Geospatial Health 2025; volume 20:1388

Urban gentrification and infectious diseases: an interdisciplinary narrative review

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Abstract

Urban gentrification, the transformation of neighbourhoods by influx of new residential groups, leading to displacement of lower-income communities, is a complex, multifaceted process with significant but generally unexplored public health implications. This study focused on the impact of this process on infectious disease dynamics investigating key factors such as sociodemographic disparities, economic conditions, housing and urban environmental changes. A systemic literature research was performed based on the search terms: gentrification and infectious disease in PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar, with additional references identified using the snowballing method. After screening the resulting 542 articles, 14 studies were selected based on relevance, with data were extracted through a consensus-driven process. This review identified the complex challenges posed by gentrification in the context of infectious disease dynamics and burdens providing valuable insights both to academic discourse and public health policy discussions. Gentrification may contribute to higher infection rates within specific urban neighbourhoods or among certain residents. For blood-borne and Sexually Transmitted Infections (STIs), gentrification leads to reduced access to essential healthcare services, including HIV and STI testing, particularly among marginalised populations, such as female sex workers and LGBTQ+ communities. For airborne diseases, gentrification can exacerbate health inequalities by increasing residential overcrowding and displacement from gentrified areas to more disadvantaged suburbs. Housing and urban planning associated with changes in the urban environment are primarily linked with vector-borne diseases, tick-borne diseases in particular, among displaced populations. We advocate the use of spatial epidemiology to examine the potential impact of gentrification on the risk for infectious diseases. Since many gentrification metrics are area-specific, mapping and visualising key indicator data can pre-emptively support practical decision-making. This approach also helps capture the complex dynamics of displacement and the within-place changes experienced by populations affected by gentrification, which might affect infectious disease dynamics. Finally, we outline key research priorities to bridge existing knowledge gaps in future multidisciplinary research on infectious diseases and gentrification.

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Key words: gentrification; infectious diseases; socioeconomic status; urban environment, urban change; displacement; public health.

Ethics approval and consent to participate: not applicable.

Availability of data and materials: not applicable.

Conflict of interest: the authors declare that they have no conflict of interest.

Contributions: BK, drafted the manuscript, reviewed the literature, analysed the included articles; GP, assisted with collation of papers for the narrative literature review, conducted written reviews of 5 of the papers and significant editing of the paper; SN, assisted with collation of papers for the narrative literature review; CL, critically reviewed the manuscript and provided significant comments for the text organization; BS, critically reviewed the manuscript and provided significant comments for the text organization.

Acknowledgments: we sincerely appreciate Robert Bergquist, Chief Editor of Geospatial Health Journal, for his editorial contributions, which significantly improved the clarity and flow of the text.

Received: 12 March 2025.
Accepted: 4 April 2025.

Geospatial Health 2025; 20:1388
doi:10.4081/gh.2025.1388

Introduction

In this narrative review, we embark on an exploration of the nexus between gentrification and infectious diseases. We dissect the historical antecedents of gentrification, tracing its evolution from urban renewal initiatives to its contemporary manifestation as a global urbanisation phenomenon. Concurrently, we explore infectious diseases dynamics within the urban milieu, where factors such as population density, housing conditions, and socioeconomic disparities converge to shape disease dynamics (Ali *et al.*, 2018; Niu *et al.*, 2020; Pini *et al.*, 2019). Through an interdisci-

plinary lens, we aimed to uncover the nuanced mechanisms through which gentrification may amplify or attenuate infectious disease risks.

The first section of this paper examines both historical and current insights into gentrification, infectious disease and urbanisation and how these intersect. Section two builds on section one delivering a "Conceptual Model of Gentrification and Infectious Disease". In section three we conduct a narrative of the current literature on gentrification and infectious disease. Spatial epidemiology to study gentrification and evidence-based recommendations for this is discussed in section four, where we also present ideas about future research.

Section 1

The history of gentrification

Gentrification, as a transformative force in urban development, finds its roots in the post-World War II era, when Western cities experienced waves of deindustrialisation and suburbanisation (Gigantino, n.d.). Initially, it emerged as a response to urban decay, with affluent individuals seeking to rejuvenate dilapidated neighbourhoods. These pioneers, drawn by the allure of historic architecture and urban proximity unwittingly set in motion a process that would fundamentally alter the socio-economic and cultural composition of urban areas, particularly those impacted by World War II (Gigantino, n.d.). The use of the term "gentrification" is attributed to Glass (1964), who, in the mid-1960s observed social and housing market changes in London as the middle class began migrating back from the suburbs displacing the working class (Pegler *et al.*, 2020).

Over the ensuing decades, gentrification evolved from a localised phenomenon into a global urbanisation trend (López-Morales, 2015). The dynamics of gentrification began to intersect with broader economic forces, including globalization, neoliberal policies (Gulson, 2009) and the proliferation of technology hubs (Cai, 2022). This confluence propelled gentrification beyond its past definition, permeating diverse cities across continents. In recent literature, significant attention has been devoted to exploring both the adverse and beneficial outcomes of gentrification (Anguelovski *et al.*, 2021) alongside an examination of the factors that contribute to the phenomenon (Shi *et al.*, 2021).

Exploring gentrification

Gentrification, a multifaceted and complex process characterized by the influx of wealthier residents into historically marginalised urban neighbourhoods, has become an emblematic force shaping urban landscapes worldwide (Bhavsar *et al.,* 2020). Gentrification causes changes in the social and spatial composition of these marginalised urban areas (Van Leeuwen, 2024). Some have argued that gentrification occurs in "waves," in which first-in-movers are lower-income people with higher levels of educational attainment whose housing location choices are often driven by affordability considerations rather than a deliberate attempt to "gentrify" an area. These first in movers are also attracted by a desire for racial, ethnic, and/or class diversity, which are more abundant in these areas, but they are often themselves displaced by future waves attracted by the improved stability and conditions of these neighbourhoods that occur due to the influx of the first in movers (Zuk *et al.*, 2018). Conversely, others posit that gentrification is planned by governments under the guise of "urban renaissance," "urban renewal" or "revitalisation" to deconcentrate the urban poor in an attempt to reign in local social problems, like crime, vandalism, drug abuse and massive unemployment (Van Leeuwen, 2024). "Wave" models have also been used by Hackworth and Smith (2001), who examined the involvement of governments in the process of gentrification (Hackworth & Smith, 2001) and more recently by Aalbers (2018), who proposes that we are now in a period of gentrification which is the urban materialization of finance-led appropriation (Aalbers, 2018).

In recent times, neoliberal policies have been cited as a key driver of gentrification and continued segregation in both the U.S. and Europe (Kelly, 2014; Van Gent, 2013; Wyly & Hammel, 2004). Recent elections across the globe have seen a rise in right-wing governments, which foreshadows increases in neoliberal policies (Dialogues, n.d.) which have the potential to increase the gentrification of urban areas in affected countries.

The gentrification phenomenon, driven by economic, social, and cultural transformations, redefines the physical and social fabric of communities, often with profound implications for the health and well-being of their inhabitants (Smith *et al.*, 2020).

Differentiating gentrification from other forms of socioeconomic processes

It is crucial to differentiate gentrification from other socioeconomic processes such as urban revitalisation, economic development, and displacement. Gentrification is specifically characterised by the influx of more affluent residents into historically lower-income neighbourhoods, leading to increased property values and living costs that often displace long-term, lower-income residents (Bhavsar *et al.*, 2020; Finio, 2022). Unlike general urban revitalisation, which aims to improve infrastructure and economic conditions without necessarily altering the demographic makeup, gentrification inherently involves a demographic shift with profound social and economic implications (Cole, Mehdipanah, *et al.*, 2021). Economic development encompasses a broader scope of activities designed to enhance economic health and quality of life, typically at a regional or city-wide level, and does not inherently result in the targeted displacement effects seen in gentrification.

Displacement, while a component of gentrification, can occur due to various other factors such as natural disasters, housing policies, and redevelopment projects, which may not involve an influx of higher-income residents (Sax *et al.*, 2022; Shaw & Hagemans, 2015). The key distinguishing feature of gentrification is the systematic movement of wealthier individuals into gentrifying neighbourhoods, which can lead to a cascade of socioeconomic changes, including alterations in the local culture, shifts in political power dynamics, and the potential intensification of health disparities (Lim *et al.*, 2017; Schnake-Mahl *et al.*, 2020).

