Article

Urban Crises and the Covid-19 Pandemic: An Analytical Framework for Metropolitan Resiliency

Thomas J. Vicino [1,2,*], Robert H. Voigt [1], Mahir Kabir [1], and Jonathan Michanie [1]

[1] Department of Political Science, Northeastern University, USA
[2] School of Public Policy and Urban Affairs, Northeastern University, USA

* Corresponding author (t.vicino@northeastern.edu)

Abstract

Social scientists of the urban condition have long been interested in the causes and consequences of the phenomena that shape the growth and decline of cities and their suburbs. Such interests have become increasingly relevant in light of the Covid-19 pandemic. Over the course of the pandemic, many academic and popular analyses have confronted two essential questions: How has the pandemic changed the city? And given these changes, are they permanent? This current scholarly and popular dialogue generally lacks comparative analysis. In this article, we attempt to further the analysis and discussion about the pandemic and the city by reframing the debate through three comparative lenses: temporal, scalar, and dimensional. Drawing on the debate and experience of urban areas in the United States, we present an analytical framework to apply a comparative analytical approach. Three temporal analytical matrices are presented: (a) pre-pandemic, (b) current-pandemic, and (c) post-pandemic. These matrices articulate the relationships between a city's developmental patterns and their related dimensions of urbanization. We pay special attention to the nature of scale within and among the cities and suburbs of regions. Each matrix is tested and contextualized using relevant narratives from cities in the United States before, during, and after the pandemic on various issues, including housing, transportation, and economic development. This framework will serve as an analytical tool for future research on the pandemic and how cities can become more resilient to such shocks.

Keywords

Covid-19; economic restructuring; pandemic; population change; resilience; urban crises; urbanization

Issue

This article is part of the issue "The Resilient Metropolis: Planning in an Era of Decentralization" edited by Thomas J. Vicino (Northeastern University).

1. Introduction

In the wake of the Covid-19 pandemic, recent headlines declared, "New York is dead. Long Live New York" (Williams, 2021). Indeed, scholars and observers of cities around the world have questioned how the pandemic will impact the future of the city. New York is a case in point. Spanning some 23 square miles, Manhattan is the densest urban environment in the United States. The borough is home to over 1.6 million residents, but the daytime population doubles as workers commute to their employers and tourists visit the city (Moss & Qing, 2012). Crowded sidewalks, streets, and subways carry over four million people daily between the East River and the Hudson River. As a global city, New York is both a command center and cultural capital (Sassen, 2001). However, on March 20, 2020, everything changed when the government issued a shelter-in-place order. The hustle and bustle of the city abruptly ended, leaving streets, parks, museums, stores, and companies empty. The sirens of ambulances echoed across the empty buildings of the city, and the striking images of large trucks

carrying portable morgues became poignant examples of the impact of the pandemic on cities across the world.

Throughout the history of urban development, there have been many challenges and shocks to the urban condition. Whether they came as natural disasters, wars, or public health crises, they all presented significant disruptions and changes for the future. The Covid-19 pandemic is the latest of such shocks and is unique as its scale has affected areas across the world. As the conditions of the pandemic necessitated physical separation, dense urban areas were naturally reshaped—literally de-densified—in order to prioritize public health. This was manifested in various physical lockdowns of the city, which halted many commercial and industrial activities. The conditions similarly sparked intense and enduring debates about socioeconomic inequalities that have come to define the urban condition.

For cities in the United States, these conversations are deeply tied to the historical patterns of development and the myriad dimensions of urbanization across metropolitan areas and their cities and suburbs (Beauregard, 2006; Teaford, 2006). The shock of the Covid-19 pandemic has reignited long-time debates about spatialized inequalities along dimensions of race and class (Martínez & Short, 2021). Questions abound over housing, transportation, economic development, social inequality, and more as the pandemic exacerbates and illuminates such challenges (Buffel et al., 2021). The spatial connectedness of the network of cities and suburbs demands a comparative, analytical approach to the study of how the pandemic impacts cities. In the context of the United States, the ecosystem of some 90,000 local governments means that the social, economic, political, and cultural lives of residents are spread across a wide array of cities, towns, villages, boroughs, and the like (Kemp, 2007). Thus, an understanding of how the pandemic impacts different spatial scales of development is essential to this scholarly and popular discourse.

In this article, we seek to contribute to the debate about the pandemic and the future of the city. We articulate an analytical framework to guide scholarly analysis of the impact of the pandemic on the city. We begin by setting the context of the pandemic by reviewing the urban condition and its relationship to shocks and resilience. Then, we put forth modes of analysis along temporal, spatial, and dimensional characteristics and outcomes. These modes are examined through a set of matrices that serve as the primary analytical tool for future research on the pandemic and how cities can become more resilient to such shocks. Finally, we conclude by reflecting on the prospects of metropolitan resiliency through planning and public policy.

2. The Urban Context of the Covid-19 Pandemic

The Covid-19 pandemic ushered an unprecedented shock to human civilization. The sheer global scale of the pandemic meant that people all over the world were impacted by this novel coronavirus. In particular, the dense form and function of urban environments meant that the shock was most severe in these areas. The scale and severity of this shock in cities warranted a wide range of perspectives about the future of the city. Scholars and observers have only begun to identify the causes and consequences of the pandemic. These scholarly and popular dialogues have focused on topics such as the rebound of downtown jobs, the population shift in cities, the innovation of urban public space, and the transformation of mass transit. The central question of density and agglomeration of cities undergirds these conversations about the unique nature of cities and shocks (Keil, 2020).

