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Uneven Geographies of COVID-19 II: Spatialities and Economic Geographies in a Syndemic

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Received: 17 July 2024 | **Revised:** 4 March 2025 | **Accepted:** 17 March 2025

Funding: The authors received no specific funding for this work.

Keywords: automatization | digitization | disease patterns | economic geographies | global trade relations | global value chains | inequalities | labor system | pandemic | work from home

ABSTRACT

This second of three review articles on the uneven geographies of COVID-19 examines geographical research on (1) spatial patterns of the pandemic's unfolding and (2) its uneven economic geographies, considering both its direct and indirect impacts—for example, those resulting from related preventive measures. In line with this article series, it (3) concludes by discussing the relevance of the reviewed research for the syndemics approach and vice versa. Research on economic effects analyzes disruptions to global value chains, industries, labor systems, and workspaces, particularly remote work. Some studies explore how the pandemic coincided with ongoing economic transitions such as economic restructuring and shrinkage, austerity politics, digitization, and automation. Studies highlight the need to contextualize spatial inequalities within historical political-economic interdependencies, power asymmetries, and structural disparities. In doing so, geographical studies add depth to syndemic analyses of structural vulnerabilities and crisis cascades, highlighting the need for spatially sensitive assessments. Still, diverging findings at national, regional, and local levels call for comparative ex-post analyses and relational methodologies able to unpack syndemic complexities. In turn, geographers can benefit from syndemic scholars' insights into disease burdens and pre-existing structural health impacts.

1 | Introduction

This second of three review articles centers on two strands of geographical research in and on the pandemic analyzing (a) the spatial patterns of COVID-19's spread, and (b) its economic impacts at various scales and the resulting disparities deepened and (re)produced by the pandemic. It aligns with a twofold agenda across the three articles: First, we present the results of a critical review of geographical research aimed at understanding the uneven geographies of the pandemic. Through an inductive process, we identified six key themes within the geographical debate: (1) geographical research agendas and the applicability

of geographical concepts, (2) intersectionality and ethics, (3) spatial patterns of disease spread, (4) economic impacts and disparities, (5) crisis temporalities and rhythms, and (6) social impacts, disparities, processes, and practices. Threads one and two are addressed in the first article (Butsch et al., 2024), while this article focuses on threads three (spatialities) and four (economic impacts). Threads five and six are discussed in the third article.

Second, in the first article, we mobilized the syndemics approach to show how it intersects with key concepts used by geographers to theorize the unfolding of the pandemic—such as

All authors have contributed equally to this article and should be considered joint first authors in line with Geography Compass guidelines.

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scale, territory, borders and intersectionality. As explained in depth in the first article, syndemic perspectives, first suggested by critical medical anthropologists, emphasize the convergence of multiple epidemics within specific population groups (Singer 2009; Singer and Clair 2003; Willen et al. 2017). They shift the focus from biological contagion to structural conditions that drive multiple epidemics, shape affected populations' experiences, and alter social positions. They highlight the need to analyze political and structural vulnerabilities while advocating for interventions that address the root causes of disease clustering. Building on initial works by geographers who explored the simultaneity and cascading of multiple crises (such as Sultana 2021) and connecting these to the syndemics concept (such as Burton and Harwood 2023; Grove et al. 2022), we argued that it offers a useful analytical lens for understanding the complexities of COVID-19 as part of an entangled polycrisis. This includes health crises (such as epidemics and pandemics, but also mental health issues, obesity and life-style related diseases), the climate crisis, economic and financial crises, political conflicts and war, socio-economic disparities and poverty as well as social polarization and racism.

We continue this discussion by reviewing geographical research that analyzed the spatialities of COVID-19 to explain differences in the disease burden as well as research that focused on economic geographies and the economic impacts and disparities that were produced and deepened by COVID-19. Our review encompasses research published by geographers between early 2020 and April 2024, explicitly integrating studies that examine COVID-19's intersection with uneven development, pre-existing socio-economic inequalities and crises. The body of published research reflects specific focal points but also reveals notable omissions. As demonstrated in the following review, the predominance of studies conducted in the Global North, particularly in the United States, compared to the smaller number of studies from the Global South, reflects the uneven geographies of knowledge production. There is also a notable focus on cities and urban areas. Furthermore, while there is now extensive economic geographical literature on the pandemic, much of it focuses more on empirically documenting the direct impacts of the pandemic than on critically discussing and addressing what needs to change. In this regard, especially comprehensive empirical studies on developments during the early phase of the pandemic are available, while systematic analyses of the medium-to long-term consequences are still needed.

The studies analyzed highlight the pandemic's impact on global value chains, specific industries and trades, regional economies and economic activities, labor systems, employment, work, and spaces of labor, particularly the shift to working from home. These contributions emphasize the importance of contextualizing findings of uneven spatialities in relation to the historicities of their emergence, historically rooted power asymmetries, and related inequalities. They underscore the relevance of the entangled political-economic and socio-political histories of places, regions, and nation-states. Some contributions highlight the coincidence of the pandemic crisis with ongoing transitions—such as economic restructuring, digitization, and automation.

We argue that the reviewed research provides important depth to syndemic perspectives by highlighting structural vulnerabilities

and the cascading effects of COVID-19 alongside various other crises. Geographers' findings emphasize the need for spatially sensitive and differentiated analyses of syndemics. In turn, geographers could benefit from considering the broader impacts of disease burdens and pre-existing structural factors on individual and population health as highlighted by syndemic scholars.

2 | Uneven Spatialities

A central focus of geographical analyses following the outbreak of the pandemic was identifying patterns in the *spatial distribution of COVID-19* morbidity and mortality while examining the spatial factors underlying these variations. Using statistical and data-driven approaches, geographers sought to uncover independent variables, drivers, and predictors of the spatially uneven distribution of COVID-19 morbidity and mortality across various regions and scales, including neighborhoods, cities, rural areas, national regions, countries, supranational regions, and globally. These analyses align with the classical disease ecology paradigm in medical geography.