Additionally, there has been recent interest in the gentrification effects of short-term rental platforms such as Airbnb, which are associated with rises in rent and housing value as well as an increase in the percentage of higher-income, more-educated, and white residents in formerly lower-income, less-educated, and non-white neighbourhoods. The association between Airbnb and gentrification has been found to strengthen as it commercialised with professional and corporate hosts. Airbnb commodifies housing, enabling investors to pursue profit maximisation. This drives up rent and housing values, displacing low-income tenants and facilitating gentrification which in turn can lead to diminished community cohesion, health equity, and residents' quality of life (Park *et al.*, 2023).

Historic infectious disease outbreaks

In the annals of urban history, several pivotal infectious disease outbreaks stand out. These outbreaks, often intertwined with socioeconomic factors, have profoundly influenced the trajectory of public health and urban development. During the 19th century, rapid urbanisation coupled with inadequate sanitation facilitated the rampant spread of cholera, typhoid, and other waterborne diseases in burgeoning industrial cities across diverse countries, including England, France the U. S. and India (Parry, 2006; Snow, 2002). These epidemics laid bare the stark disparities in living conditions between affluent and impoverished urban neighbourhoods, underscoring the profound influence of socio-economic factors on disease susceptibility and transmission (Jenson & Szabo, 2011; Smith, 2002).

The early 20th century witnessed the scourge of the Spanish flu, a global pandemic that swept through the world, including urban centres. A recent systematic review synthesised the results of studies on the 1918 influenza pandemic and showed that the highest disease burden were reported in people with low socioeconomic status (Mamelund *et al.*, 2021). Subsequent decades saw outbreaks of tuberculosis, fueled by crowded tenements and inadequate healthcare access in urban slums (Kiani *et al.*, 2021).

More recently, the HIV/AIDS epidemic of the late 20th century, now a pandemic, revealed the complex interplay between urban social networks, stigmatisation, socioeconomic status, education, behaviour and disease transmission (Karon *et al.*, 2001).

The COVID-19 pandemic represents the most recent global concern regarding infectious diseases, causing substantial mortality and severe health outcomes. Socioeconomic disparities exacerbated by gentrification can influence health outcomes and access to healthcare resources which could contribute to both COVID-19 incidence rates and deaths (Anguelovski, *et al.*, 2021; Hwang & Shrimali, 2023; Hyra & Lees, 2021), with studies employing diverse spatial epidemiological approaches to support this claim (MohammadEbrahimi *et al.*, 2021; Mohammadi *et al.*, 2023).

These historic infection waves serve as important reminders of the strong and enduring relationship between infectious diseases and urban socioeconomics. As we probe further into the contemporary landscape, it becomes evident that gentrification, with its potent capacity to reshape urban spaces, carries implications for infectious disease dynamics that merit meticulous examination.

Urban renewal and infectious disease

There have been attempts to look at the effect of urban renewal on infectious diseases especially in light of the COVID-19 pandemic. In Spain, an urban renewal programme showed positive effects on COVID-19 infection rates (Fernández-Barrés *et al.*, 2023). Conversely in Africa, urban renewal programmes often focus on beautification of city centres, something, which often leaves growing slum populations just a few kilometers away to suffer disproportionately from underlying health conditions that complicated COVID-19 infections by leading to high mortality (Alonge & Wadinga, 2021). In the USA, neighbourhoods adjacent to those targeted with "planned shrinkage" to disperse poor people and allow urban development, experienced significantly increased levels of infectious diseases, HIV/AIDS in particular (Fullilove, 2003). While the current literature provides a broader understanding of urban renewal and its connection to infectious diseases (Davis, 2022), it lacks emphasis on the necessity to investigate the intersection between gentrification and burden of infectious disease (Tulier *et al.*, 2019). Urban renewal encompasses various processes, including gentrification, yet delving into the specific health implications of gentrification necessitates focused inquiry (Cole, Mehdipanah, *et al.*, 2021). Shifting from discussions on urban renewal to explicit examinations of gentrification's impact on infectious disease dynamics can enhance our understanding of the distinct challenges and opportunities presented by this phenomenon.

Infectious diseases and urban planning

Gentrification is associated with urban planning, which results in improvements to the urban environment. Urban planning plays a pivotal role in shaping infectious disease dynamics within cities, particularly for airborne diseases and vector-borne diseases (Neiderud, 2015). Effective design can mitigate transmission, as demonstrated during the ongoing SARS-CoV-2 pandemic (Oh *et al.*, 2021). In cities with well-maintained parks and green areas, outdoor activities like walking or jogging reduce indoor crowding, which decreases the likelihood of respiratory virus transmission such as COVID-19 (Bulfone *et al.*, 2022). Beyond pandemics, effective urban design can also reduce transmission during non-crisis periods when there is persistent background infectious disease transmission. Infrastructure improvements, such as sanitation systems with clean water supply, promotion of social distancing measures, accessible healthcare facilities, green spaces and thoughtful urban design can collectively reduce the frequency and intensity of outbreaks and background disease rates (Yang *et al.*, 2023). Urban planning thus serves as a proactive strategy to combat infectious diseases, ensuring the health and well-being of urban populations in crisis and non-crisis situations alike. Notably, a recent study (Aguilar *et al.*, 2022) on intra-urban flows in diverse cities reveals two predominant types of responses to epidemics. Hierarchical cities, characterised by concentrated flows, are vulnerable but highly responsive to mobility restrictions. In contrast, cities with sprawled habitation exhibit slower epidemic spread with weaker responses to restrictions.

As gentrification transforms urban neighbourhoods, planners must be attuned to the evolving needs and vulnerabilities of the community. This necessitates a proactive approach to urban design that considers the diverse health profiles and social dynamics of both incoming and existing residents. Moreover, urban planning should embrace principles of inclusivity, ensuring that the benefits of gentrification are equitably distributed (Shaw & Hagemans, 2015). This includes provisions for affordable housing, accessible healthcare, and community spaces that cater to all segments of the population, mitigating potential disparities in health outcomes (Howell, 2016).

Different forms of gentrification have varying consequences for infectious diseases. Environmental gentrification, characterised by investments in previously neglected or polluted neighbourhoods, can significantly alter the urban landscape (Pearsall & Anguelovski, 2016). As these areas undergo revitalisation efforts, such as improved infrastructure and green space development, they often experience demographic shifts and changes in socioeconomic status which are common outcomes of gentrification (Mullenbach & Baker, 2020). While these transformations may bring benefits such as enhanced living conditions and increased property values, they can also introduce new health benefits or challenges for different urban areas or residents. For instance, a study in Ontario, Canada has shown a negative relationship between normalised difference vegetation index (NDVI) and human West Nile virus case counts (Albrecht & Kaufeld, 2023). This suggests that areas with higher

NDVI values, indicating more green and healthy vegetation, are associated with fewer human West Nile virus cases. This counterintuitive finding, which has been noted in other studies, was proposed to be due to the tendency of *Culex* mosquitoes to thrive better in artificial pools of water where fewer predators are present. Low NDVI can also be indicative of a drought which may cause mosquitoes and birds to congregate near the remaining bodies of water thus increasing transmission (Albrecht & Kaufeld, 2023). Similarly, green gentrification, which focuses on the creation of environmentally sustainable spaces, can attract wealthier residents to formerly blighted areas. While this can lead to improvements in air and water quality, it may also displace low-income communities and disrupt social networks that might exacerbate vulnerability to infectious diseases (Sax *et al.*, 2022). Gentrified areas may experience lower rates of infectious diseases due to improvement in environmental factors (Krings & Schusler, 2020). This could be attributed to improved infrastructure, enhanced sanitation practices, and better access to healthcare. It is essential to consider that neighbourhoods not subject to gentrification, possibly due to environmental issues, might still pose risks as potential breeding grounds for insects, rats and vectors, contributing to the spread of diseases (Hubbard & Brooks, 2021).

Housing conditions and infectious diseases

Gentrification, housing conditions, and infectious diseases are intricately linked, with strong implications for urban public health. The association between housing situation and gentrification highlights the role of housing quality in shaping disease dynamics, particularly concerning vector-borne diseases. In areas not affected by gentrification, poorer housing may be found, potentially contributing to higher rates of infectious diseases through various pathways. Recent research, such as a systematic review and meta-analysis, has shed light on the impact of household flooring on the prevalence of enteric and parasitic infections in low- and middle-income settings. This research revealed that improved flooring significantly lowers the odds of such infections compared to unimproved flooring, indicating a protective effect against a range of pathogens (Legge *et al.*, 2023).

The type, quality, and layout of housing stock also notably influence the transmission dynamics of vector-borne diseases (Degroote *et al.*, 2018). Diseases such as dengue and Lyme disease, transmitted by mosquitoes and ticks respectively, are particularly sensitive to the physical attributes of housing (Frank *et al.*,1998; Toan *et al.*, 2015). High-density housing complexes, characterized by closely spaced buildings, can foster environments conducive to supporting disease vector reproduction and abundance. Stagnant water in containers, poorly maintained yards, and inadequate waste management in such settings provide breeding sites for mosquitoes, heightening dengue transmission risks (Horstick & Runge-Ranzinger, 2019).