After the initial shock of the pandemic, popular commentators and public intellectuals quickly began to speculate about the future of the post-pandemic city (Krugman, 2021; Pinsker, 2020; Williams, 2021). Will jobs return to downtown? Where will people live after this pandemic? What has the pandemic taught us about urban innovation? Such analyses provide an important foundation for thinking about questions of urbanization and resilience. This public discourse serves the important purpose of starting the national and global conversation about shocks, resilience, and recovery from the pandemic. However, more attention is needed to better understand the context of how metropolitan regions—cities and their myriad suburbs—are impacted by the pandemic. Through a comparative lens, it is necessary to define the spatial differences within and among metropolitan areas. Let us turn to a synthesis of the pandemic's impact on the city and its relationships to shocks and resilience.

2.1. Cities and Pandemics

The impact of the pandemic stretched across all parts from Manhattan to rural America, and indeed around the world. While all populations and all geographies of human civilization were ultimately impacted, large urban centers experienced the most severe effects. Not only did the virus spread quicker in urban areas, but the social and economic impacts were often stronger in metropolitan centers (Nathan, 2021). The disparate outcomes in cities led many observers to ask important questions about the role of the city and the pandemic, including: What can we learn from past shocks to urban areas (Glaeser, 2020)? Where are the impacts most concentrated and why (Sharifi & Khavarian-Garmsir, 2020)? What can policymakers and planners learn from these experiences (Florida et al., 2021)?

Pandemics and the city have always had a tenuous history (Crawford, 2007; McNeill, 1976). From the black plague of the 1300s to the cholera epidemic of the 1800s, cities often become the epicenter of public health crises (Kelly, 2005; Rosenberg, 1987). For example, the 1918 pandemic (known as the "Spanish flu") ravaged many cities in the early 20th century (Barry, 2005; Spinney, 2017). More recently, the severe acute respiratory syndrome (SARS) outbreak spread rapidly as the world's

cities were much more connected to the global economy. By the early 2000s, cities, as the engines of globalization, had created a platform for quick global spread of respiratory viruses (Ali & Keil, 2006). The SARS outbreaks, which never reached the pandemic phase, still shaped the processes of urbanization, migration, and economic change in the wake of a rapidly spreading virus (Ali & Keil, 2008). Thus, over the course of the history of human civilization, cities have borne the brunt of policy responsibility falling on public administrators of cities (Hays, 2009). In response to both SARS and Covid-19, public administrators around the world faced questions about what a "new normal" would look like in cities. These experiences should have provided a foundation for effective policy responses to a public health crisis, but the past has not always yielded lessons for the present (Batty, 2020).

Another central theme is the density of urbanized areas. An intuitive examination would posit that increased urban density would yield higher spread of a respiratory virus and thus more severe public health impacts. However, the research conclusions are more nuanced. While the spread is notably higher in denser areas, researchers have also found lower mortality rates (Hamidi et al., 2020). Many have attributed these low rates to the strong health infrastructure featured prominently in many urban cores. Some researchers have gone even further, arguing that patterns of suburbanization and sprawl exacerbated virus conditions due to the strain on governance structures and medical institutions (Connolly et al., 2020). This is consistent with larger dynamics of resilience, or lack thereof, that result from the sprawl of North American suburbs (Phelps, 2015).

The virus has also had tangible effects on the dynamism of the city. The modality of location of the labor force, especially among professional services, shifted to remote work. At the onset of the pandemic, there was a dramatic decrease in commercial and labor activity in and around the central business district (Loh & Kim, 2021). Decreased volume of professional workers created ripple effects among supporting retailers and transportation networks. Notably, public transportation usage decreased across all major transportation agencies in the United States (Parker et al., 2021). Compared to other modes, public transit has had the slowest recovery with an increased stratification of ridership by social class (Wilbur et al., 2020). It remains unclear how recovery will proceed as the pandemic transformed perceptions of public transportation.

Finally, the pandemic ushered in a new era of population migration. Before the pandemic, the world's cities were connected through social and economic networks that migration flows utilized (Hanlon & Vicino, 2014). International migration was disrupted and nearly stopped in most nations (Chamie, 2020). Domestically in the United States, inter- and intra-regional migration reshaped the population geography of cities and their regions. Intra-regional migration persisted as remote work facilitated household relocation from urban dwellings to single-family units located along the fringe of metropolitan areas. Furthermore, inter-regional migration grew in some regions as households relocated to new areas. Such changes in migration patterns revealed divisions by socioeconomic status: Wealthy households were more likely to relocate (Mongey et al., 2020). Questions abound about whether these changes to migration behavior remain after the pandemic (Frey, 2021).

