement as gentrification.[5,15,20,21] As highlighted by others,[18,19] studying health in the context of complex and dynamic urban environments requires us to evolve, developing new methods and conceptual models to address complex

problems. In the following sections, I present several topics and debates from the study of gentrification and discuss their relevance for public health research. These topics and implications are summarized in Table 1. This is not an exhaustive list, but is meant instead to instigate thoughtful dialogue and decisions made by public health researchers as we begin to delve into this important topic backed by a vast literature from the social sciences.

Model Building: Hypothesized Pathways

First and foremost, one essential decision made by researchers is to determine where gentrification lies in the hypothesized model being tested: is it an exposure, an effect modifier or a mediator, and what other variables appear in the model (see Figure 1)? Hypothesized pathways by which exposure to gentrification may affect health have been proposed,[15,17,20] including: changes to the neighborhood social environment such as increased drug and alcohol consumption;[22] changes to patterns of violence or other neighborhood security issues;[23,24] changes to the built environment such as decreased traffic safety with the influx of car and other traffic in gentrifying neighborhoods;[25] and changes in the institutional-level determinants of health such as the quality and existence of schools, access to healthy food and patterns in the availability and quality of health care.[10,26,27] Together, these neighborhood changes may lead to intervening individual-level determinants of mental and physical health such as changes in dietary patterns, physical activity, drug and alcohol use, healthcare-seeking behavior, and a host of mental health risk factors such as stress, double trauma, and fear.[17] In addition to these detrimental effects of gentrification, some also argue that aspects of urban renewal which may occur along with gentrification provides improved infrastructure, and resources resulting in better quality of life and health for residents.[15] This myriad of pathways highlights the challenge of interpreting results of studies conceptualizing gentrification as a simple direct exposure.

Emerging research in public health focusing on gentrification often treats gentrification as a direct exposure measure,[9,12–14] see Figure 1a, seeking to evaluate whether health outcomes are influenced by exposure to neighborhood gentrification. Responding to discussions around who benefits from gentrification, and who does not, existing research also highlights differences in the effect of gentrification itself by race/ethnicity, social class or length of residence in the neighborhood, showing in

general that the health effects of gentrification processes may be beneficial for dominant racial or class groups while harming those of ethnic or racial minorities or lower socioeconomic classes.[9,11] This makes sense in that gentrification tends to occur in areas exemplifying known health inequities due to the legacy of uneven urban development, slowly (or quickly) changing the character and demographic makeup of the neighborhood as new wealthier, whiter populations move in. For example, residents of long disinvested neighborhoods, which are often primarily lower income and minority neighborhoods, often experience worse health outcomes than others. These same neighborhoods, due to a lack of investment leading to low property prices, are those in which a "rent gap"[28] places the neighborhood at risk for gentrification. Thus, considering existing race and class inequities, and patterns of segregation, in a city is essential when evaluating the role of gentrification in influencing health. This is often operationalized in analyses by testing race/ethnicity, social class, or length of residency as an effect modifier in the relationship between gentrification and health, asking whether exposure to gentrification has the same effect on health among different subgroups.

Although there are many pathways by which exposure to gentrification may impact health in both positive and negative ways, as described above, we must also consider that in addition to exposing residents to a myriad of new or modified conditions, the process of gentrification also acts as a modifier itself by changing how or to what extent residents may be influenced by other aspects of the neighborhood environment (see Figure 1b). For instance, one study revealed that the relationship between exposure to green space and health varies by level of neighborhood gentrification, where those living in gentrifying neighborhoods experienced positive effects of neighborhood active green space whereas those in already wealthy or not gentrifying neighborhoods experienced no such benefit.[26] Similarly, the health benefits of other neighborhood amenities or aspects of the social or physical environments may also be moderated by gentrification.[21] If instead of affecting residents directly, gentrification changes how residents experience certain aspects or changes to their neighborhood environments, such as neighborhood revitalization or urban renewal processes[21] or urban green spaces,[29] we could then conceptualize gentrification as an effect modifier rather than a direct exposure.