Housing quality, including screened windows and doors, sealed gaps, and insecticide-treated bed nets, acts as critical barriers against vector-borne diseases (Firouraghi *et al.*, 2022). Well-maintained housing with effective screening reduces vector entry, lowering transmission risks. Conversely, substandard housing increases susceptibility to infections due to inadequate protection against vectors. Moreover, air conditioning and window screens reduce the need to leave windows and doors open, limiting mosquito exposure. Adequate housing insulation and ventilation further prevent vector entry and maintain a comfortable indoor environment, reducing the necessity for open windows and doors.

Section 2

Conceptual model of gentrification and infectious diseases

The relationship between gentrification and infectious diseases is multifaceted, intertwining sociodemographic and economic shifts, urban planning strategies, and housing conditions. In Figure 1, we present a conceptual model delineating potential interconnections between gentrification and infectious diseases. The central theme revolves around urban renewal, a facet intricately linked to urban planning. An equitable approach to urban renewal, characterized by fair development practices and community involvement, may preclude the onset of gentrification (Zhu & Ye, 2024). Conversely, while an unfair urban renewal strategy, marked by either disproportionate benefits or neglect of marginalised communities, most often leads to a gradual process of gentrification, it is not always the case. This means that although there is a strong tendency for inequitable urban renewal practices to result in gentrification, several factors can lead to different outcomes. For instance, strong community resistance and activism can effectively counteract gentrification pressures (Thurber *et al.*, 2021). Additionally, policy interventions aimed at protecting marginalised communities, such as rent controls and affordable housing initiatives, can mitigate the impact of unfair renewal strategies (Howell, 2016). Moreover, the unique social dynamics and historical context of a neighbourhood may result in different outcomes, where gentrification might not occur as expected as evidenced by the case studies presented by Thurber *et al.* (2021). Ways of understanding, resisting, and responding to gentrification and advance equitable development in the city through social work practice, including social action group work, community organizing, community development, and participatory research and planning are presented to illustrate alternate outcomes of gentrification (Thurber *et al.*, 2021). These exceptions highlight the complexity and variability of urban development processes, emphasising the need for a nuanced understanding of how urban renewal impacts different communities. However, it can inadvertently trigger such gentrification, resulting in socioeconomic changes and potential health disparities (Cole, Mehdipanah, *et al.*, 2021).

The changes discussed classifies urban neighbourhoods into gentrified and non-gentrified categories, with some areas falling into gray areas like super-gentrified or ineligible for gentrification (Kiani *et al.*, 2023). While some long-standing residents may opt to stay in gentrified areas, they often encounter heightened financial burdens, housing crises and the erosion of social networks. Moreover, even if these residents do not physically relocate, they often experience a sense of displacement (Valli, 2015). These challenges create conditions that make long-term residents, primarily low-income individuals, in gentrified neighbourhoods more susceptible to infectious diseases. Several pathways contribute to infectious disease risks. Overcrowded living conditions, driven by rising housing costs, are particularly important for airborne diseases. Limited access to healthcare facilities is another factor, as gentrification leads to the rise of private clinics that long-term residents struggle to afford. Additionally, disruptions to established community health networks can impact the management of all types of infectious diseases. All of these factors can facilitate the spread of infectious diseases within these populations (Bhavsar *et al.*, 2022; Wimalasena *et al.*, 2021). Simultaneously, a portion of these longstanding residents may be compelled to relocate to non-gentrified urban neighbourhoods or even suburban or rural regions,

a situation triggering a displacement process filled with numerous challenges. Displaced people may face increased vulnerability due to a lack of access to essential facilities such as limited healthcare services and sanitation infrastructure (Bhavsar *et al.*, 2022). The resultant impediments to healthcare and sanitation services can contribute to increased transmission of infectious diseases within non-gentrified and suburban/rural areas. Another pathway that could intensify vulnerability to infectious diseases is the state of the built and natural environment. In non-gentrified areas, infrastructure is often in a comparatively poor condition, and green spaces may be neglected, creating conditions that facilitate disease transmission. In relation to gentrified areas, these neighbourhoods may experience greater challenges in maintaining environmental health. For instance, non-gentrified neighbourhoods might have lower quality greenspace compared to gentrified ones (Maantay & Maroko, 2018; Figure 1).

Section 3

Narrative literature review - gentrification and infectious diseases

To better understand the complex relationship between gentrification and infectious diseases, we conducted a narrative literature review. Searches were performed in PubMed, Scopus, Web of Science, and Science Direct using the terms gentrification and infectious disease. For PubMed, additional terms such as disease outbreaks, infectious disease outbreak, and residential segregation were included. Relevant articles were also examined for additional references using the snowballing method. Additionally, we reviewed the first five pages of a Google Scholar search with the terms 'gentrification' and 'infectious disease' to identify any further relevant articles.

In total, 542 articles underwent title and abstract screening. Of these, we selected 18 studies for full-text screening, which eventually yielded 14 studies suitable for our review. Inclusion criteria focused on the relevance of the studies to the topic of gentrification and infectious diseases. Studies were excluded if they did not focus on the topics of interest or if the link between gentrification and infectious disease was mediated by another factor e.g., homelessness (Linton *et al.*, 2017). Studies were chosen by a manual selection process in which pertinent studies were selected based on the authors' expertise and the alignment with the research question. Agreement for each paper's inclusion was reached via consensus between all the authors. Data were extracted from the selected articles, and a summary of each provided, as shown in Figure 2. While efforts were made to ensure comprehensive coverage, like other narrative reviews, limitations include the potential for bias in article selection.

Results and Discussion

Gentrification and infectious diseases

The 14 chosen papers were analysed and sub grouped according to the type of infectious disease they represented. Below are the summaries of the key findings of these papers. They reflect the nuanced and complex and diverse interplays between gentrification and infectious diseases highlighted in Figure 1.

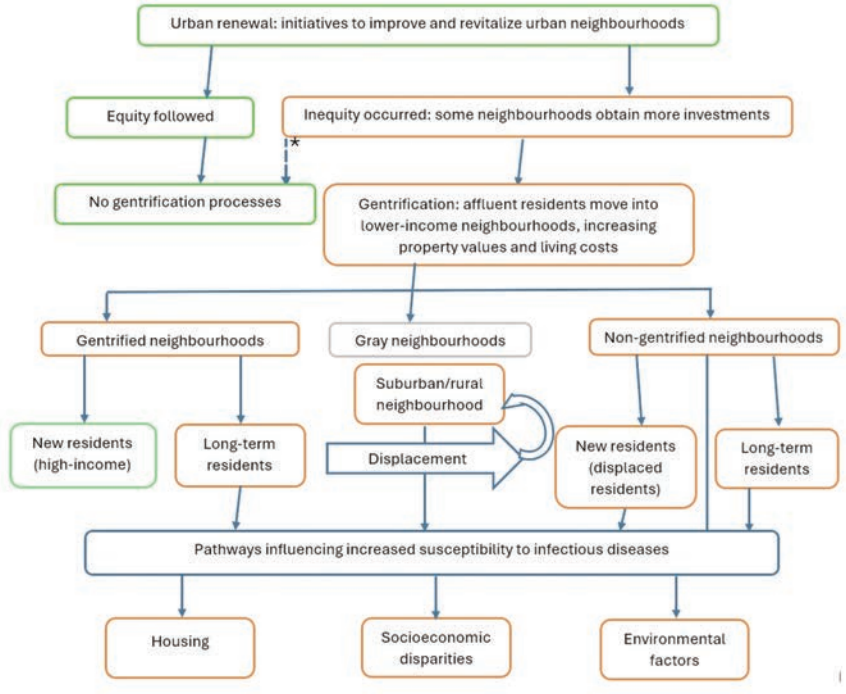

Figure 1. Conceptual model illustrating potential pathways through which gentrification may contribute to increased susceptibility to infectious diseases. *This scattered arrow highlights the rarity of inequity not leading to the gentrification process, indicating that in most cases, inequity does indeed lead to gentrification.