2.2. Shocks and Resilience

The concept of resilience provides a useful context for understanding how people and places recover after a shock to society and the built environment (Aldrich, 2012). Even though the resilience concept is broad, and definitions vary across many contexts, it is nonetheless possible to operationalize the meaning of resilience as it relates to the city (Meerow & Newell, 2019). The Resilient Cities Network (2021) defines urban resilience as "the capacity of a city's systems, businesses, institutions, communities, and individuals to survive, adapt, and grow, no matter what chronic stresses and acute shocks they experience." Some scholars argue that resilience is the ability to bounce back from large shocks to the precondition (Klein et al., 2003), while others define it as the ability to create something new and stronger after a shock (Campanella, 2006). Still others define resilience as a city's ability to overcome adverse effects of a shock and the policies or structures that remain to address future shocks (Pendall et al., 2010). Despite these various definitions, urban resilience is a useful analytical category to capture the impacts of shocks on cities—be they social, economic, or environmental (Chelleri et al., 2015; Glaeser, 2021).

Parallel to the larger conversations about the definition of resilience, a variety of case studies on the resilience of individual cities illustrates the successes of recovery and the failures of overcoming shocks. Consider the case of the economic resilience of the city. Boston, for example, was faced with a deindustrialized and stagnated economy by the end of the 1970s; yet by the end of the 20th century, the city's ability to reinvent itself transformed the region and resulted in a social and economic renaissance (Bluestone & Stevenson, 2002). The city's ability to leverage the intellectual surplus provided by the various academic institutions allowed Boston to become a leader in various industries like biotechnology, robotics, and chemical processing (Glaeser, 2005). Decades later, the city's capacity to bounce back after the bombing of the Boston Marathon finish line highlights the key role that social capital and community resilience play in building strong cities as exemplified by the "Boston Strong" ideology (Ferrer & Conley, 2015). From the economic shock of industrial decline to the disaster of a bombing, the resilience of Boston demonstrates a city's capacity to overcome and thrive.

Cities are not the only places to experience shocks. Suburbs, too, confront the very same threats to the

urban environment. Differences between the urban core and the surrounding suburbs of a region point to significant variation in how shocks are experienced. The impacts of some types of shocks, such as natural disasters, may be specific to a single locale in a metropolitan region, whereas other shocks like outbreaks of diseases or the consequences of climate change are not constrained by spatial boundaries. This spatial difference underscores the intersectional nature of resilience and the structure of metropolitan regions (Banai, 2020).

The spatial structure and political organization of cities and suburbs in the United States provide a case in point. Local government is decentralized and lacks coordination across political jurisdictions (Miller, 2002). Public administrative functions such as planning, land-use zoning, transit, health, and economic development are largely determined by independent, local governments. As a result, the growth of the metropolis has been shaped by the structure and function of local government (Hanlon et al., 2010). This structure and organization of local governments meant that residents of cities, inner suburbs, outer suburbs, and exurbs experienced different impacts of the pandemic based on a variety of geographic characteristics and policy responses. Indeed, initial observations suggest that the resilience of metropolitan areas to the pandemic depended, in part, on a region's ability to mitigate inter- and intra-regional differences caused by the virus and thereby integrate economic, social, environmental, and health resilience at a metropolitan scale.

The Covid-19 pandemic presented a unique shock in scale and severity. The shock was global in nature. From rural areas to the suburbs, to the urban centers, the pandemic challenged the ability of human societies to survive, adapt, and grow. Let us turn to a framework that guides the analysis of the impacts by time, scale, and dimension.

3. Analytical Framework

Drawing on the debate and experience of urban areas in the United States, we present an analytical framework to apply a comparative analytical approach. Our analytical framework is divided into three primary modes of analysis: temporal, scalar, and dimensional. Each provides a unique perspective of any shock condition, with a specific focus on the Covid-19 pandemic. Together, these modes form a series of matrices that serve as our main instrument for analyzing the urban impacts of the pandemic. In this section, we present an analytical framework to guide the mode of analysis on how the pandemic impacts urban areas.

3.1. Temporal Mode of Analysis

There are distinct periods of analysis that serve to frame the conclusions that can be drawn from any shock. There is a pre-condition, a current condition, and a post-condition as illustrated in Figure 1. The pre-condition is a clear distinction of what existed before any shock occurred. This serves as the analytical baseline. Observers can reflect on the environmental conditions that existed before a shock. The pre-condition period ends with the arrival of a shock, marking the beginning of the current condition. Conditions immediately following the shock are temporary and observable. Shock conditions create disruption for society. When the shock dissipates, there are new outcomes, policies, and attitudes that shape the post-condition. A new environment exists that will become a future pre-condition. The current Covid-19 pandemic, which is the shock under analysis, has not yet reached this period. However, current public health discussions suggest the potential need for preparations to manage endemic conditions. Therefore, we provide an analytical framework for predicting the transition to the new normal.
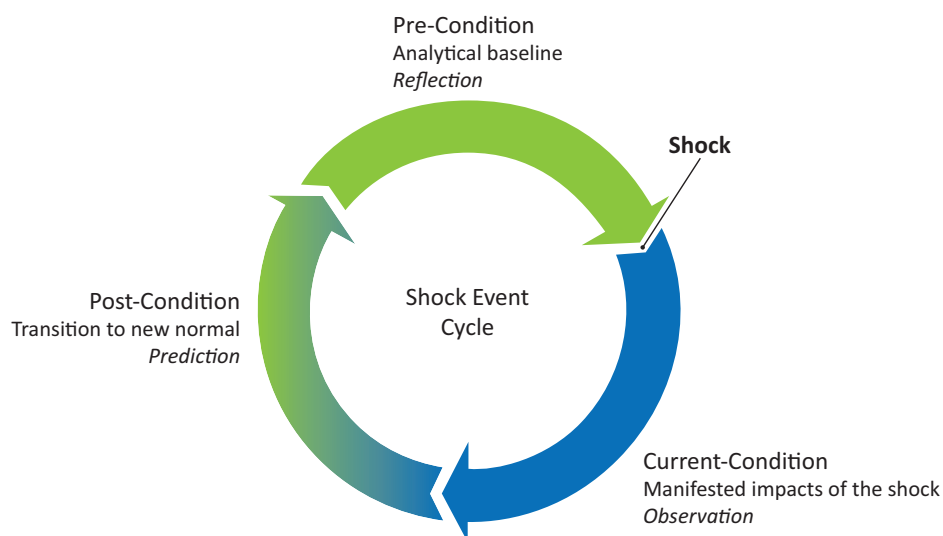