The scale of research played a significant role. International and supra-regional comparisons identified commonalities between countries with similar governance approaches or socio-economic backgrounds. However, these findings were complicated by more in-depth studies at the national, regional and neighborhood levels, which challenged simplistic representations of clear-cut predictors at these scales. Many quantitative analyses operationalize well-established debates about the underlying causes of the uneven spatialities found in data—several of which explicitly reference social determinants of health and disease or highlight COVID-19's impact on already disease-burdened groups (e.g., Pranzo et al. 2022; Santos et al. 2024, 2022)—providing evidence for interpreting COVID-19 from a syndemics perspective. One aspect that became clear as the pandemic progressed was, that, across varying viral waves, *socioeconomic groups* were affected differently, with a general trend of increasing incidence rates and a shift in the highest disease burden from initially higher socioeconomic strata to lower ones (Pranzo et al. 2022). Overall, our analysis of this research underscores the importance of contextual particularities, emphasizing the need for differentiated, spatially and time-sensitive analyses that can enrich syndemic perspectives.

2.1 | Cities, Population Density, Urban Settlement Types and Neighborhoods

A significant share of studies debated the role of *population density and agglomeration* and was therefore much focused on the role of cities. Not surprisingly, studies focusing on the global scale as well as overall reviews of geographical factors suggest that the spread of the novel coronavirus largely correlates with the uneven spatial patterns of globalization and economic relations (Jeanne et al. 2022) as well as the unevenness of planetary urbanization (Hesse and Rafferty 2020; Keil 2020; Vandelli et al. 2024).

For the early phase of the pandemic, Kapitsinis (2020) examined statistical data from nine EU regions (as of 1 May 2020) to identify key factors influencing virus transmission and mortality. Cities were found to be disproportionately affected, with rural areas experiencing lower impacts. Factors increasing mortality included older populations (particularly those in care homes), environmental burdens (elevated air pollution), global interconnectedness through trade (influx of goods and people), and underfunded healthcare systems (resulting in, e.g., low ratios of medical personnel or hospital beds to population). Conversely, swift government responses reduced mortality. Similarly, Ramirez et al. (2022), analyzing data for all of 2020 across OECD and European countries, identified healthcare system capacity, population density, exposure to air pollution, and trust in institutions as key predictors of regional differences in excess mortality. Rodriguez-Pose and Burlina (2021), focusing on excess mortality during the first half of 2020 in Europe, found that the hardest-hit regions were relatively large, well-connected, situated in colder and dryer climates, exposed to high levels of air pollution, and characterized by underfunded healthcare systems.

However, this supposedly clear relationship between agglomerations, *population densities* and the spread of COVID-19 as one of several factors has been debated. Rodriguez-Pose and Burlina (2021, 749) argue that “[m]ost agglomeration factors and, in particular, population density have been relatively marginal to the impact of the disease (...)”. Likewise, some national studies from around the world suggest that densities play an unclear role depending on a range of factors. W. R. Boterman (2020, 525) shows that the Dutch Randstad conurbation, one of the most densely populated areas in Europe, had lower infection rates than most other parts of the Netherlands using national statistics from the end of April 2020. For Sweden, Florida and Mellander (2022) found a weak correlation between density and population size in municipalities and neighborhoods (Florida and Mellander 2022, 146). For the US, Otterstrom and Hochberg (2021) argue that over time remoteness is even positively associated with severe regional impacts of COVID-19. In contrast, other national and regional studies rather confirm the link between density and agglomerations and the spread of the virus. For São Paulo state in Brazil, a spread along the urban hierarchy from São Paulo city and metropolitan area to other inner state municipalities has been observed by Fortaleza et al. (2021). Nasiri et al. (2022) show for Tehran, Iran, that population density is highly related to COVID-19 cases per capita. The same finding was reported for Nigeria as a country (Olusola et al. 2022). Altogether, these different and controversial findings on the national and regional level call into question overly simplistic assumptions about the link between agglomerations, density, and the spread of COVID-19.

Several studies examine how settlement types, *urban form* and densities and their characteristics influence morbidity and mortality rates. Informal settlements, where extreme density and inadequate urban infrastructure intersect, are particularly vulnerable. These areas, marked by overcrowding and significant structural and service deficits, facilitate the rapid spread of diseases, further exacerbating existing inequalities. Bhattacharjee et al. (2024) illustrate this dynamic through examples from slums in Kolkata, highlighting how these conditions amplify

health disparities. Wu et al. (2023) show for Salt Lake City, that socioeconomically deprived, often compact, areas were hit worst during the first waves of the pandemic. Still, some studies also highlight protective factors in these areas. For example, Kaushal and Mahajan (2021) argue that strong social networks in informal settlements lead to unique forms of self-help.

Hence, the diversity of these studies suggests that density, settlement types, and characteristics are just some factors, that they can have very different influences and that it is important to consider the specificity, and variety of other contextual factors that cascade in syndemics. In a follow-up article to Boterman's above-cited study of the Randstad, the author (W. Boterman 2022) confirms most of his initial findings for the Netherlands but also argues “that there is no ‘natural’ relationship between urban features, density and the spread and effects of the outbreak of an infectious disease” but a relationship “mediated by a wide range of factors that include demography, socio-economic conditions, and cultural factors, but moreover are also very strongly impacted by policy measures and the degree to which these policies are and can be complied with” (W. Boterman 2022, 20). The author concludes by emphasizing the importance of understanding the fine-grained local differences and the need for a “governance of epidemics that is spatially sensitive and takes the multiple geographies of density into account” (W. Boterman 2022, 21; see for respective national studies: De Cos Guerra et al. 2024 for Spain; Florida and Mellander 2022 for Sweden; Zhai et al. 2021 for the USA).