Blood-borne and sexually transmitted infections (STI's)

Compared to other types of infectious diseases, these are more affected by the socioeconomic components of the gentrification process. In total we found nine studies investigating this association. Goldenberg *et al.* (2020) conducted a community-based longitudinal cohort study to investigate the outcomes of urban gentrification on necessary service access among female sex workers aged ≥14 years in Metro Vancouver, Canada between 2010 and 2014. The research revealed a significant decline in service utilisation during the gentrification period, which was supported by out-migration trends and alterations in solicitation methods. The services examined included HIV and STI testing, utilisation of sexual and reproductive health services and those specifically focused on sex workers (Goldenberg *et al.*, 2020). This reduction in service use may influence the incidence and prevalence of infectious diseases, particularly HIV, as fewer individuals had access to essential sexual and reproductive health services after gentrification. However, it is important to note that this study did not employ a formal measure of gentrification for the period between 2010 and 2014. The researchers instead relied on reports indicating gentrification in Vancouver's inner-city Downtown Eastside during this time. This approach seems subjective, and the use of a formal definition of gentrification, along with its quantification, is highly recommended for future studies. Some formal measures specifically for example those provided for the in American (Linton *et al.*, 2024) or Canadian (Firth, 2021) contexts could have been used by the researchers. Additionally, the study was conducted in only one neighbourhood categorised as gentrified. Conducting similar studies in various neighbourhoods with different gentrification profiles could provide a clearer understanding of the effects of gentrification on service access. Pulvirenti *et al.* (2007) conducted an analysis, at Stroger Hospital of Cook County to examine the impact of gentrification on HIV infected admissions during the Highly Active Antiretroviral Therapy (HAART) era between 2000 and

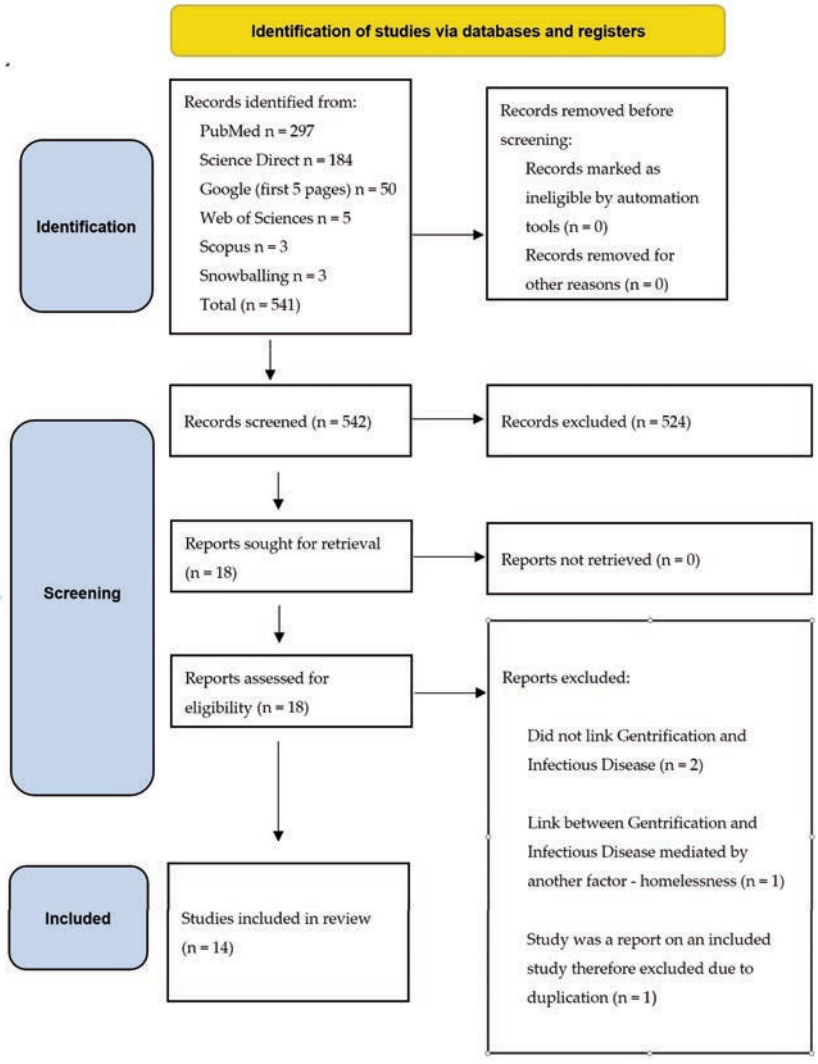

Figure 2. PRISMA flow diagram demonstrating the process of identification, screening, eligibility assessment, and inclusion of studies selected for this narrative review.

2005. The study focused on a hospital in Chicago that primarily served the city and its surrounding areas. The findings revealed changes in demographics showing a decrease in admissions of substance abusers, homeless individuals, injection drug abusers and African Americans. Conversely there was an increase in patients over 50 years old and Asian patients (Pulvirenti *et al.*, 2007).

These changes in the population were accompanied by a decrease in co-infections with the hepatitis C or B virus and a significant shift in the reasons for hospitalization, with a rise in diagnoses connected to medicine. In addition, changes in the use of antiretroviral therapy drugs were reported, coupled with a rise in lymphoma and non-HIV related cancer admissions. Numerous variables, such as real estate development, hospital relocation and immigration patterns were attributed to these complex demographic transitions. Significantly, these results highlight the complex interactions between gentrification and the consequences it had on HIV risk factors, drug misuse patterns and homelessness in the hospital catchment population (Pulvirenti *et al.*, 2007). The gentrification-driven transformation of urban areas, previously inhabited by low-income residents, especially African Americans, may have led to the displacement of former residents to peripheral or suburban regions distant from essential healthcare facilities. This displacement, often linked with a heightened prevalence of substance abuse among the urban poor, likely contributes, either partially or entirely, to the shift in HIV risk factors within the community (Pulvirenti *et al.*, 2007).

Wong *et al.* (2020) conducted a study between August 2016 and December 2017 that involved 45 in-depth interviews with leaders, members and gay family participants of the House Ball Community in the San Francisco Bay Area. This community was comprised of young men and women from varied sexual and ethnic minority backgrounds who established familial bonds within their respective houses and engage in competitive formal events. This study focused on understanding how urban gentrification is affecting the economic survival of organizations that serve the community. They found that gentrification poses a significant challenge, often resulting in the closure or relocation of community services. The study specifically tested HIV-associated factors within the House Ball Community, highlighting the effects of gentrification on the reduction of HIV services. In particular, the 2015 closure of SAGMY (Sexual and Gender Minority Youth), a prominent Oakland community area group had far-reaching effects, including the loss of safe spaces, a decrease in the number of ball events, and housing instability among network leaders. Despite these challenges, the community adapted by offering Vogue classes, a style of dance characterized by model-like poses often associated with the House Ball community's culture of performance and self-expression. This initiative promotes inclusion, social justice action, acceptance of inclusivity, and engagement in activism for social impartiality. Advocacy for safe spaces and less costly housing was considered crucial to prevent further displacement and ensure immediacy to health services (Wong *et al.*, 2020).

Using information from an international consultation with HIV prevention experts, researchers, professionals and leaders of the LGBTQ community in 17 cities in 14 countries, Simon Rosser *et al.* (2008) carried out a qualitative study investigating structural changes in gay communities due to gentrification. Despite stable or increasing LGBTQ populations, the study found a perceived reduction in gay community structures, such as visibility, friendships and community events. Homosexual communities were vanishing because of gentrification, where homosexual men easily blend into suburban life. Various variables, such as changes in drug usage and more internet interaction, were attributed to the loss of reorded homosexual bars and clubs. Businesses were impacted by the perception that online LGBTQ communities were larger than offline ones. Changes in the law, including same-sex marriage and civil unions, had an impact on domesticity and settling down, however the degree of activism varied by city. HIV preventive programmes for homosexual men fell out of favour and were replaced with internet tools. The LGBTQ community's transformation was associated with a rise in the complexity of safer sex options, an increased risk of HIV infection and a decline in successful prevention initiatives. The study raises the possibility that gay communities will cease to exist, highlighting the importance of focused HIV prevention and reassessing approaches in the post-gay community period. To guide successful solutions, ongoing research should examine macro-level alterations (Simon Rosser *et al.*, 2008).

In their qualitative study, Bandewar *et al.* (2015) investigated the rising incidence of HIV among female sex workers in Mumbai and Thane, India. Despite a total of 140 individuals associated with HIV prevention intervention participating in the various aspects of the research, including interviews and focus group discussions, the study focused on the narratives of only 10 participants. The phenomenon of urban revival and gentrification resulted in a decline in sex workers in traditional areas, a fact that benefiting landowners. Efforts against trafficking and police raids dispersed sex workers, thereby increasing vulnerability. Changes in the management of sex trends shifted towards hidden and mobile activities. Economic factors and stigmatization related to HIV interventions contributed to riskier practices. The dynamics of condom use were influenced by social desirability bias and economic considerations. The study challenges the reliability of self-reported condom use and underscores the complex interplay of structural factors influencing HIV prevalence (Bandewar *et al.*, 2015).