Figure 1. Shock event cycle.

It is important to note that the process of shocks can be cyclical in nature. Each cycle influences other cycles until a new stasis emerges in the post-condition period. However, the post-condition eventually emerges as the pre-condition for the observer of the next shock. This builds on existing theories of resilience that underscores our generational progress as a result of disruptive events, or shocks, to society—be it a pandemic, a natural disaster, or a socio-political event.

3.2. Scalar Mode of Analysis

The spatial scale of the impact of the shock is another important consideration. In the context of the urbanization of the United States, we identify three types of patterns of regional development: rustbelt, sunbelt, and knowledge economy regions. These regional patterns of development provide a useful categorical distinction for capturing the essence of how regional patterns of development vary across the United States. Specifically, regional patterns of development vary *among* and *within* metropolitan areas (Bluestone et al., 2022). First, inter-regional development patterns (among regions) can be defined by their economic base and the spatial processes of growth. For example, knowledge economies, or post-industrial regions, have a high concentration of professional services and high economic growth (e.g., Boston, San Francisco, and Seattle). Rustbelt regions have experienced deindustrialization and stagnant growth (e.g., Detroit, Cleveland, and Buffalo). Sunbelt regions have experienced sprawling and fast growth (e.g., Atlanta, Dallas, and Phoenix). Second, intra-regional development patterns (within a region) can be defined by the differences in the spatial gradient from the urban core to the metropolitan fringe. Distinct patterns can be identified in the central business district, the outer urban neighborhoods, the inner suburbs, the outer suburbs, and the exurbs (Mikelbank, 2004). Therefore, the significant variation in urban development means that the analysis of shocks in urban areas needs to account for such differences in the spatial scales among and within metropolitan regions.

3.3. Dimensional Mode of Analysis

Temporal and scalar modes of analysis provide us with the foundation for analysis, but it is also necessary to understand how the shock impacts specific characteristics of urbanization. A dimensional approach contextualizes the characteristics and outcomes. We identify five defining dimensions of urbanization, including density, population trend, socioeconomic structure, transportation patterns, and economic base. These dimensions are representative of the dynamics that shape the process of urbanization. They serve to best describe the growth and decline dynamics of a metropolitan region's composition while allowing for generality to carry out a broad comparative analysis. It is important to note that global connectivity of the economy and the human population is also a notable dimension of the urbanization process and impacts to the shock cycle.

These dimensions yield different results as the temporal period and regional type vary. In the pre-pandemic phase, these dimensions are baseline characteristics. These characteristics define the urban landscape and what we know about a region before any shock occurs. Once the shock occurs, we can observe changes in these characteristics. Shock conditions are inherently temporary and serve as a barometer of the impacts of the shock. Finally, once the shock has stabilized, those changes in the shock conditions become new characteristics or outcomes. Dimensions inform the temporal periods and type of regional pattern of development. They serve as a platform to collect evidence, conduct analysis, and make predictions. Ultimately, the goal is to articulate a generalizable framework to understand the impacts of the Covid-19 pandemic on cities through reflection, observation, and prediction.

4. Discussion of Matrices: Conditions and Outcomes

Drawing on this analytical framework, three distinct matrices are used to identify the urban impacts of the pandemic. These matrices serve to support an intersectional analysis among spatial, temporal, and dimensional aspects of a shock such as the Covid-19 pandemic. Each matrix represents a unique period in a shock cycle (see Figure 1) and illustrates the intersection between a region's pattern of development and the subsequent socio-spatial dimensions of urbanization. Specifically, these five dimensions are representative of the key features of the process of urbanization, which allow us to articulate the impacts of the pandemic effectively.

For the purposes of this discussion, we utilize this analytical framework as a means of understanding *how* the pandemic transforms the city. Using matrix-based analysis grounded by the period of the shock cycle (i.e., pre-, current, and post-shock), we characterize the urban impacts of Covid-19 by dimension. Each dimension serves as a variable to analyze impacts across stages of the shock cycle through the lens of each matrix. This provides an opportunity to reflect on the pre-condition of the shock, observe the current conditions during the shock, and predict potential outcomes in the post-shock condition. The following discussion exhibits how changes occur during each stage of the shock cycle and how these changes vary by type of region. Future researchers may use this analysis as a template, utilizing the framework to formulate novel hypotheses.