A dual effect moderation is also possible- combining the conceptualization of gentrification as an effect modifier with the importance of persistent social inequities by social class and/or race in understanding neighborhood effects on health responds to a well-known debate in gentrification research- that is- do original long-term residents who are not displaced benefit from neighborhood change that is indicative of gentrification? If many of the changes that we might classify as indicators or examples of gentrification may benefit ones' health, such as the presence of new retail outlets offering healthier food options (e.g., organic grocers or restaurants, often in neighborhoods that were previously food desserts or mirages), it is important to understand whether the benefit of these changes is extended beyond the benefit to new residents who are often the intended clientele for new businesses in gentrifying areas (e.g., new organic food stores with high prices, thus catering to new wealthier residents while excluding lower income, longer term residents).[27] Operationalizing this debate can be done by considering whether a dual modification (see Figure 1c), in which exposure effects vary not just by neighborhood gentrification status but also by social strata, tested by including a cross interaction term between gentrification and social strata. For instance, in the study mentioned above, green space benefited residents who may be considered "gentrifiers" (that is, wealthier or better educated residents who are among those moving to a disadvantaged neighborhood, exemplifying the process of gentrification) while poorer residents and those with lower levels of education did not experience the same benefits of exposure to green space.[26] Meanwhile, a study conceptualizing the health effects of urban renewal and revitalization, hypothesized that due to gentrification, benefits may similarly be reserved primarily for higher income residents.[21]

An additional debate in the social science literature concerns the potential causes of gentrification, as well as the directionality of relationships between potential causes and gentrification. Hypothesized causes of gentrification generally fall into the categories of *production*, in which the addition of luxury amenities is thought to attract wealthier residents, and in turn instigate change, or *consumption*, in which wealthier residents find an area attractive perhaps due to location or lower real estate prices, which then spurs development and changes indicative of gentrification.[4] Thus, one may question, for example, whether urban renewal in cities may lead to gentrification, or whether gentrification processes, and particularly the attraction to gentrifying

neighborhoods of wealthier residents with greater political clout and power, then encourage the renewal or revitalization of neighborhoods, particularly in formerly disinvested neighborhoods which often lack infrastructure and other public amenities. Thus, the production side of this debate places gentrification as a potential mediator between new amenities and health outcomes,[21] or more aptly, between new amenities and health equity, whereas the demand side places gentrification as a precursor to the development of new amenities (see Figure 1d). Thus, the researchers' position in this debate should inform how the concept of gentrification is included in their conceptual framework and subsequent analysis.

Measuring Gentrification

Quantitative assessments generally employ demographic data and other geographically-specific economic data (such as change in housing or rental prices), often incorporating multiple dimensions of population change over a period of time. Methods vary in terms of which dimensions of change are valued and in turn included in measurements of gentrification, with some for example, focusing exclusively on changes in median income and excluding consideration of other potential demographic changes,[30,31] or changes in investment indicative of gentrification,[6] or the importance of non-wealthy populations who may be conceptualized as "gentrifiers" such as artists, students, or others.[32] The neighborhoods identified as gentrifying by these measurements thus vary,[8] and no gold standard exists. One recent study highlighted a stark difference (identifying 5.2%, 6.1%, and 46.7%, respectively, of census tracts as gentrifying or at risk of gentrifying) when comparing three existing methodologies in the San Francisco Bay Area.[33] Such discrepancies in measurement would likely lead to quite different results in studies considering gentrification as an exposure, depending on the sensitivity and specificity of the measure. To date, public health studies measuring gentrification have largely adopted modified versions of measurements developed by, or modified from Freeman,[6,9,12,14,34–36] but decisions, and modifications, about which measurement is used is rarely discussed or justified.[15]

Defining Scope in Time and Space

Our initial understanding of gentrification derives from the study of urban areas, such as Ruth Glass' initial analysis of a London neighborhood, but as gentrification becomes more widespread, some have noted its occurrence also in periurban and rural areas.[37] While urban gentrification follows patterns of uneven urban development leaving many disinvested areas in urban centers,[3,38] but some have noted that in rural areas, lower property prices and cultural values such as the appeal of nature and cultural heritage have also attracted wealthier residents resulting in the displacement or exclusion of long-term residents.[39,40] This too is a debate with consequences for public health research, specifically in determining the appropriate scale of analysis, selection of cases, and definition of study populations and geography. Most public health studies on gentrification to date have focused on specific cities or metropolitan areas. However, two recent articles have expanded analysis to an entire state of California, encompassing rural, periurban and urban areas of one of the largest US states and making direct comparison between them,[14,22] and one study looks at the relationship between gentrification and health in cities across the entire United States.[12] Such analyses where the same measurement is used across multiple geographies and scales assumes homogeneity of the process. However, some argue that the same measurement cannot be used for all settings, as the process varies by context. Thus, we must ask whether gentrification should be considered in different geographies, if it is appropriate to use the same measure exactly across very different settings in the first place, and to what extend studies of different areas can be compared.