Similarly, the impact of gentrification in San Francisco on people living with HIV was examined by Black (2017). Their exploratory research used mixed-methods combining spatial analysis of socioeconomic, eviction, and epidemiologic data with qualitative surveys and in-depth interviews. It examined the effect of gentrification on HIV linkage and retention in the region. The author argued that one factor in the decline in new HIV cases in San Francisco is gentrification, with the displacement of low-income residents (who have higher levels of HIV) from the city, thus easing the burden of new infections. The 2016 HIV Epidemiology Annual Report issued by San Francisco Department of Public Health showed that by the end of 2015, one third of HIV cases had moved outside the city. The decline had previously been attributed to the city's improvement in services for HIV prevention, testing, and treatment and its aggressive policy of offering immediate HIV treatment to individuals, who test positive (interventions which may have been aided by increased wealth in the city enabling expensive public health interventions feasible) (Black, 2017).

The potential role of gentrification on reduced HIV levels in San Francisco has more recently been studied by Pagkas-Baker *et al.* (2020) They posited that the reductions in new HIV infections were not just due to biomedical prevention methods (such as pre-exposure prophylaxis and treatment as prevention), but also due to the declining Black population. They pointed out that from a US context; gentrification has overall disproportionately affected the Black populations with the continued elimination of affordable housing in metropolitan areas. This was highlighted by the fact that

net outmigration from 2006 to 2013 for Black belonging to the group of Men who have Sex with Men (MSM) had higher rates of HIV than White MSM groups with HIV, providing additional explanations as to why San Francisco's HIV elimination strategies appeared to be more robust than it actually was. They also cited evidence of a rising HIV incidence among Black MSM groups, who have historically been more likely to acquire HIV due to structural, racial and criminal justice-related factors than have White such groups. The authors concluded that the combination of gentrification and the subsequent outmigration of a priority community (with higher HIV infection rates) has led to overestimation of the effect of public health measures to reduce HIV rates in the gentrified city (Pagkas-Bather *et al.*, 2020).

Linton *et al.* (2024) examined the complex intersection between gentrification, segregation, rental cost burden and sexually transmitted infections in Atlanta, Georgia, 2005–2018. They used spatial cluster detection to explore the geographic distribution of STIs in relation to the distribution of gentrification, social and economic disadvantage, and rental cost burden over time. Their results revealed an overlap between gentrification and STIs among Black people, which was greater than that observed for the overlap between gentrification and STIs among White people. The overlap of hot spots of STI diagnoses among Black adults and adolescents with that of gentrification over both time periods suggests that gentrification and any economic and social benefits that may arise from it may not play any role in preventing the higher spatial concentration of STIs among Black people living in that region. The study raised the possibility that contextual features that caused vulnerability to gentrification in the first place may also create vulnerability to STI acquisition. For example, disinvestment in communities of predominantly people of colour creates an environment prime for depopulation, deterioration of infrastructure, and residential instability, which have been associated with gentrification and its correlate community development and with STI transmission. Marked influx and out flux of populations accompanying gentrification may also cause churning in sexual networks and high levels of interaction with law enforcement and the criminal justice system. Involvement in the criminal justice system second to considerable exposure to intensified policing and harassment and exposure to police violence during periods of gentrification have been linked to STI transmission in prior literature (Linton *et al.*, 2024).

This churning of sexual networks was also explored in Chicago by Youm *et al*. (2009). They postulated that there are "hidden" bridging communities consisting of areas with above-average levels of sexual ties with other areas but whose below-average AIDS prevalence may hide their potential importance for HIV prevention. They argued that while social network methods are well-suited to the study of bridge populations, analyses tend to focus on dyads (*i.e.,* risk between drug and/or sex partners via traditional contact tracing) and ignore bridges between distinct subpopulations. To address this, they expanded their sexual network linkage analysis beyond individual and risk group levels to a community level in which Chicago's 77 community areas were examined as subpopulations for the purpose of identifying potential bridging communities. The study revealed eight community areas that met or came close to meeting the definition of hidden bridges. Six areas were near the city's periphery, and all eight areas likely had high inflows or outflows of low-income persons displaced by from the city's core by the destruction of high-rise public housing and the gentrification of the central city neighbourhoods. The authors concluded that the elevated level of sexual bridging in these communities reflects in part dislocations associated with gentrification. These areas have persons pushed to peripheral neighbourhoods maintaining ties—including sexual ties—with those who remain behind in the gentrified areas. Results were generalisable to Chicago residents who were low income and substance users (there were also large proportions that belonged to MSM groups) with high HIV infection risk thus these ties were seen as possibly being important for transmitting HIV more widely in Chicago especially in this sub group (Youm *et al.*, 2009). However, similar to Goldenberg *et al.* (2020) it is important to note that this study did not employ a formal measure of gentrification (Goldenberg *et al.*, 2020). Rather it discussed dislocation of people due to city centre development and gentrification. In order for the effect of gentrification on infectious disease to be validated and better recognised, we again recommend that future studies use a more formal measure of gentrification (Firth, 2021; Linton *et al.*, 2024).

Airborne diseases

A notable study, conducted in Itaewon in South Korea, exemplifies the manifestation of degentrification amid the pandemic, particularly evidenced by COVID-19 outbreaks linked to clubs frequented by LGBTQ individuals. The analysis highlights several key characteristics of degentrification, particularly in the context of the COVID-19 pandemic. Firstly, COVID-19 emerges as a significant driver of degentrification, leading to a reversal of gentrification trends observed during previous phases. Notably, degentrification is primarily observed in areas where gentrification had previously reached its peak. While the pandemic accelerates degentrification, its impact on addressing economic recession is limited in non-gentrified areas. Media coverage further accentuates this aspect, often framing the narrative around the gender identity of confirmed cases, underscoring the complex intersection of gentrification, public health, and societal attitudes towards marginalised communities (Han *et al.*, 2021).

Hwang & Shrimali (2022) focused on the San Francisco Bay Zone, investigating the sophisticated correlations between gentrification, household crowding, and COVID-19 consequences. Using regression models, the research investigates the correlation between crowding and COVID-19 case rates, revealing a positive correlation—representing that a 1% increase in crowded households corresponds to a 0.021 increase in logged case rates per 100,000 residents. It recognised that gentrification is linked to boosted shifts to crowded households, remarkably affecting middle socio-economic status residents in Silicon Valley, with spillover effects into non-gentrifying areas. Regardless of the influence of gentrification, crowding remains a considerable predictor of COVID-19, emphasizing its part in participating in health differences. The discussion emphasizes the nuanced strategies needed across the socioeconomic range to address housing challenges and health consequences during the pandemic. The study assumes by supporting targeted housing policies, early interferences to avoid displacement, and increased affordable housing options to alleviate the impact of gentrification and crowding on COVID-19 outcomes (Hwang & Shrimali, 2023).

Cole, Anguelovski, *et al.* (2021) looked at how the COVID-19 pandemic made urban health inequalities more visible. Lower income residents of urban areas are at greater risk for infection and death as a result of these inequities. Gentrification acted as a double socio-environmental injustice as it displaces former residents

from gentrifying neighbourhoods into neighbourhoods with low quality housing and overcrowded conditions which make them prime hotspots for the spread of COVID-19 and other infectious agents. The authors also examined how COVID-19 might add to green gentrification as governments moved to invest in outdoor amenities such as green spaces to aid social distancing. They examined how investment into creating or restoring urban environmental amenities could lead to subsequent neighbourhood demographic changes, and real estate price increases leave long-term residents unable to benefit from new green spaces and other environmental amenities due to displacement or cultural exclusion (Cole, Anguelovski, *et al.*, 2021). Again, it is important to note that the authors did not provide a formal measurement of gentrification in this study.

Vector-borne diseases

A recent study by Halsey *et al.* (2022) sheds light on the potential implications of gentrification for the incidence of tick-borne diseases such as Lyme disease in people of colour in the U.S. The rise in Lyme disease incidence, attributed partly to climate change and socioecological determinants including gentrification, underscores the complex interplay between urban development and health outcomes. The authors outline three scenarios illustrating how gentrification may increase the population's exposure to tick-borne diseases, emphasising factors such as discriminatory housing policies and inadequate healthcare access. Importantly, the study proposes solutions to mitigate gentrification-related tick-borne diseases exposure, highlighting the importance of public health campaigns, altering public perception of exposure and risk factors, and reducing inequities in public service allocation. This research underscores the urgent need for further evaluation of the link between tick-borne disease exposure risk and urban policy, particularly in the context of environmental racism and community demographic changes associated with gentrification (Halsey, 2022). Campos *et al.* (2017) investigated the epidemiological aspects and spatial distribution of human and canine Visceral Leishmanosis (VL) within an endemic area of northeast Brazil (data from 2013 showed that this region had the highest number of cases in all of Brazil). Spatial distribution and epidemiological analysis of human and canine VL incidences were utilised to delineate the areas with the highest disease concentrations. The study revealed that the neighbourhoods with the highest disease frequency were located on the outskirts of the city, and in urbanised areas or those subjected to development (Campos *et al.*, 2017). Whilst the study did not specifically mention gentrification, the areas which exhibited the largest burden of disease are comparable to areas where people are displaced to by gentrification or are undergoing potential gentrification (development).