4.1. Density

The pandemic's direct impact on the density of urban areas remains one of the most significant developments of this shock. Prior to the pandemic, patterns of density

varied by type of region (see Table 1). During the current conditions of Covid-19, cities across all types of regions experienced significant de-densification of the urban core and an increase in activity in the suburban areas (see Table 2). However, the intensity of the de-densification was dependent on pre-pandemic conditions. Cities and regions with higher pre-pandemic densities (such as knowledge economies) tended to experience the most dramatic shifts during the pandemic, whereas the sunbelt and rustbelt regions were already more highly decentralized and less dense (see Table 3). Thus, the agglomeration of economic activities in cities—the density of firms and downtowns—is a strong indicator to consider as cities recover. As we consider the prospects of post-pandemic cities, the density of the built environment, such as the location of firms and the labor force, will shape a city's ability to rebound. Although cities and their businesses have shown signs of slow recovery to pre-pandemic density levels in the urban core, urban futures remain uncertain as the supply and demand of local services and goods have dramatically changed (Glaeser & Cutler, 2021).

4.2. Population Trends

Prior to the pandemic, patterns of growth and decline in metropolitan America were divided by steady population growth of knowledge economy regions, decline or stagnation of the rustbelt, and rapid growth of the sunbelt (Poon & Yin, 2014). The pandemic disrupted and exacerbated these patterns in notable ways, including migration and natural population changes. The shift from physical to remote work in the professional services industries impacted the geography of work across cities and suburbs. There was a notable exodus of high-skill workers from various urban cores, especially in knowledge economies. The population increased in suburban areas and decreased in the urban core (Anacker, 2021).

Despite the overall volume of inter-regional migration decreasing, pre-pandemic metropolitan growth trends continued. There is still rapid growth throughout the sunbelt, moderate to slow growth in knowledge economies, and decline in the rustbelt (Broughton, 2015). While the dimensional observations remain consistent, there are still significant underlying impacts of the pandemic. Namely, death rates increased nationally, which decreased natural population growth and increased the burden of net migration on economic and demographic viability (Frey, 2021). Since demographic shifts manifest over longer periods, it remains to be seen how the pandemic will reshape patterns of urbanization. While current indicators suggest a return to the status-quo, demographic outcomes will undoubtedly vary across regions.

4.3. Socioeconomic Structure

Socioeconomic inequality is a spatial phenomenon in the United States that shaped the historical development of metropolitan areas (Dreier et al., 2014). Neighborhoods are stratified by race and class, oftentimes along political boundaries of a jurisdiction or the neighborhood boundary within a city (Jargowsky, 1997). Prior to the shock of the pandemic, cities and suburbs across the nation suffered from high levels of economic and racial dissimilarity, which was most intense in regions with strong historical manufacturing bases and industrial decay (Neumann, 2016). Thus, the onset of the pandemic exacerbated social and economic inequalities everywhere, from the central city to the suburbs and beyond. Table 2 illustrates that dissimilarity consistently increased as a result of the numerous impacts of the pandemic. The intensity of inequality and its conditions were largely determined by the pre-pandemic characteristics of the socioeconomic structure of the city. For example, Detroit, a metropolitan area that is highly segregated by race and class, witnessed significant spatial differentiation of health

Table 1. Pre-pandemic matrix.

		Density	Population Trend	Socioeconomic Structure	Transportation Patterns	Economic Base
Type of Regional Pattern of Development	Knowledge Economy	Dense urban core and dense suburbs	Steady growth	Moderate dissimilarity	High volume, mixed mode	Growing professional services economy
	Rustbelt	Decentralized urban core and low-density suburbs	Decline or stagnation	High dissimilarity	Moderate volume, single mode	Declining manufacturing economy
	Sunbelt	Polycentric pattern and highly sprawled	Rapid growth	Moderate dissimilarity	High volume, single mode	Growing high- and low-wage service economy

Table 2. Current pandemic matrix.

		Density	Population Trend	Socioeconomic Structure	Transportation Patterns	Economic Base
Type of Regional Pattern of Development	Knowledge Economy	High dedensification	Slowed growth	Increased dissimilarity	Lowered volume, single mode	Remote work of professional services and reduced in-person
	Rustbelt	Moderate dedensification	Decline or stagnation	Increased dissimilarity	Lowered volume, single mode	Reduced volume of in-person manufacturing
	Sunbelt	Moderate-to-low dedensification	Rapid growth	Increased dissimilarity	Lowered volume, single mode	Remote work of professional services, in-person wage-services

and economic outcomes, while other cities such as Minneapolis experienced disparate social impacts in the wake of socio-political movements during the pandemic (Pleyers, 2020). These socioeconomic outcomes are emblematic of the pandemic, which continues to reveal and exacerbate enduring socio-spatial inequalities.

4.4. Transportation Patterns

Transportation patterns before the pandemic were highly stratified by region, but the consistent feature of the 20th century is the dominance of the automobile (Shoup, 2017). The immediate impact of the pandemic decreased all travel to the central business district nationally, especially in its early stages (except among essential workers). At the same time, intra-suburban travel increased as many bedroom suburbs saw a dramatic increase in the daytime population. As the pandemic progressed, commuting patterns slowly returned to pre-pandemic levels, although the patterns varied by region. For example, knowledge economies, which previously had more mixed-mode travel (e.g., subway, commuter rail), had slower volume recovery with less diversity of transit mode. Many workers who previously rode the subway or other public transportation in cities like Boston and the District of Columbia simply stopped. Workers continued to work remotely or have chosen to embrace the social distancing benefits of automobile travel (Berger, 2020). Commuting patterns in cities of the sunbelt and rustbelt, by comparison, have returned more quickly to pre-pandemic conditions. Collectively, changes in the volume of both travel and ridership of public transit have dramatically impacted transit accessibility. Nearly every United States transit agency now faces harsh fiscal realities. Service reductions and halted capital developments will continue to have large-scale ripple effects, even in a post-pandemic world.