Additional methodological questions concerning geographic scale include the question of defining the appropriate comparison areas for benchmarking changes associated with gentrification including the question of using city or metropolitan area boundaries. Measurements determining which neighborhoods are gentrifying also depend on the availability of data at an appropriate geographic scale, generally at a scale that can be used as a meaningful proxy for neighborhoods, often the census tract. As administrative boundaries do not correspond to residents' experiences of their neighborhoods, and therefore to their real exposure, the spatial unit chosen for analysis can be assumed to introduce error.[41] Meanwhile, as with other studies of neighborhood geographies and health, the modifiable areal unit problem (MAUP) that the relationship between spatial data is influenced by the size and shape of aggregated areas, must also be taken into account, and considered in analysis and the interpretation of results.[42]

In addition to defining the geographic scope of a study, defining the timeframe of a study should also be theoretically backed and matched to the context of the area being studied. Thus researchers should reflect on the specific hypothesized drivers of gentrification and their timeframe in their study area- for example, if state-led development is seen as a driver, what and when was the impetus for this development (hosting a large international event, zoning changes such as up-zoning or the establishment of development zones, etc.), then the timing of such drivers should be considered when deciding the timeframe within which to measure gentrification. The timing of various drivers of gentrification may vary between areas, thus complicating comparisons. Further, external factors with impacts on social and economic changes of a neighborhood or city should also be considered. For example, the timing of the financial crisis affecting many cities, to various degrees, in the 2000's had substantial impact on many of the variables which may be used to measure gentrification such as property values and income, and at the same time the financial crisis is thought to have influenced health,[43] thus the crisis may confound results if the time during which the crisis occurred is also used to study the effect of gentrification on health.

Some consider gentrification as a staged process, in which neighborhoods are considered to be experiencing weak vs strong or early vs late gentrification depending on the strength of the gentrification measurement or the time during which gentrification seemed to appear, hypothesizing that outcomes may vary by stage of gentrification.[36,44] Finally, in measuring health effects, an appropriate lag time between gentrification, other neighborhood changes and measurements of health outcomes must be considered. How soon after a neighborhood begins to gentrify might we begin to see a specific health effect that is related to gentrification? This depends on the nature of the health outcome being measured, where perceived general health or stress for example may be more sensitive to recent neighborhood changes whereas diagnosed heart disease or mortality may take longer to appear.

Defining the appropriate scope in both time and space is of course dependent on the existence of data for measuring both exposures and outcomes, which often limits feasibility to precisely pinpoint timeframes and geographies, and the ability to use longitudinal data which would be ideal for understanding and analyzing time-related issues. The decisions made by researchers about how to measure gentrification must be evaluated by readers, along with whether such studies can be compared across settings.

Thus researchers should outline their thinking and justify measurement and conceptual decisions so that readers have enough information to make use of the study.

Limitations for studying the Health Effects of Gentrification

As with many of the concepts central to the study of social epidemiology, urban health, and neighborhood health, one core challenge with studying the effects of gentrification is that gentrification itself is difficult to measure, and is often defined and measured in different ways depending on the context, the orientation of the researcher, and the availability of data. Thus, one must question whether studies measuring the concept in different ways are testing the same concept, or slightly different ones, which has implications for the ability to compare results across studies and locations. Measuring gentrification is made even more difficult due to its complexity and multi-dimensionality, and ongoing debates around its meaning and definition.

In addition to limitations relating to the measurement of gentrification, the existence of or limitations on access to data which include measures of health, race or social class, and geographic location at the individual level also places limitations on using gentrification in quantitative public health research. This particularly the case in operationalizing the potential dual effect modification of gentrification with social stratification, as this analysis requires nested data with individual-level demographic indicators and specific locations linking individual-level data to area-level data used to measure gentrification. When data is available only at the census tract-level or above, it is not possible to then stratify results within census tracts by social strata, which is necessary to understand how gentrification may affect within-neighborhood health equity.