Section 4

Use of spatial epidemiology to study gentrification and infectious diseases

Spatial epidemiology is a powerful tool for understanding the distribution and determinants of infectious diseases, offering critical insights for devising targeted intervention strategies (MohammadEbrahimi *et al.*, 2022). In addition, spatial epidemiology can be a useful tool to measure gentrification, but has been identified as a challenge in the current literature (Finio, 2022). There are a number of measures developed by researchers to quantify the complex dynamics of gentrification, encompassing changes in housing prices, neighbourhood demographics, and land use patterns (Firth, 2021). All these measures are area-based; therefore, it would be prudent to include the use of spatial epidemiology techniques when measuring gentrification (Firth, 2021; Kiani *et al.*, 2024). It is evident from our literature review that the methods by which gentrification was quantified was not provided in most of the studies. By leveraging spatially explicit data and advanced analytical tools, researchers can map the spatial distribution of gentrification trends and identify hotspot areas where infectious diseases are occurring. In addition, whilst some of the studies used in this narrative review, including Australian and Canadian based research, have provided robust methods of spatial epidemiology to measure gentrification (Firth, 2021; Ilic *et al.*, 2019; Linton *et al.*, 2024; Pegler et al., 2020), there is often a lack of measures of displacement and health measures of the people that move into non-gentrified areas. Policymakers armed with nuanced insights would be better equipped to formulate strategies promoting public health while fostering sustainable urban development.

Recommendations

Gentrification and infectious disease patterns

Geospatial tools offer the potential to improve the spatio-temporal targeting of disease control measures and to enhance the cost-effectiveness of integrated disease control programmes (Brooker & Utzinger, 2007) thus providing a valuable tool to fill the gaps demonstrated in some of the studies reviewed in this narrative. Previous research in the geospatial health area has presented sophisticated methods to define the spatiotemporal epidemiology of HIV/Aids (Birri Makota & Musenge, 2023) , Covid-19 (Cavalcante Filho *et al.*, 2023) and vector borne disease (DelaPaz-Ruíz *et al.*, 2025). Many of the studies discussed in this review were focused on investigating specific infectious diseases and their burdens, prevalence or incidence in gentrified areas compared to non-gentrified neighbourhoods and in those adversely affected by gentrification, e.g., displaced. Future studies should be focused on analysing the association between gentrification dynamics (including social determinants influenced by gentrification) and spatiotemporal infectious disease patterns using advanced geospatial methods. We also call for more research in this area from different countries with diverse socio-economic and environmental settings, which can provide alternate definitions and new validated ways of measuring gentrification. This would provide better insights given the uneven distribution of infectious diseases worldwide. Climate change in association with gentrification may also further influence the patterns and distributions of infectious diseases, increasing the need for more diverse research to quantify these relationships and predict future impact. Furthermore, we call for more qualitative research to capture the perspectives of community members on the relationship between gentrification and infectious diseases. This can help in understanding the lived experiences and challenges faced by residents.

Gentrification and healthcare access/utilisation

Future research should prioritise a thorough examination of the healthcare accessibility associated with gentrification in urban development planning. Policymakers need to ensure that improvements benefit the entire community, including both longstanding residents and newcomers, emphasising the adoption of 'equitable

urban development.' Researchers are encouraged to investigate the equitable distribution of healthcare services within urban areas, exploring potential disparities in healthcare utilisation between gentrified and non-gentrified neighbourhoods. Additionally, a crucial focus should be on understanding the healthcare-seeking behaviour of long-term residents in gentrified areas, assessing whether they may experience reduced utilisation of healthcare services due to increased healthcare costs or social issues like a loss of sense of belonging. Such research on the actual use of healthcare services in gentrified areas will provide valuable insights into the healthcare needs and challenges faced by these communities, informing more targeted and inclusive urban development strategies. Researchers are also encouraged to evaluate the effectiveness of community health interventions in mitigating the impact of gentrification on infectious diseases. This could include initiatives to improve vaccination coverage, sanitation, and overall public health infrastructure.

Gentrification policy analysis

We call for more research to analyse the role of urban planning policies in gentrification and their implications for infectious disease control. This research should also explore how well-designed urban development can contribute to disease prevention and community health including studying the effects of new infrastructure, green spaces, and the overall physical environment on public health. In addition to reviewing planning strategies, research is also needed to study the effectiveness of existing public health policies in addressing the health challenges posed by gentrification. By identifying potential gaps, researchers can advise on and shape policy adjustments. Finally, while our review primarily addresses the negative impacts of gentrification, it is essential to acknowledge that gentrification can also bring about positive changes, particularly for new residents in gentrified areas. Therefore, we recommend exploring the positive dimensions of gentrification policies to provide a comprehensive understanding of the phenomenon and its implications for public health and urban development.

Conclusions

We have identified several pathways through which gentrification may contribute to the spread of infectious diseases in urban neighbourhoods. These pathways include socioeconomic disparities, primarily connected with bloodborne and STIs, as well as housing and urban planning, primarily associated with vector-borne diseases. Each of these pathways warrants further investigation, and researchers could expand upon them to develop a comprehensive framework outlining the relationship between infectious diseases and gentrification.

Whilst pathways between gentrification and infectious disease have been elucidated in this study, our narrative literature review revealed a scarcity of studies directly examining associations between infectious disease outcomes and gentrification. The majority of the studies conducted so far were carried out in the US and focused on blood-borne infections or STIs in general. We expect to see future investigations broaden their scope to study other infectious diseases transmission pathways.

In light of growing urbanisation and the persistent threat of pandemics, several broad preventive strategies can help reduce the spread of infectious diseases in urban areas. These include inclusive urban planning that ensures equitable access to healthcare, sanitation, and housing; strengthening public health infrastructure to guarantee adequate services and outreach across all neighbourhoods; and promoting housing policies that mitigate overcrowding. In addition, the use of spatial epidemiology for real-time surveillance can support targeted interventions, while engaging long-term residents in planning fosters trust and cultural relevance in health strategies. Lastly, investing in accessible green infrastructure promotes physical and mental well-being and can help reduce transmission risks in densely populated areas.

This review summarizes existing knowledge but its main message, apart from encouraging spatial or spatiotemporal studies in this area, is to serve as a call to action for urban planners, public health officials, and policymakers to recognize the interconnectedness of these phenomena. In doing so, we expect to foster a more holistic and equitable approach to urban development that safeguards the health and well-being of all urban residents, both current and future.

References

Aalbers MB. 2018. Forum: revisiting the changing state of gentrification. introduction to the forum: from third to fifth□wave gentrification. Tijdschr Voor Econ En Soc Geogr 110:1-11.

Aguilar J, Bassolas A, Ghoshal G, Hazarie S, Kirkley A, Mazzoli M, Meloni S, Mimar S, Nicosia V, Ramasco JJ, Sadilek A. 2022. Impact of urban structure on infectious disease spreading. Sci Rep 12:3816.

Albrecht L, Kaufeld KA. 2023. Investigating the impact of environmental factors on West Nile virus human case prediction in Ontario, Canada. Front Public Health 11:1100543.

Ali SH, Foster T, Hall NL, 2018. The relationship between infectious diseases and housing maintenance in indigenous australian households. Int J Environ Res Public Health 15:2827.

Alonge SK, Wadinga A. 2021. Rethinking urban renewal programmes for pandemic control in Nigeria. Afr J Health Safety Environ 2:14-24.

Anguelovski I, Cole HVS, O'Neill E, Baró F, Kotsila P, Sekulova F, Pérez Del Pulgar C, Shokry G, García-Lamarca M, Argüelles L, Connolly JJ, Honey-Rosés J, López-Gay A, Fontán-Vela M, Matheney A, Oscilowicz E, Binet A, Triguero-Mas M. 2021. Gentrification pathways and their health impacts on historically marginalized residents in Europe and North America: Global qualitative evidence from 14 cities. Health Place 72:102698.