Overall, the debates related to cities in the COVID-19 pandemic, urban density, settlement types and characteristics, and agglomerations raise questions about future urban development and their relevance to syndemics. Shatkin et al. (2023, p. 1788) postulate that “[t]he fallout from the COVID-19 pandemic will without doubt lead to a shift in paradigms of urban development”. They highlight how entrepreneurial modes of planning and governance have created three diverging discourses, and argue these will likely continue to shape post-pandemic urban development, the framing of urban informality and informal settlements: (a) A revanchist approach that blames and stigmatizes informalized communities as sources of the virus, (b) contrasting reformist approaches that emphasize the importance of the informal urban economy, (c) an incrementalistic approach that underlines the potential of bottom-up, community-based self-help, organization and politics aimed at pushing for structural and policy change from below (Shatkin et al. 2023). Eventually, they note, planning should play a central role in this shift and that holistically multi-system approaches are needed that integrate equity and sustainability (Shatkin et al. 2023, 1788). Also Joiner et al. (2024) offer a distinct and critical perspective on the role of density and its politicization. They contrast a government viewpoint, where crowds are framed as “social and political forces” (Joiner et al. 2024, 2) that are difficult for police to control, with a citizens' perspective, in which density and crowds have shifted from spaces of joy to spaces of anxiety. In response, they advocate for a new approach to spatial analysis, arguing that “understanding the production, management, and experience of densities would benefit from a relational methodology that investigates different connections, actors, and sites, rather than the site of density alone” (Joiner et al. 2024, 16). Such a

relational approach could also prove valuable for studying and providing depth to the emergence of syndemics. The relations of socio-spatial inequalities rooted in political-economic and socio-political historicities are apparent in many other studies, which we attend to next.

2.2 | Political-Economic and Socio-Political Historicities and Inequalities

While many studies highlight the link between pre-existing vulnerabilities and higher morbidity and mortality (e.g., Cao et al. 2023; Galanis and Georgiadis 2024; Santos et al. 2022), fewer explore how uneven outcomes among specific regions or groups are rooted in political-economic and socio-political histories and related inequalities, exacerbated in a syndemic. Some identify correlations between *historically grown regional economic structures, socio-economic factors, the nature of manufacturing jobs* (vs. e.g., jobs in the services sector) and the spatiality of the spread of the virus. They argue that industrial legacies, uneven economic transformations, and systemic neglect of marginalized regions and populations created fertile ground for syndemic interactions, where pre-existing vulnerabilities intensified the health impacts of COVID-19.

For example, in Poland, where public health measures were introduced swiftly and decisively, Krzysztofik et al. (2020) find that the coal-mining districts in the province of Silesia have the highest number of cases. They argue the regional pattern of virus transmission is linked to (post)-industrialism and urban shrinkage and that the case of Silesia reveals that it strikes particularly at more socioeconomically marginalized or economically transformed places. Similarly, in Italy, Ascani et al. (2021) link the higher per capita case rates in manufacturing-dominated regions to historical patterns of industrial clustering and employment, where close physical interactions among workers amplified transmission risks. This pattern created a core-periphery divide in COVID-19 geography, reflecting economic landscapes and production modalities rooted in local histories. A syndemic reading of these findings points to pre-existing burdens of disease, stemming, for example, from previous working conditions.

Other studies discuss how *historicity of colonialism, exclusion, discrimination and marginalization* and related economic and infrastructural disadvantages that cascade in syndemics surface in a higher impact of COVID-19 case numbers and mortality among socio-politically marginalized population groups (Moreno-Tabarez 2020). Some scholars thereby explicitly emphasize the intersection of COVID-19 with other health burdens faced by disadvantaged population groups.

For instance, examining the case of the Navajo Nation in the USA, Wang (2021) identifies historical, socio-economic, and political factors as key contributors to the disproportionate impact of the pandemic on rural areas and Native American communities. Similar findings have been reported for indigenous populations in other contexts, such as in Peru (Gianella et al. 2021) and Wisconsin, USA (Grubestic et al. 2021). Wang (2021) further highlights that the prevalence of chronic

health conditions among the Navajo Nation is a significant explanatory factor for the severity of the pandemic's effects. This vulnerability is compounded by additional factors rooted in the historical oppression of Native Americans in the USA, including a lack of institutional resilience, limited social trust, and the fraught relationship between federal and tribal governments. In a separate study exploring perceptions of COVID-19 across U.S. states and population subgroups, Howe et al. (2023) argue that levels of concern about the pandemic strongly reflect its uneven impacts and the cumulative effects of prior health threats, such as extreme heat. These threats have disproportionately affected Black or African American and Hispanic or Latino populations. According to Howe et al., these disparities stem from institutional and social inequalities, unequal access to healthcare, and heightened exposure to health risks.

Altogether, these studies thus highlight how the legacies of colonialism until today shape political exclusion, structural inequities and related social and health inequalities including multiple health burdens that affect marginalized groups disproportionately in a syndemic.

2.3 | Further Contextual Factors

Further diverse contextual factors intersect with spatial specificities in shaping the unequal spread of COVID-19 across regions, highlighting the need to consider these aspects when seeking to understand the pandemic's spatialities. We highlight a few that received attention by geographers in the following.

A number of studies have argued that the *concentration of specific economic activities and related mobilities* contributed to the spread of the disease. One highly debated factor was tourism, particularly ski tourism, which has been associated with superspreading events in the Alps (Kuebart and Stabler 2020; Neuhann et al. 2022). Praharaj and Han (2022) present findings for India, where grocery and retail locations are significantly associated with COVID-19 incidence. A highly sophisticated methodology, based on movements of individuals in time and space for a local case study in Lanzhou, China, by Yang et al. (2024) revealed that streets with high social and economic activities turned out to be centers of infection. The use of highly individualized data and the movement data of individuals impressively shows the possibilities of tracing back single infection pathways but also calls for a critical ethical debate of the use of data—and a debate for the role of research in stigmatizing places.