4.5. Economic Base

While the shift to remote work was highly publicized, it was far less ubiquitous than it may seem. Professional services almost universally shifted modality in 2020; however, low-wage service industries and manufacturing remained in-person (with notable declines in productivity and worker safety). These industrial base differences manifested into some of the most significant regional variations of the pandemic's influence. In the sunbelt and rustbelt, a higher proportion of the labor force remained in-person throughout the pandemic. The timing of easing pandemic restrictions reflected the economic and political imperatives to reopen businesses in various industries. Sunbelt cities were the first to exit lockdowns and thus had the quickest economic recovery with their large service industries. Meanwhile, many knowledge economies, like Boston and Seattle, have experienced a significantly slower recovery as the myriad of pandemic policies varied across many suburban and urban jurisdictions. Public and private decisions about the management of the economy will shape post-pandemic outcomes. There is evidence to suggest that economic disruptions such as labor shortages, supply chain disruptions, and inflation will continue until a new normal fully emerges.

5. Conclusions

5.1. Summary

In the United States and around the world, the Covid-19 pandemic ushered a new debate about the future of the city. In this article, we put forth an analytical framework to guide scholarly analysis in the wake of disruptions and shocks to the urban system. Specifically, we articulated a mode of analysis along temporal, spatial, and

Table 3. Post-pandemic matrix.

		Density	Population Trend	Socioeconomic Structure	Transportation Patterns	Economic Base
Type of Regional Pattern of Development	Knowledge Economy	Slight decline in urban core and higher density suburbs	Steady slower growth	Moderate dissimilarity	High volume and less mixed mode	Professional services remain in mixed modality
	Rustbelt	Slight decline in urban core, slightly denser suburbs	Decline or stagnation	High dissimilarity	Moderate volume and single mode	Manufacturing volume increases
	Sunbelt	Continued sprawl and polycentrism	Rapid growth	Moderate dissimilarity	High volume and single mode	Service economies return to in-person

dimensional characteristics and outcomes. The shock event cycle calls for scholars to consider the pre-condition, the current condition, and post-condition of the shocks. The spatial differences of inter-regional and intra-regional patterns of development provide nuance for understanding differentiation of impacts. The dimensions of density, population trend, socioeconomic structure, transportation patterns, and economic base provide context for how patterns of urbanization evolve. In conclusion, the mode of analysis can serve as the primary analytical tool to reflect, observe, and predict urban impacts of the Covid-19 pandemic.

5.2. Lessons and Prospects

The Covid-19 pandemic unearthed and exacerbated socio-spatial inequalities in metropolitan regions across the United States. Enduring and systemic inequalities contributed to the debate about the future of the city. The policy response to the pandemic was impacted by the complex federalist structure that led to disparate policy responses. This fragmented policy response undermined the ability to improve conditions for everyone. Pandemics taught us that planning practices and policy responses need to be regional in nature, reflecting the spatial differences from the urban core to the suburban fringe of metropolitan areas. This analytical framework suggests that the future of the city is strong. Cities benefit from the staying power of agglomeration and the human connection. Indeed, the post-pandemic recovery depends on human responses and policy responses, especially given that the potentially endemic nature of the disease presents ongoing risks, shocks, and disruptions to communities around the world. Future research should focus on understanding the determinants and outcomes of pandemic resiliency in cities around the world.

Conflict of Interests

The authors declare no conflict of interests.

References

Aldrich, D. P. (2012). *Building resilience: Social capital in post-disaster recovery.* University of Chicago Press.

Ali, S. H., & Keil, R. (2006). Global cities and the spread of infectious disease: The case of severe acute respiratory syndrome (SARS) in Toronto, Canada. *Urban Studies*, *43*(3), 491–509. https://doi.org/10.1080/00420980500452458

Ali, S. H., & Keil, R. (Eds.). (2008). *Networked disease: Emerging infections in the global city*. Wiley.

Anacker, K. (2021). U.S. suburbs and the global Covid-19 pandemic: From cleanscapes to safescapes 2.0? The case of the New York metropolitan area. *Urban Geography*. Advance online production. https://doi.org/10.1080/02723638.2021.2003608

Banai, R. (2020). Pandemic and the planning of resilient cities and regions. *Cities*, *106*, Article 102929. https://doi.org/10.1016/j.cities.2020.102929

Barry, J. M. (2005). *The great influenza: The story of the deadliest pandemic in history*. Penguin Books.

Batty, M. (2020). The Coronavirus crisis: What will the post-pandemic city look like? *Environment and*

Planning B: Urban Analytics and City Science, *47*(4), 547–552. https://doi.org/10.1177/2399808320926912

Beauregard, R. A. (2006). *When America became suburban*. University of Minnesota Press.