The majority of research cited here utilizes quantitative methods, as does traditional epidemiology. It is important to consider also that not all questions are appropriately analyzed using quantitative methods and that qualitative or mixed methods research have an important role to play in addressing many of the contextual questions around how gentrification may influence health, and in helping researchers to interpret and frame quantitative results. Such framing and contexts may be particularly important in understanding policy implications of results, such as providing further understanding of what policies or other protections may protect residents from adverse health or other outcomes in the face of gentrification and possible displacement.[5] In

addition, true transdisciplinary collaborations between fields such as public health and various social sciences, such as geography, sociology, and political science, would strengthen research that bridges the study of gentrification and with health equity.

Conclusion

The inclusion of gentrification in public health research has the potential to push the field of public health forward by acknowledging the more realistic, dynamic nature of the political, physical and social environments which, along with biological determinants, shape the distribution of health outcomes. This requires us to think carefully not only about the measurement of gentrification employed in our research, but also about how we conceptualize the process of gentrification in the theoretical models driving our analyses. This means also engaging in the many active debates about gentrification such as its causes, consequences, and potential interventions to prevent its negative impacts. Taking a position on these debates leads to important and necessary decisions about how we operationalize gentrification and what role we conceive gentrification to play in the conceptual models that we aim to test.

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Figure 1: Conceptualizing gentrification as an exposure, mediator, or effect modifier

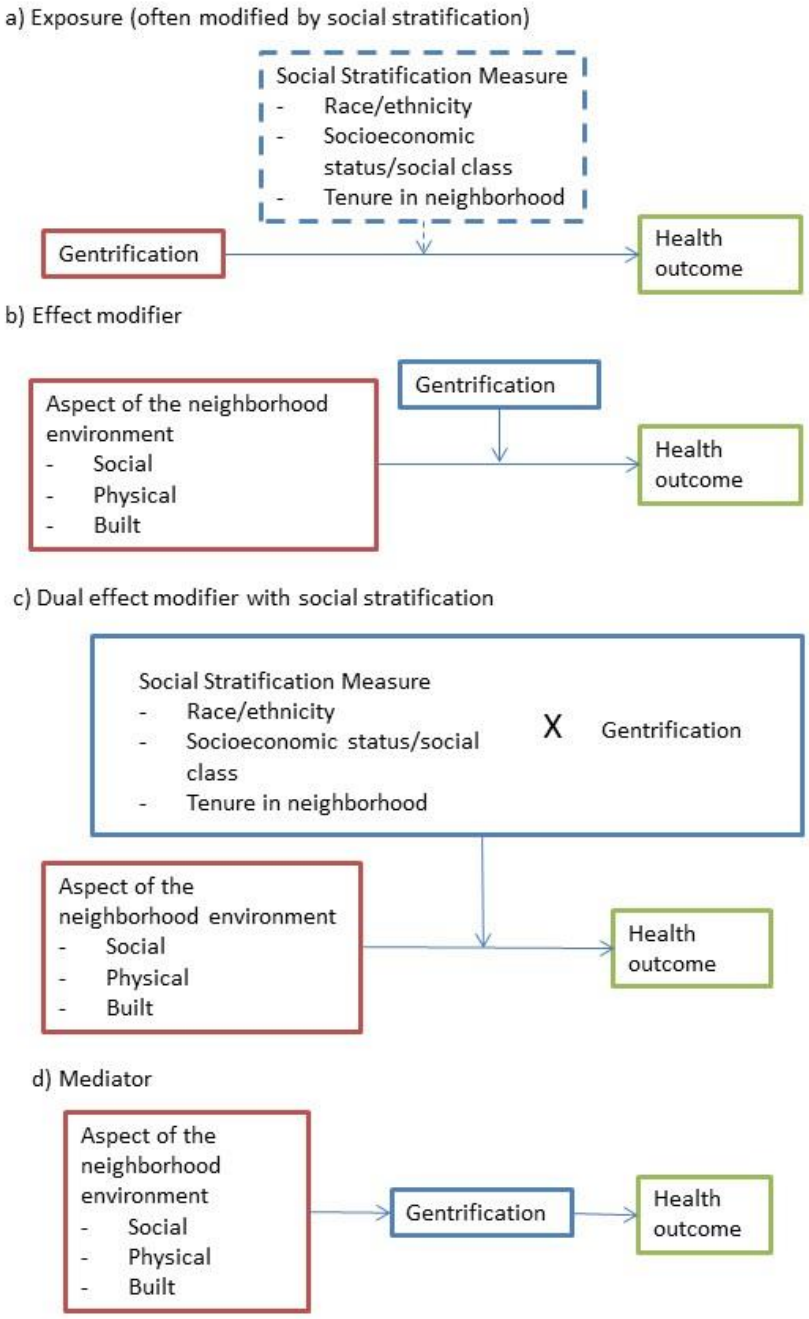

Table 1: Investigators take on key arguments in current debates around gentrification have implications for the treatment of gentrification in public health research.