Other studies have highlighted a range of diverging *political aspects* they correlate to the spread of COVID-19. Landman and Smallman-Raynor (2023) show that globally wealthy democracies were hit worst compared to autocracies. However, after critically examining global data, they argue that when alternative measures, such as estimated excess mortality rates, are used, no significant difference emerges between democracies and autocracies in their pandemic response. Instead, they attribute cross-national variations primarily to geography, demographics, and economic conditions, while also noting the influence of politically motivated reporting biases during the

pandemic (Landman and Smallman-Raynor 2023, 11). For the USA, Albrecht (2022) finds that political views are a strong predictor for per capita COVID-19 cases and spatial inequalities (especially in terms of levels of education, income, and marginalized populations) are the best predictor for COVID-19 deaths (see also Grekousis et al. 2022, 2021). Counties with higher shares of Trump voters had higher morbidity, and in non-metro areas also higher mortality rates (Albrecht 2022).

Overall, the wide variety of studies on the uneven spatialities of COVID-19 and their differing findings highlight the complexity of syndemics and the importance of contextual and spatial factors. They also demonstrate how a spatial and scalar perspective can complement existing views on syndemics and contribute to further developing this theoretical approach to health and disease.

3 | Uneven Economic Geographies

Economic geographers have sought to understand the impact of the pandemic and public health measures on regional economies and economic activities, and how these factors exacerbate existing socio-spatial inequalities. We argue that these findings provide important insights into how political-economic structures are (re-)produced within economies and how they simultaneously shape and interact with multiple disease burdens in specific groups.

3.1 | Global Value Chains and Production Networks and the Debate on Re-Localization and De-Globalization

Central concepts applied for analyzing the impacts of the pandemic by economic geographers are *global value chains* (GVC) and *global production networks* (GPN) (Bathelt and Li 2022; Bryson and Vanchan 2020b; Gibson et al. 2021; Gong et al. 2022). Bryson and Vanchan (2020a) describe how the pandemic and national states' reactions resulted in new strategies for firms to reorganize their GPN. Early in the pandemic, they asserted that "firms are beginning to develop strategies involving upgrading and the re-localization of production" and that "[c]lost control management is no longer the prevalent strategy when it comes to the security of a GPN and national security" (Bryson and Vanchan 2020b, 540), while the state keeps a critical role as investor, facilitator and consumer in GPN. This intertwining of firms relocating production and nation states playing an active role in the redesign of GPNs could be reinterpreted as a speeding up of more nationalistic economic policies—witnessed with Brexit, the first 2017–2021 regnum of the Trump administration in the USA and, at the time of this article's publication, anticipated as part of the further tightening of import tariffs under Trump's renewed presidency from 2025–2029. It can be seen as a reversal of globalizing strategies that were common before the pandemic and the Russian attack on Ukraine in February 2022. Discussions about de-risking (also in the light of other crises and threats) and on de-globalization, which have been initiated by

the experiences of the pandemic and the Russian attack on Ukraine, have started to affect the calculation of decision makers in politics and economics.

Yet, Gong et al. (2022, 176) argue that "a full-scale 'globalization in reverse' is highly unlikely" even if some industries experience a slowdown or partial deglobalization. Also, Butollo and Staritz (2022) argue that the pandemic did not trigger a general retreat from global manufacturing but must be seen as factor reinforcing long-standing shifts toward more multipolar production and consumption. They base these conclusions on analysis of divergent developments in the automotive, electronics, and clothing industries, which brings us to look closer at how COVID-19 cascaded with ongoing processes and transitions in particular economic sectors and industries.

3.2 | Uneven Impacts on Particular Economic Sectors and Industries

The highly uneven impact of COVID-19 on particular *trades and industries* has been a strand of geographical interest although with very different foci—some more focused on general impacts on national and regional economies, others on effects on GPN, and still others mostly on employment effects. Butollo and Staritz' (2022) analysis shows the relevance of disrupted supply chains, but also demand-side effects. They highlight how the *automotive industry*, for example, was simultaneously struck by a disrupted supply chain and a strong decrease in demand. In turn, their and other geographers work show how the *clothing and fashion industry* has traditionally been one of the first to recognize and adapt to emerging crises. Flexibility in the just-in-time production, low inventories and short delivery times contribute to this adaptability (Butollo and Staritz 2022). However, this was not universally true in the case of COVID-19, as significant differences between countries and regions were observed. In Sydney and Melbourne, Australia, the fashion industries demonstrated innovation and adaptability in their responses to the pandemic's impact (Brydges et al. 2021). Their strategies included new ways to connect with consumers and buyers, investments in digital retailing and promotions, and efforts to keep staff employed through the JobKeeper program (Brydges et al. 2021). In contrast, *garment industries* more reliant on global markets were immediately and severely affected by disruptions in trade due to the pandemic, leading to macroeconomic crises in countries highly dependent on these industries. The most significant impacts were felt by informal workers, particularly women (cf. Brickell et al. 2024), as discussed further in the section on employment.

The pandemic's impact on the *consumption and food industry*, including *groceries, restaurants, and catering*, varied across regional, urban and local contexts. In one of the comparisons across commercial sectors and with a focus on Shanghai, Zhou et al. (2023) have analyzed the vulnerability and adaptation of commerce through a comparison of weekly consumption data of UnionPay cards. The findings reveal large differences between sectors, stages of the pandemic and according to consumption value.

Dannenberg et al. (2020) note that while online grocery shopping surged in Germany, it is unlikely to become a lasting trend, as caught in the immediacy of the pandemic, companies struggled to also spatially expand their services. Meanwhile, increased household grocery consumption coincided with a significant downturn in out-of-home catering. Using the example of Jiang Han Road in Wuhan, Rao et al. (2024) asked in this context how city-center streets can stay resilient in the context of post-pandemic transformation. Their findings show how a socio-digital reinvention of the urban experience is crucial for transformative resilience as are aspects such as a multiscale pedestrian mobility and shop mix. Other studies highlight how the role of pre-existing inequalities exacerbated pandemic effects. A study in Germany found that businesses already in precarious positions before the pandemic, particularly urban ones, faced greater challenges, partly because peripheral enterprises retained more of their daily customer base during lockdowns (Verfürth et al. 2022). Huang et al. (2023) report that Black-owned restaurants in 20 U.S. cities experienced disproportionately higher visitation losses, underscoring the pandemic's unequal economic impact on the consumption sector.