Berger, P. (2020, May 29). Social distancing on New York's subway may be too hard. *Wall Street Journal.* https://www.wsj.com/articles/social-distancing-on-new-yorks-subway-may-be-too-hard-11590775621

Bluestone, B., & Stevenson, M. F. (2002). *The Boston renaissance: Race, space, and economic change in an American metropolis*. Russell Sage Foundation.

Bluestone, B., Stevenson, M. F., & Williams, R. E. (2022). *The urban experience: An interdisciplinary policy perspective* (2nd ed.). Oxford University Press.

Broughton, C. (2015). *Boom, bust, exodus: The rust belt, the maquilas, and a tale of two cities*. Oxford University Press.

Buffel, T., Yarker, S., Phillipson, C., Lang, L., Lewis, C., Doran, P., & Goff, M. (2021). Locked down by inequality: Older people and the Covid-19 pandemic. *Urban Studies*. Advance online publication. https://doi.org/10.1177/00420980211041018

Campanella, T. (2006). Urban resilience and the recovery of New Orleans. *Journal of the American Planning Association*, *72*(2), 141–146. https://doi.org/10.1080/01944360608976734

Chamie, J. (2020). International migration amid a world in crisis. *Journal on Migration and Human Security*, *8*(3), 230–245. https://doi.org/10.1177/2331502420948796

Chelleri, L., Waters, J. J., Olazabal, M., & Minucci, G. (2015). Resilience trade-offs: Addressing multiple scales and temporal aspects of urban resilience. *Environment and Urbanization*, *27*(1), 181–198. https://doi.org/10.1177/0956247814550780

Connolly, C., Ali, H. S., & Keil, R. (2020). On the relationships between Covid-19 and extended urbanization. *Dialogues in Human Geography*, *10*(2), 213–216. https://doi.org/10.1177/2043820620934209

Crawford, D. H. (2007). *Deadly companions: How microbes shaped our history*. Oxford University Press.

Dreier, P., Mollenkopf, J., & Swanstrom, T. (2014). *Place matters: Metropolitics for the twenty first century*. University Press of Kansas.

Ferrer, B., & Conley, L. (2015). Boston strong: The role of community resilience. *Journal of Public Health Management and Practice*, *21*(1), S34–S37. https://doi.org/10.1097/PHH.0000000000000133

Florida, R., Rodríguez-Pose, A., & Storper, M. (2021). Cities in a post-Covid world. *Urban Studies*. Advance online publication. https://doi.org/10.1177/00420980211018072

Frey, W. H. (2021). *Despite the pandemic narrative, Americans are moving at historically low rates*. The Brookings Institution. https://www.brookings.edu/research/despite-the-pandemic-narrative-americans-are-moving-at-historically-low-rates

Glaeser, E. (2005). Reinventing Boston 1630–2003. *Journal of Economic Geography*, *5*(2), 119–153. https://doi.org/10.1093/jnlecg/lbh058

Glaeser, E. (2020). Cities and pandemics have a long history. *City Journal*. https://www.city-journal.org/cities-and-pandemics-have-long-history

Glaeser, E. (2021). Urban resilience. *Urban Studies*. Advance online publication. https://doi.org/10.1177/00420980211052230

Glaeser, E., & Cutler, D. (2021). *Survival of the city: Living and thriving in an age of isolation*. Penguin Books.

Hamidi, S., Ewing, R., & Sabouri, S. (2020). Longitudinal analyses of the relationship between development density and the Covid-19 morbidity and mortality rates: Early evidence from 1,165 metropolitan counties in the United States. *Health & Place*, *64*, Article 102378. https://doi.org/10.1016/j.healthplace.2020.102378

Hanlon, B., Short, J. R., & Vicino, T. J. (2010). *Cities and suburbs: New metropolitan realities in the US*. Routledge.

Hanlon, B., & Vicino, T. J. (2014). *Global migration: The basics*. Routledge.

Hays, J. N. (2009). *The burdens of disease: Epidemics and human response in Western history*. Rutgers University Press.

Jargowsky, P. (1997). *Poverty and place: Ghettos, barrios, and the American city*. Russell Sage Foundation.

Keil, R. (2020). The density dilemma: There is always too much and too little of it. *Urban Geography*, *41*(10), 1284–1293. https://doi.org/10.1080/02723638.2020.1850025

Kelly, J. (2005). *The great mortality: An intimate history of the black death, the most devastating plague of all time*. HarperCollins.

Kemp, R. (Ed.). (2007). *Forms of local government: A handbook on city, county and regional options*. McFarland.

Klein, R. J. T., Nicholls, R. J., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Global Environmental Change Part B: Environmental Hazards*, *5*(1/2), 35–45. https://doi.org/10.1016/j.hazards.2004.02.001

Krugman, P. (2021, March 15). The pandemic and the future city. *The New York Times*. https://www.nytimes.com/2021/03/15/opinion/cities-covid-remote-work.html

Loh, T. H., & Kim, J. (2021). *To recover from Covid-19, downtowns must adapt*. The Brookings Institution. https://www.brookings.edu/research/to-recover-from-covid-19-downtowns-must-adapt

Martínez, L., & Short, J. R. (2021). The pandemic city: Urban issues in the time of Covid-19. *Sustainability*, *13*(6), Article 3295. https://doi.org/10.3390/su13063295

McNeill, W. (1976). *Plagues and peoples*. Anchor Books.