Bandewar SVS, Bharat S, Kongelf A, Pisal H, Collumbien M. 2015. Considering risk contexts in explaining the paradoxical HIV increase among female sex workers in Mumbai and Thane, India. BMC Public Health 16:85.

Bhavsar NA, Kumar M, Richman L, 2020. Defining gentrification for epidemiologic research: A systematic review. PLoS One 15:e0233361.

Bhavsar NA, Yang LZ, Phelan M, Shepherd-Banigan M, Goldstein BA, Peskoe S, Palta P, Hirsch JA, Mitchell NS, Hirsch AG, Lunyera J, Mohottige D, Diamantidis CJ, Maciejewski ML, Boulware LE. 2022. Association between gentrification and health and healthcare utilization. J Urban Health 99;984–97.

Birri Makota R, Musenge E. 2023. Spatial heterogeneity in relationship between district patterns of HIV incidence and covariates in Zimbabwe: A multi-scale geographically weighted regression analysis. Geospat Health 18:1207.

Black F. 2017. The impact of gentrification on HIV linkage and

retention in San Francisco. Accessed 10 Jan 2025. Available from: https://environment.sfsu.edu/sites/default/files/2022-05/finn_black_thesis.pdf

Brooker S, Utzinger J. 2007. Integrated disease mapping in a polyparasitic world. Geospat Health 1:141.

Bulfone TC, Blat C, Chen Y-H, Rutherford GW, Gutierrez-Mock L, Nickerson A, Buback L, Welty S, Sokal-Gutierrez K, Enanoria WTA, Reid MJA. 2022. Outdoor activities associated with lower odds of SARS-CoV-2 acquisition: a case–control study. Int J Environ Res Public Health 19:6126.

Cai W. 2022 Environment, aesthetics, technology, and gentrification from global north to global south: an integrated review of literature. J Smart Cities 7(1).

Campos R, Santos M, Tunon G, Cunha L, Magalhães L, Moraes J, Ramalho D, Lima S, Pacheco JA, Lipscomb M, Ribeiro De Jesus A, Pacheco De Almeida R. 2017. Epidemiological aspects and spatial distribution of human and canine visceral leishmaniasis in an endemic area in northeastern Brazil. Geospat Health 12:503.

Cavalcante Filho JB, Góes MADO, Araújo DDC, Peixoto MVDS, Nunes MAP. 2023. Association of socioeconomic indicators with COVID-19 mortality in Brazil: A population-based ecological study. Geospat Health 18:1206.

Cole HVS, Anguelovski I, Baró F, García-Lamarca M, Kotsila P, Pérez Del Pulgar C, Shokry G, Triguero-Mas M. 2021. The COVID-19 pandemic: Power and privilege, gentrification, and urban environmental justice in the global north. Cities Health 5:S71–5.

Cole HVS, Mehdipanah R, Gullón P, Triguero-Mas M. 2021. Breaking down and building up: gentrification, its drivers, and urban health inequality. Current Environmental Health Reports 8:157–66.

Davis J. 2022. Epidemics, planning and the city: a special issue of planning perspectives. Planning Perspect 37:1–8.

Degroote S, Zinszer K, Ridde V. 2018. Interventions for vector-borne diseases focused on housing and hygiene in urban areas: A scoping review. Infect Dis Poverty 7:96.

DelaPaz-Ruíz N, Augustijn E-W, Farnaghi M, Abdulkareem SA, Zurita Milla R. 2025. Integrating agent-based disease, mobility and wastewater models for the study of the spread of communicable diseases. Geospat Health 20:1326.

Dialogues, G. (n.d.). From Plunder Neoliberalism to Conservative Dominance. Retrieved January 14, 2025, from: https://globaldialogues.georgetown.edu/responses/from-plunder-neoliberalism-to-conservativedominance https://globaldialogues.georgetown.edu/responses/from-plunder-neoliberalism-to-conservative-dominance

Fernández-Barrés S, Perez G, Piñero M, Reyes A, Pérez K, Artazcoz L, Borrell C. 2023. Effect of COVID-19 prevention as part of an urban renewal programme. Public Health 223:179–82.

Finio N. 2022. Measurement and definition of gentrification in urban studies and planning. J Planning Lit 37:249–64.

Firouraghi N, Mohammadi A, Hamer DH, Bergquist R, Mostafavi SM, Shamsoddini A, Raouf-Rahmati A, Fakhar M, Moghaddas E, Kiani B. 2022. Spatio-temporal visualisation of cutaneous leishmaniasis in an endemic, urban area in Iran. Acta Tropica 225:106181.

Firth CL. 2021. Gentrification, Urban Interventions and Equity (GENUINE): A map-based gentrification tool for Canadian metropolitan areas. Health Reports, 32:00500002.

Frank DH, Fish D, Moy FH. 1998. Landscape features associated with lyme disease risk in a suburban residential environment. Landscape Ecol 13:27-36.

Fullilove MT. 2003. Neighborhoods and infectious diseases. In I. Kawachi & L. F. Berkman (Eds.), Neighborhoods and Health (1st ed., pp. 211–222). Oxford University PressNew York.

Gigantino, A. (n.d.). Suburban sprawl: the greatest social change of post-World War II America. Histories 5:35.

Goldenberg SM, Amram O, Braschel M, Moreheart S, Shannon K. 2020. Urban gentrification and declining access to HIV/STI, sexual health, and outreach services amongst women sex workers between 2010-2014: Results of a community-based longitudinal cohort. Health & Place 62;102288.

Gulson KN. 2009. Wither the neighborhood? Education policy, neoliberal globalization and gentrification. Teachers College Record 111:148-59.

Hackworth J, Smith N. 2001. The changing state of gentrification. Tijdschrift Voor Economische En Sociale Geografie 92:464–77.

Halsey SJ. 2022. The public health implications of gentrification: tick□borne disease risks for communities of color. Frontiers Ecol Environ 21:2549.

Han S, Bohannon CL, Kwon Y. 2021. Degentrification? Different Aspects of Gentrification before and after the COVID-19 Pandemic. Land 10:1234.

Horstick O, Runge-Ranzinger S. 2019. Multisectoral approaches for the control of vector-borne diseases, with particular emphasis on dengue and housing. Trans Royal Soc Trop Med Hygiene 113:823–8.

Howell KL. 2016. Planning for empowerment: Upending the traditional approach to planning for affordable housing in the face of gentrification. Plann Theory Pract 17:210-26.

Hubbard P, Brooks A. 2021. Animals and urban gentrification: Displacement and injustice in the trans-species city. Progress Human Geogr 45:1490–511.

Hwang J, Shrimali BP. 2023. Shared and crowded housing in the bay area: where gentrification and the housing crisis meet COVID-19. Housing Policy Debate 33:164–93.

Hyra D, Lees L. 2021. De-gentrification or disaster gentrification? Debating the impact of COVID-19 on Anglo-American urban gentrification. In B. Doucet, P. Filion, & R. Van Melik (Eds.), Volume 2: Housing and Home (1st ed., pp. 31–40). Bristol University Press.

Ilic L, Sawada M, Zarzelli A. 2019. Deep mapping gentrification in a large Canadian city using deep learning and Google Street View. PLoS One 14:e0212814.

Jenson D, Szabo V. 2011. Cholera in Haiti and other caribbean regions, 19th century. Emerging Infectious Diseases, 17:110958.

Karon JM. 2002. HIV in the United States at the turn of the century: An epidemic in transition. Am J Public Health 91:1060–8.

Kelly S. 2014. Taking Liberties: Gentrification as Neoliberal Urban Policy in Dublin. In: Neoliberal Urban Policy and the Transformation of the City (pp. 174–188). Palgrave Macmillan UK.

Kiani B, Mamiya H, Thierry B, Firth C, Fuller D, Winters M, Kestens Y. 2023. The temporal sequence between gentrification and cycling infrastructure expansions in Montreal, Canada. Habitat Int 139:102899.

Kiani B, Raouf Rahmati A, Bergquist R, Hashtarkhani S, Firouraghi N, Bagheri N, Moghaddas E, Mohammadi A. 2021.