Another aspect explored in geographic studies pertains to micro-spatial changes in street spaces and curbsides, particularly in relation to consumption, pedestrian activity, and bicycle mobility. Scholars such as Shirgaokar et al. (2021) argue that the temporary transformations observed during the pandemic—such as the increased use of these spaces for non-automobile purposes, outdoor dining, and pick-up services for delivery—should be used as an opportunity to reimagine and repurpose these spaces, prompting a critical evaluation of whether such pandemic-induced adaptations should be retained in the long term.

Tourism geographers have highlighted the profound impact of the COVID-19 pandemic on *tourism-dependent economies*, emphasizing how structural inequalities in this sector were exacerbated during the crisis. For instance, Sufian and Hoque (2022) illustrate how the pandemic disrupted the growing importance of tourism in Bangladesh's Sylhet region, which plays a critical role in national economic growth, regional development, and the job market. While addressing the overall economic impact on Sylhet, the authors underscore that informal workers were the hardest hit. Similarly, González-Domingo et al. (2023), in their study of Southern European cities, reveal how tourism workers faced heightened uncertainty, a situation compounded by the housing crisis and deepened precarity caused by rentier capitalism and tourism-driven gentrification.

Truman and Sarmiento (2023) explore the case of Clarksdale, in the Mississippi Delta, USA, where blues music and culture—heavily reliant on in-person experiences and blues-tourism—were severely impacted. They demonstrate how the pandemic disproportionately affected various groups, including musicians, business owners, and other cultural workers. Yet, they also highlight how intergroup solidarities helped mitigate some of the challenges faced by both privileged and marginalized populations. Meanwhile, Rogerson and Rogerson (2022) examine the uneven impacts of the pandemic on tourism destinations in South Africa, noting that smaller coastal destinations fared

significantly better than larger urban ones, which had flourished in the pre-COVID-19 period.

In addition to documenting immediate effects, geographers have discussed the potential mid- and long-term implications of the pandemic on tourism trends. Paradoxically, as Iaquineto (2020) points out, tourism was a major vector for the initial spread of the virus. Early in the pandemic, scholars speculated that tourism would need to reinvent itself in response to the crisis. Brouder (2020), for instance, predicted that shifts in “global consciousness” would push tourism toward sustainability goals, a sentiment echoed by Galvani et al. (2020), Mostafanezhad (2020) and Mostafanezhad et al. (2020), who envisioned a movement toward “mindful tourism” (Stankov and Filimonau 2021).

However, reflecting on this rhetoric of transformative change, Wilkinson and Coles (2024) argue that early predictions lacked robust empirical evidence of substantial shifts in tourists' attitudes. They contend that research has often focused on the supply-side of tourism, while greater attention must be paid to demand-side preferences to effectively advance sustainable pathways.

The pandemic further amplified global-scale inequalities within the *financial sector*. Wójcik and Ioannou (2020) explain that the global financial system became increasingly unbalanced, with “[t]he Fed and the US\$ [leading] the show, highlighting the lopsidedness of the global financial system.” Meanwhile, economies in the Global South faced significant challenges, particularly through pressure on their currencies and financial markets, even before the full impact of the pandemic reached them (2020). Sokol and Pataccini (2020), 411) warn that existing inequalities in global financialization are likely to deepen, particularly through the “dramatic expansion of debt-based financial chains reaching out to the Global South.” Examining the case of the International Finance Facility for Immunization (IFFIm), which issues vaccine bonds, Hughes-McLure and Mawdsley (2022) demonstrate how financial centers in the Global North ultimately profited from the pandemic-induced crises. In contrast, countries in the Global South were pushed further into debt and economic dependency.

Funding for *research, development and innovation* (RDI) was made available in unprecedented sums and at remarkable speed in many countries worldwide. However, financially stronger countries in the Global North significantly outpaced others in mobilizing these resources. In the case of South Korea, Lim (2021) highlights exceptional financial gains in the biotech sector driven by state funding and deregulation. Lim notes that “[t]he South Korean state's well-promoted nationalistic images of utmost urgency, efficiency, and transparency combined with shock strategies have paved the way for both state and corporate financialization and super-profits beyond national scales” (Lim 2021, 7). Within individual countries, RDI funding also gave rise to new, and sometimes unexpected spatial disparities. For example, Makkonen and Mitze (2022) observe that in Finland, pandemic-era RDI funding became more evenly distributed overall. Notably, firms in rural areas benefited more significantly from flexible access to RDI funding compared to their urban counterparts, creating an unusual reversal of typical funding patterns.

Overall, this geographic research on trades and industries highlights variegated effects across industries and across the temporal unfolding of the pandemic. It also makes clear that more systematic analyses are needed that differentiate temporary from mid-to long-term economic impacts to contextualize impacts as part of syndemics and to inform policy and decision-making.

3.3 | Work and Employment

Geographers have also examined changes to work and employment. This work contributes to exploring how the intersection of COVID-19 with pre-existing inequalities but also ongoing economic and industrial transitions shapes labor markets in different contexts. Across the world, layoffs through furloughs, and job losses were widespread, but their impact was uneven. Significant differences emerged between economic and labor systems in the Global South and North as well as related formal and informal work. These studies highlight how COVID-19-induced changes to work and employment intersected with existing inequalities and dependencies in global economic relations. They also underscore important intersections with ongoing industrial restructuring and transitions driven by digitization and automation, that altogether have transformed job markets.