Meerow, S., & Newell, J. P. (2019). Urban resilience for

whom, what, when, where, and why? *Urban Geography*, *40*(3), 309–329. https://doi.org/10.1080/02723638.2016.1206395

Mikelbank, B. A. (2004). A typology of U. S. suburban places. *Housing Policy Debate*, *15*(4), 935–964. https://doi.org/10.1080/10511482.2004.9521527

Miller, D. (2002). *The regional governing of metropolitan America*. Routledge.

Mongey, S., Pilossoph, L., & Weinberg, A. (2020). *Which workers bear the burden of social distancing?* (Working Paper No. 27085). National Bureau of Economic Research. http://www.nber.org/papers/w27085

Moss, M. L., & Qing, C. (2012). *The dynamic population of Manhattan*. Rudin Center for Transportation Policy and Management. https://wagner.nyu.edu/files/rudincenter/dynamic_pop_manhattan.pdf

Nathan, M. (2021). The city and the virus. *Urban Studies*. Advance online publication. https://doi.org/10.1177/00420980211058383

Neumann, T. (2016). *Remaking the Rust Belt: The postindustrial transformation of North America*. University of Pennsylvania Press.

Parker, M. E. G., Li, M., Bouzaghrane, M. A., Obeid, H., Hayes, D., Frick, K. T., Rodríguez, D. A., Sengupta, R., Walker, J., & Chatman, D. G. (2021). Public transit use in the United States in the era of Covid-19: Transit riders' travel behavior in the Covid-19 impact and recovery period. *Transportation Policy*, *111*, 53–62. https://doi.org/10.1016/j.tranpol.2021.07.005

Pendall, R., Foster, K. A., & Cowell, M. (2010). Resilience and regions: Building understanding of the metaphor. *Cambridge Journal of Regions, Economy and Society*, *3*(1), 71–84. https://doi.org/10.1093/cjres/rsp028

Phelps, N. A. (2015). *Sequel to suburbia: Glimpses of America's post-suburban future*. The MIT Press.

Pinsker, J. (2020, August 15). How the pandemic has changed us already. *The Atlantic.* https://www.theatlantic.com/family/archive/2020/08/pandemic-habits-behaviors-great-depression-wash-hands/615283

Pleyers, G. (2020). The pandemic is a battlefield: Social movements in the Covid-19 lockdown. *Journal of Civil Society*, *16*(4), 295–312. https://doi.org/10.1080/17448689.2020.1794398

Poon, J., & Yin, W. (2014). Human capital: A comparison of Rustbelt and Sunbelt cities. *Geography Compass*, *8*(5), 287–299. https://doi.org/10.1111/gec3.12133

Resilient Cities Network. (2021). *What is urban resilience?* https://resilientcitiesnetwork.org/what-is-resilience

Rosenberg, C. E. (1987). *The cholera years: The United States in 1832, 1849, and 1866*. University of Chicago Press.

Sassen, S. (2001). *The global city: New York, London, Tokyo* (2nd ed.). Princeton University Press.

Sharifi, A., & Khavarian-Garmsir, A. R. (2020). The Covid-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. *Science of the Total Environment*, *749*, Article 142391. https://doi.org/10.1016/j.scitotenv.2020.142391

Shoup, D. (2017). *The high cost of free parking*. Routledge.

Spinney, L. (2017). *Pale rider: The Spanish flu of 1918 and how it changed the world*. PublicAffairs.

Teaford, J. C. (2006). *The metropolitan revolution: The rise of post-urban America*. Columbia University Press.

Wilbur, M., Ayman, A., Ouyang, A., Poon, V., Kabir, R., Vadali, A., Puglies, P., Freudberg, D., Laszka, A., & Dubey, A. (2020). *Impact of Covid-19 on public transit accessibility and ridership*. arXiv. https://doi.org/10.48550/arXiv.2008.02413

Williams, A. (2021, May 15). New York is dead. Long live New York. *The New York Times*. https://www.nytimes.com/2021/05/15/style/new-york-city-future.html

About the Authors

Thomas J. Vicino is full professor of political science, public policy, and urban affairs at Northeastern University in Boston, Massachusetts, USA. His research focuses on the political economy of metropolitan development. His recent books include *Global Migration* (co-authored with Bernadette Hanlon) and *The Routledge Companion to the Suburbs* (co-edited with Bernadette Hanlon). He serves on the Governing Board of the Urban Affairs Association.
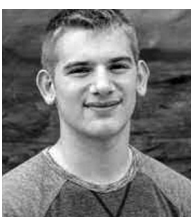
Robert H. Voigt is a candidate for the BSc in political science and economics with minors in urban studies and data science in the College of Social Sciences and Humanities at Northeastern University in Boston, Massachusetts, USA. His research focuses on urban planning and equity in cities.

Mahir Kabir holds a BSc in political science and economics with minors in urban studies and data science from the College of Social Sciences and Humanities at Northeastern University in Boston, Massachusetts, USA. His research focuses on sustainable development in urban environments.

Jonathan Michanie is a PhD student in political science in the College of Social Sciences and Humanities at Northeastern University in Boston, Massachusetts, USA. He holds a BA in political science from Florida International University and an MA in government with a diplomacy and conflict specialization from IDC Herzliya. His research interests focus on the role of mass media in political violence and conflict resolution in international relations.