Spatio-temporal epidemiology of the tuberculosis incidence rate in Iran 2008 to 2018. BMC Public Health 21:1093.
Kiani B, Sartorius B, Lau CL, Bergquist R. 2024. Mastering geographically weighted regression: Key considerations for building a robust model. Geospat Health 19:1271.
Krings A, Schusler TM. 2020. Equity in sustainable development: Community responses to environmental gentrification. Int J Social Welfare 29:321–34.
Legge H, Pullan RL, Sartorius B. 2023. Improved household flooring is associated with lower odds of enteric and parasitic infections in low- and middle-income countries: A systematic review and meta-analysis. PLOS Global Public Health 3:e0002631.
Lim S, Chan PY, Walters S, Culp G, Huynh M, Gould LH. 2017. Impact of residential displacement on healthcare access and mental health among original residents of gentrifying neighborhoods in New York City. PLoS One 12:e0190139.
Linton SL, Cooper HL, Kelley ME, Karnes CC, Ross Z, Wolfe ME, Friedman SR, Jarlais DD, Semaan S, Tempalski B, Sionean C, DiNenno E, Wejnert C, Paz-Bailey G. 2017. Cross-sectional association between ZIP code-level gentrification and homelessness among a large community-based sample of people who inject drugs in 19 US cities. BMJ Open 7;e013823.
Linton SL, Corrigan AE, Sisson LN, Cooper HLF, Kramer MR, Curriero FC. 2024. Mapping gentrification, segregation, rental cost burden and sexually transmitted infections in Atlanta, Georgia, 2005–2018. Spatial Spatio-Temporal Epidemiol 51;100680.
López-Morales E 2015. Gentrification in the global South. City 19:564–73.
Maantay JA, Maroko AR. 2018. Brownfields to Greenfields: environmental justice versus environmental gentrification. Int J Environ Res Public Health 15;2233.
Mamelund S-E, Shelley-Egan C, Rogeberg O. 2021. The association between socioeconomic status and pandemic influenza: Systematic review and meta-analysis. PLoS One 16:e0244346.
MohammadEbrahimi S, Kiani B, Rahmatinejad Z, Baral S, Hashtarkhani S, Dehghan-Tezerjani M, Zare E, Arian M, Kiani F, Gouya MM, Dadras MN, Karamouzian M. 2022. Geospat epidemiology of hospitalized patients with a positive influenza assay: A nationwide study in Iran, 2016–2018. PLoS One 17:e0278900.
MohammadEbrahimi S, Mohammadi A, Bergquist R, Dolatkhah F, Olia M, Tavakolian A, Pishgar E, Kiani B. 2021. Epidemiological characteristics and initial spatiotemporal visualisation of COVID-19 in a major city in the Middle East. BMC Public Health 21:1373.
Mohammadi A, Pishgar E, Fatima M, Lotfata A, Fanni Z, Bergquist R, Kiani B. 2023. The COVID-19 mortality rate is associated with illiteracy, age, and air pollution in urban neighborhoods: a spatiotemporal cross-sectional analysis. Tropical Med Infect Dis 8:85.
Mullenbach LE, Baker BL. 2020. Environmental justice, gentrification, and leisure: a systematic review and opportunities for the future. Leisure Sci 42:430–47.
Neiderud CJ. 2015. How urbanization affects the epidemiology of emerging infectious diseases. Infect Ecol Epidemiol 5:27060.
Niu X, Yue Y, Zhou X, Zhang X, 2020. How urban factors affect the spatiotemporal distribution of infectious diseases in addition to intercity population movement in China. ISPRS Int J Geo-Information 9:615.
Oh J, Lee H-Y, Khuong QL, Markuns JF, Bullen C, Barrios OEA, Hwang S, Suh YS, McCool J, Kachur SP, Chan C-C, Kwon S, Kondo N, Hoang VM, Moon JR, Rostila M, Norheim OF, You M, Withers M, … Gostin LO. 2021. Mobility restrictions were associated with reductions in COVID-19 incidence early in the pandemic: Evidence from a real-time evaluation in 34 countries. Sci Rep 11:13717.
Pagkas-Bather J, Ozik J, Millett G, Schneider JA. 2020. The last Black man with HIV in San Francisco: The potential role of gentrification on HIV getting to zero achievements. Lancet HIV 7:e853–6.
Park S, Mullenbach L, Kim J. 2023. Short-term rentals, resilience, and gentrification. Ann Tourism Res 101:103610.
Parry CM. 2006. Epidemiological and clinical aspects of human typhoid fever. In P. Mastroeni (Ed.), Salmonella Infections (1st ed., pp. 1–24). Cambridge University Press.
Pearsall H, Anguelovski I. 2016. Contesting and resisting environmental gentrification: responses to new paradoxes and challenges for urban environmental justice. Sociol Res Online 21:121–7.
Pegler C, Li H, Pojani D. 2020. Gentrification in Australia's largest cities: A bird's-eye view. Australian Planner 56:191–205.
Pini A, Stenbeck M, Galanis I, Kallberg H, Danis K, Tegnell A, Wallensten A. 2019. Socioeconomic disparities associated with 29 common infectious diseases in Sweden, 2005–14: An individually matched case-control study. Lancet Infect Dis 19:165–76.
Pulvirenti J, Muppidi U, Glowacki R, Cristofano M, Baker L. 2007. Changes in HIV-related hospitalizations during the HAART era in an inner-city hospital. AIDS Read 17:390-4, 397-401.
Sax DL, Nesbitt L, Quinton J. 2022. Improvement, not displacement: A framework for urban green gentrification research and practice. Environ Sci Policy 137:373–83.
Schnake-Mahl AS, Jahn JL, Subramanian SV, Waters MC, Arcaya M. 2020. Gentrification, neighborhood change, and population health: a systematic review. J Urban Health 97:1–25.
Shaw KS, Hagemans IW. 2015. 'Gentrification without displacement' and the consequent loss of place: the effects of class transition on low□income residents of secure housing in gentrifying areas. Int J Urban Regional Res 39:323–41.
Shi J, Duan K, Xu Q, Li J. 2021. Effect analysis of the driving factors of super-gentrification using structural equation modeling. PLoS One 16:e0248265.
Simon Rosser BR, West W, Weinmeyer R. 2008. Are gay communities dying or just in transition? Results from an international consultation examining possible structural change in gay communities. AIDS Care 20:588–95.
Smith GD. 2002. Commentary: Behind the Broad Street pump: aetiology, epidemiology and prevention of cholera in mid-19th century Britain. Int J Epidemiol 31:920-32.
Smith GS, Breakstone H, Dean LT, Thorpe RJ. 2020. Impacts of gentrification on health in the US: a systematic review of the literature. J Urban Health 97:845–56.
Snow SJ. 2002. Commentary: Sutherland, Snow and water: the transmission of cholera in the nineteenth century. Int J Epidemiol 31:908–11.
Thurber A, Krings A, Martinez LS, Ohmer M. 2021. Resisting gentrification: The theoretical and practice contributions of social work. J Social Work 21:26–45.
Toan DTT, Hoat LN, Hu W, Wright P, Martens P. 2015. Risk fac-

tors associated with an outbreak of dengue fever/dengue haemorrhagic fever in Hanoi, Vietnam. Epidemiol Infect 143:1594–8.

Tulier ME, Reid C, Mujahid MS, Allen AM. 2019. "Clear action requires clear thinking": A systematic review of gentrification and health research in the United States. Health & Place, 59, 102173.

Valli C. 2015. A sense of displacement: long□time residents' feelings of displacement in gentrifying Bushwick, New York. Int J Urban Reg Res 39:1191-208.

Van Gent WPC. 2013. Neoliberalization, housing institutions and variegated gentrification: how the 'third wave' broke in Amsterdam. Int J Urban Reg Res 37:503–22.

Van Leeuwen B. 2024. What is wrong with gentrification-related displacement? Progress Human Geography 03091325241 289546.

Wimalasena NN, Chang-Richards A, Wang KI-K, Dirks KN. 2021. Housing risk factors associated with respiratory disease: a systematic review. Int J Environ Res Public Health 18;2815.

Wong JO, Benjamin M, Arnold EA. 2020. 'I want the heart of fierceness to arise within us': Maintaining public space to promote HIV-related health with House Ball Community members in an era of gentrification. Culture Health Sexuality 22:444–58.

Wyly EK, Hammel DJ. 2004. Neoliberal housing policy and the gentrification of the american urban system. Environment and Planning A 36:1215–41.

Yang L, Iwami M, Chen Y, Wu M, Van Dam KH. 2023. Computational decision-support tools for urban design to improve resilience against COVID-19 and other infectious diseases: A systematic review. Progress Plann 168:100657.

Youm Y, Mackesy-Amiti ME, Williams CT, Ouellet LJ. 2009. Identifying hidden sexual bridging communities in Chicago. J Urban Health 86:107–20.

Zhu Y, Ye C. 2024. Urban renewal without gentrification: Toward dual goals of neighborhood revitalization and community preservation? Urban Geogr 45:201–33.

Zuk M, Bierbaum AH, Chapple K, Gorska K, Loukaitou-Sideris A. 2018. Gentrification, Displacement, and the Role of Public Investment. J Planning Literature 33:31–44.