Many studies have emphasized how the large number of workers in the informal economies of the Global South were severely affected by the *loss of basic income*. For these highly vulnerable groups, the risk of further impoverishment increased drastically during the pandemic. It also intersected with pre-existing structures of suppression and disadvantage. For example, Kiaka et al. (2021) interviewed street vendors in Kenya and Zimbabwe, who play an essential role in the urban food system. Their study reveals how this already marginalized population was further burdened by bribes and systematic harassment. Thanh and Duong (2022), based on research in Vietnam, show that women street vendors, particularly those with a migration background, were disproportionately affected, suffering more than local vendors and lacking coping capacities. This highlights the intersectionality of disadvantage during the acute phase of COVID-19 (see article 1 for a discussion of intersectionality). Numerous other studies have documented the negative impact of income loss on informal workers, including food shortages, hunger, and increased debt. These studies include research on workers in the Cambodian garment sector (Brickell et al. 2024; Brickell and Lawreniuk 2022; Brickell et al. 2023; Lawreniuk 2020), tourism workers in Sylhet, Bangladesh (Sufian and Hoque 2022), informal sector workers in Gweru, Zimbabwe (Dzawanda et al. 2021), and the urban poor in Delhi, India, Dhaka, Bangladesh, and Manila, Philippines (Recio et al. 2021). Recently, Brickell et al. (2024, 4) highlighted the continued post-pandemic challenges faced by garment workers and their families in Cambodia, noting that stagnant wage growth and increased labor flexibility have worsened employment conditions for most workers, perpetuating the ongoing crisis.

Workers in the Global North were also affected by job and income losses. The pandemic here amplified existing inequities related to larger global trends such as economic restructuring and digitization. Studies, however, also highlight impacts of specific

national economic policies, such as austerity and regional economic developments. Cross et al. (2022) found that pandemic measures in the UK reinforced pre-existing structural inequalities, deepened by austerity, and significantly widened the wealth gap. Pointing to intersectional inequalities, they show how “job loss was especially likely among social tenants, those from black ethnic backgrounds, and those not born in the UK, while furlough was more common among those from lower income backgrounds” (Cross et al. 2022, 479). Similarly, Houston (2020, 1205) emphasizes that regions with the highest unemployment prior to the lockdown in the UK were hit hardest, while affluent and high-tech areas, and to a lesser extent industrial regions, experienced less impact. For Italy, Cerqua and Letta (2022) report that job losses were stronger in the Center-North, due to region-specific factors such as sectoral specialization, exposure of economic activities to social aggregation risks, and pre-existing vulnerabilities in the job market (Cerqua and Letta 2022, 11). For the Mediterranean EU, Herod et al. (2022) found that while urban areas faced early job losses, tourism-dependent and peripheral regions experienced disproportionate impacts later (Herod et al. 2022, 14–15). Highlighting local-level differences in the impact of COVID-19, Leyshon (2023) argued that suburban residents, with higher socioeconomic status, benefitted from rising home values and remote work, whereas urban workers in precarious jobs faced greater challenges due to lack of job security.

Lin (2022b), discusses the coincidence of the pandemic with the *digital transition in the job market* and the ongoing replacement of infrastructure workers by automation, machines and algorithms. The pandemic spurred an unprecedented increase in the use of machines and algorithms to address infrastructural issues, such as solving logistical problems and providing self-service applications. Through a case study on infrastructure workers at Singapore's Changi airport, Lin (2022a) points out how “the micro-dynamics mediated by atmospheres that pitch (airport) work, labor, and automation one against another, [...] allow capital the best chance of survival” (Lin 2022a, 225). This debate is further explored by Sumartojo and Lugli (2021), who examine the increased use of robots in the care sector during COVID-19. They question the “liveliness” of robots and machines and discuss the implications of using them in caregiving roles—a practice that has recently gained more support and funding in many countries.

3.4 | Shifts in Spaces of Labor

Spaces of labor underwent tremendous shifts during the pandemic, with significant variations across economic sectors as well as between national and regional pandemic measures. The most striking and unprecedented shift caused by the COVID-19 pandemic was the massive (temporary) shift to *working from home* (WFH). Early in the pandemic, Reuschke and Felstead (2020) pointed out how lockdowns led to an uneven geography of WFH, noting that “[t]he ability to work at home is unevenly distributed by occupation, sector, skills level, and income as well as being profoundly shaped by welfare policies and housing markets” (Reuschke and Felstead 2020, 211). They argued that those working in highly globalized and interconnected sectors typically experienced a smoother transition to

WFH. In a case study in Sweden, Bohman et al. (2021) observed how opportunities for WFH are gendered, with women in their study in Malmö reporting less than half as often as men that they were able to work from home prior to the pandemic.

Shearmur et al. (2022) showcase workers' mixed attitudes and experiences with WFH in Montreal, Canada, pointing to generally positive feedback but noting challenges like ergonomic issues, childcare and a lack of quiet workspaces. They also emphasize the reduced work efficiency compared to office settings, including the loss of informal communication and quick exchanges (Shearmur et al. 2022). Similarly, Bratton and Wojcik (2022) identify the loss of "tacit, complex, sensitive, unstructured and/or time-urgent information" (Bratton and Wojcik 2022, 142) as a key disadvantage of remote work in their study of sell-side analysts across Asia. In the field of diplomacy specifically, Kuus (2021) reports that some diplomats argue online meetings are 80% less effective than in-person meetings. Focused on how WFH might shift after the pandemic and based on a review of literature on WFH from a feminist economic geography perspective and using Shopify's "digital by default" initiative (one of Canada's most valuable firms) as an example, Cockayne (2021) argues that WFH and hybrid models will become more common. While this may seem to offer more flexibility, the author argues that it also leads to work encroaching on our lives—conceptually, rhetorically, and materially.

In contrast to those who could or had to work from home, those making "contact-free" working and living possible also experienced significant changes in their jobs. Based on interview data with delivery drivers during the first year of the pandemic, Straughan and Bissell (2022) highlight the detrimental effects on mental health for gig economy workers. They explain that "two forms of consolatory encounter afforded to workers prior to the pandemic disappeared—light touch encounters with customers, and cathartic encounters with other delivery workers". They argue that these "non-encounters" take away the "consolatory aspects of gig work that once interrupted the monotony of what is otherwise felt by many as a boring job" (Straughan and Bissell 2022, 543). However, Katta et al. (2020) found some positive effects of the pandemic. They report that Uber began offering drivers a minimum standard of living (via paid sick leave) otherwise absent from the gig marketplace, thereby "contributing—if only partially—to decommodifying their labor" (Katta et al. 2020, 205–206).