Gentrification Debate	**Implications for Research Design and Methodology**
Considerations for the measurement of gentrification	
How is gentrification defined?[1–3]	
• Gentrification is marked primarily by local changes in economic indicators: increases in land prices leading to higher rents and home sale values	• **Gentrification measurement** includes only economic indicators.
• Non-economic indicators such as changes in the socioeconomic and cultural makeup of residents are also indicators of gentrification which have implications for the wellbeing of residents	• **Gentrification measurements** include demographic data in addition to economic measures.
Who are "gentrifiers"? Populations of interest in gentrification research.[4–10]	
• Artists (see Ruth Glass' original essay coining gentrification, and additional discussions on waves of gentrification led by artist communities) • Race/ethnic group (particularly reflecting on histories of segregation, racist policies maintaining structures of disinvestment and social disadvantage along racial lines)	• The role of subpopulations in the gentrification process has meaning both for the **measurement of the gentrification** process (which demographic and socioeconomic indicators are included in the measurement) and which subpopulations may be at a disadvantage in the gentrification process (who is it that stands to "lose" and who "wins"?).

• The Creative Class (made popular in more recent years, playing a role in neighborhood change accompanying tech industry development, for example) • Socioeconomic class (education, income, wealth, profession)	• These may also have implications for **sampling strategies** in the case primary data is being collected.
Considerations for scope in time and space	
Where does gentrification occur?[11–13]	
• Gentrification occurs only in inner cities which have a history of disinvestment	• Studies focus on urban residents.
• Gentrification is more widespread, and can happen also in rural or peri-urban areas	• Studies may include suburban or rural areas.
What is the correct timeframe during which we might observe gentrification? Are stages (early vs late) of gentrification important?[14,15]	
• Neighborhoods showing signs of gentrification in some earlier time period may show delayed impact on long-term residents • Early vs late-stage gentrification processes are marked by different characteristics and may have distinct effects on residents	• What is the expected **lag time** for the health effects of gentrification? • The **timeframe used to measure gentrification** must be conceptually sounds, balanced with: 1) available data, 2) correspondence with the timeframe of health and other data being linked to gentrification measures, 3) consideration for important external events such as economic recessions

	• Does measuring gentrification during different **timeframes** in relation to the heath data change the results of the study?
Considerations for model building and defining exposures	
What are the principal causes of gentrification?[16–20]	
• Gentrification is primarily caused by excess supply of luxury amenities	• Gentrification may serve as a **mediator**, conceptualized as a mechanism by which new luxury amenities or aspects of the neighborhood environment affect the health of residents. This relationship could also be moderated by socioeconomic class, race, or other social strata, or by a **dual interaction between gentrification** and social strata.
• Gentrification is primarily caused by an increase in demand for luxury amenities, driven by new wealthier residents with greater political clout, who were initially attracted to the neighborhood for other reasons	• Gentrification is conceptualized as **a primary exposure**, with new amenities potentially mediating the relationship between gentrification and health of residents, with or without moderation by social strata.
• Gentrification may be caused by a mixture of demand and supply principals and may vary by instantiation	• Is using the same measure of gentrification across cities and countries appropriate? As above, decisions should be theoretically justified.
Does gentrification lead to physical displacement of lower income, minority or longer-term residents?[21,22]	
• Gentrification leads to undesired displacement due to rising costs of housing	• Ideally, longitudinal data is used and includes former residents, and information on reason for leaving the neighborhood.

• Gentrification causes no specific increase in displacement	• Error caused by in- and out-moving is mentioned as a potential limitation, but is not expected to overly bias results.
Does gentrification lead to decreased opportunity and life chances for lower income, minority, or longer-term residents?[21–23]	
• Longer term residents, as new residents, benefit from neighborhood improvements that may be counted as indicative of gentrification	• **No moderation** by social strata is expected. • Length of residents may be included as a length/intensity of exposure measurement.
• Longer term and/or less advantaged residents tend to be excluded from new amenities due to cultural contrasts, issues related to cost of living, or other reasons	• **Moderation** is expected by social strata and/or length of residence.

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