After all, through measures of confinement in homes during COVID-19, spaces of labor played a central but variegated role. While offering options to decrease contact and potentially the spread of the virus, mental health effects and diverging burdens carried, for example, by those with care work, must be carefully weighed.

4 | Conclusions

In this article, we have reviewed geographic studies focusing on (1) the uneven spatial unfolding of COVID-19 and (2) economic geographies and economic disparities exacerbated by the pandemic and related measures. In the conclusions, we discuss

the insights offered by existing studies, reflect upon the gaps that remain, and debate (3) how geographers can contribute to conceptual advancement of the syndemic perspective. We also highlight potential future avenues of research—both topic-wise, methodologically, and theoretically—that could deepen understandings of the spatialities, economic geographies, and disparities in deepening syndemics, which are composed of multiple epidemics in diverse ecological, economic, social, and political crises.

Early in the pandemic, Gonzalez et al. (2021) criticized the underutilization of geographers' expertise, despite their possession of the appropriate toolkits to research pandemic impacts. We argue that, 5 years after the onset of the pandemic, the growing body of diverse geographical studies demonstrates that this is no longer the case. However, as our review shows, geographical research remains uneven, with a notable overrepresentation of studies focused on the Global North, urban areas, and early-pandemic empirical analyses, mainly rooted in the medical geography paradigm of disease ecology. There is a significant lack of insights from the Global South, as well as from rural and peripheral areas and a lack of (theoretical) explanatory power to explain the observed statistical connections.

As shown, one focus of geographical research has been statistical analyses of spatial patterns of virus spread and the underlying spatialities across various scales and locations. Our comparison of the often diverging findings reveals that the initial hypothesis—that population density, urban form, and/or agglomeration factors are accurate predictors of morbidity and mortality—is oversimplified and cannot be generalized. Instead, analyses of disease patterns must be differentiated spatially, contextually, and temporally.

Furthermore, critical theoretical approaches, including post-medical perspectives in health geography, can be helpful in unlocking the complexities behind the cascading and unfolding nature of syndemics. Geographical research, in particular, contributes in-depth analysis of the spatial and contextual factors that culminate in syndemics. However, the controversial findings at national, regional, and urban scales simultaneously call for comparative ex-post analyses of available datasets across these different spatial scales in relation to the spread of COVID-19. By combining the classical data driven approaches of medical geography with new technologies of data mining, health geography's post-medical perspectives, modeling and forecasting approaches, geography could contribute even more significantly to the understanding of COVID-19 dynamics. Advanced analyses would in this way add to the understanding of root causes of disease burdens and their consequences. Existing theories of causal factors could be further developed, which is needed in light of the diverging findings described above. Referring to Joiner et al. (2024), who suggest that relational methodologies could offer an appropriate lens, we argue that in-depth comparative empirical studies can also provide more holistic analyses of the convergence of diseases and social comorbidities in syndemic contexts in times of multiple crises.

Several of the studies focused on global and international scales reviewed above illustrate how the uneven trajectory of the COVID-19 pandemic is intertwined with the historic legacies of

unequal global trade relations, colonialism, and structural exclusion, which have intensified the impacts on marginalized populations. Beyond the findings on immediate impacts, follow-up analyses will be necessary to better understand the mid-term consequences of COVID-19 on these populations' vulnerabilities, resilience, and coping strategies, serving as a basis for developing policies and adequate support.

Furthermore, while the pandemic's economic impacts were uneven in both the Global South and North, findings from studies in the Global South underscore the often larger and more existential impact of the pandemic on vulnerable populations there. Our analysis of these studies highlights how pre-existing, often intersectional inequalities were reproduced within global trade relations and international formal and informal labor systems, particularly in industries such as tourism, hospitality, and fashion. Geographical research further reveals how global financial disparities, including unequal access to RDI funding during the pandemic, have perpetuated inequalities.

Studies within countries and regions of the Global North illustrate how economic restructuring, austerity policies, and other systemic factors have exacerbated disparities there. Areas undergoing economic restructuring had comparatively higher numbers of COVID-19 cases, indicating a higher baseline vulnerability that may also contribute to greater susceptibility to syndemics. An overarching insight from the reviewed literature is that, as the COVID-19 pandemic progressed, the burden on socioeconomically deprived populations increased, further exacerbating their overall disease burden.

This research also highlighted how pandemic measures and their consequences intersected with ongoing transitions in specific sectors and labor markets, driven by automation and digitization. This body of work draws attention to the ongoing economic transitions and the temporal dimensions involved, which must be incorporated into the theorization of syndemics. It provides evidence for further theorizing the structural factors and practices that explain the emergence of syndemics.

Then again, countries in the Global North used the pandemic's effects on their own countries as justification for a shift toward nationalistic economic and trade policies, often entangled within larger populist nationalist and divisive discourses—such as blaming migrants for both the virus spread and economic hardships. At the time of writing in early 2025, this is, for example, pushed by the Trump administration in the U.S., which is ordering tariffs, cuts to foreign aid, and to leave the World Health Organization. These policies can be expected to further deepen disparities—globally but also nationally—at a time when those most affected by COVID-19 have yet to recover. Geographers must contribute by making visible the direct impacts of policy changes, their entanglements with the historic legacies of uneven global socio-economic divides, and their connections to multiple political, economic, social, and ecological crises in syndemics, as well as the overall effects this has. Yet, given the resulting deepening of divides and even announced and unprecedented interventions in higher education systems, such as those in the U.S., we can expect a further entrenchment of global divides in knowledge production rather than steps toward overcoming them.

While most geographic studies documented the detrimental impacts of the pandemic, a few studies highlighted pathways toward partial resilience through regional and sector-specific adaptations. Among these diverse case studies are those on digital innovation in the fashion industry or on the reinvention of urban retail through innovative socio-digital experiences. Other studies emphasized the importance of solidarity efforts. Still, early hopes for a broader shift toward more sustainable and transformative pathways have proven utopian. This applies not only to expectations for more sustainable tourism but also to the reversal of urban experiments, such as pop-up open-air restaurants and temporary bike lanes.

Overall, the review showcases the syndemic interplay of health crises with economic and social vulnerabilities, highlighting the need for systemic, equitable change. These outcomes call for addressing historical injustices and structural inequalities in spatial planning and economic and social policy to build resilience in syndemics. There are also specific topics to which geographic and spatial analyses could make significant contributions, and where systematic studies could be of particular interest. This includes an analysis of how different countries intervened to support their markets, while others were unable to do so due to financial constraints. Another important area is the effect of vaccine stockpiling in states of the Global North, which resulted in unequal access to vaccines globally. This situation was further exacerbated by states prioritizing the needs of their own citizens, adding an additional layer of marginalization and discrimination to the challenges faced in the Global South.

While we have mostly highlighted how insights from geographers enrich the syndemics perspective, we can in turn ask how the work of syndemic scholars can be used fruitfully to inform geographical perspectives. With a few exceptions, we see a lacking engagement with pre-existent burdens of disease, epidemics and pandemics in populations in the geographic research presented here. Pre-existing conditions, which are clustered in specific population groups and specific locations, were simply perceived as risk factors for a severe course of a COVID-19 infection. This reductionist view mistakes the detection of a relation with an explanation. Here the syndemics concept could offer a deeper understanding to geographers' engagements with uneven geographies related to pandemics and epidemics, especially the deeper structural forces at work. Further, there are complex links between public and mental health that affect economic geographies in syndemics that are yet little researched and understood. How exactly are multiscale contexts of health inequalities linked to economic systems, structures and processes in different regional contexts? How exactly do health vulnerabilities interrelate with economic stress, inequalities, and employment? We hope to have demonstrated here the benefits of integrating different health dimensions in addition to economic and social dimensions into spatial analyses to better understand and address syndemic dynamics.

Author Contributions

The literature review, as the basis of this article, was conducted jointly. J.E. provided the first draft. T.B.-H., J.E. and C.B. jointly developed the text and the discussion/conclusion.

Acknowledgments

The authors have nothing to report. Open Access funding provided by Universitat Innsbruck/KEMÖ.

[Correction added on 28 April 2025, after first online publication: KEMO funding statement has been added.]

Conflicts of Interest

The authors declare no conflicts of interest.

References

- Albrecht, D. E. 2022. "COVID-19 in Rural America: Impacts of Politics and Disadvantage." *Rural Sociology* 87, no. 1: 94–118. <https://doi.org/10.1111/ruso.12404>.
- Ascani, A., A. Faggian, and S. Montresor. 2021. "The Geography of COVID-19 and the Structure of Local Economies: The Case of Italy." *Journal of Regional Science* 61, no. 2: 407–441. <https://doi.org/10.1111/jors.12510>.
- Bathelt, H., and P. F. Li. 2022. "The Interplay Between Location and Strategy in a Turbulent Age." *Global Strategy Journal* 12, no. 3: 451–471. <https://doi.org/10.1002/gsj.1432>.
- Bhattacharjee, A., S. Mitra, V. Choudhary, S. Das, and P. P. Patel. 2024. "COVID-19, 'Risks' and Critical Reflections on WASH Services in Kolkata's Slums." *Regional Science Policy & Practice* 16, no. 7: 100051. <https://doi.org/10.1016/j.rspp.2024.100051>.
- Bohman, H., J. Ryan, V. Stjernborg, and D. Nilsson. 2021. "A Study of Changes in Everyday Mobility During the Covid-19 Pandemic: As Perceived by People Living in Malmo, Sweden." *Transport Policy* 106: 109–119. <https://doi.org/10.1016/j.tranpol.2021.03.013>.
- Boterman, W. 2022. "Population Density and SARS-CoV-2 Pandemic: Comparing the Geography of Different Waves in the Netherlands." *Urban Studies* 60, no. 8: 1377–1402. <https://doi.org/10.1177/00420980221087165>.
- Boterman, W. R. 2020. "Urban-Rural Polarisation in Times of the Corona Outbreak? The Early Demographic and Geographic Patterns of the SARS-CoV-2 Epidemic in the Netherlands." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 513–529. <https://doi.org/10.1111/tesg.12437>.
- Bratton, W., and D. Wojcik. 2022. "Financial Information, Physical Proximity and COVID: The Experience of Asian Sell-Side Equity Research Analysts." *Geoforum* 137: 135–145. <https://doi.org/10.1016/j.geoforum.2022.11.001>.
- Brickell, K., T. Chhom, S. Lawreniuk, L. McCarthy, R. Mony, and H. So. 2024. "Doing Feminist Longitudinal Research Across the COVID-19 Crisis: Unheard Impacts on Researchers and Garment Workers in Cambodia." *Area* 56, no. 1: e12885. <https://doi.org/10.1111/area.12885>.
- Brickell, K., and S. Lawreniuk. 2022. "Reduced 'Fates of the Body' and 'Production of Value for Others' in the Global Garment Industry: Thinking With Berlant on Eating and Hunger During the COVID-19 Pandemic." *Geographical Journal* 188, no. 3: 464–467. <https://doi.org/10.1111/geoj.12454>.
- Brickell, K., S. Lawreniuk, T. Chhom, R. Mony, H. So, and L. McCarthy. 2023. "'Worn Out': Debt Discipline, Hunger, and the Gendered Contingencies of the COVID-19 Pandemic Amongst Cambodian Garment Workers." *Social & Cultural Geography* 24, no. 3-4: 600–619. <https://doi.org/10.1080/14649365.2022.2055778>.
- Brouder, P. 2020. "Reset Redux: Possible Evolutionary Pathways Towards the Transformation of Tourism in a COVID-19 World." *Tourism Geographies* 22, no. 3: 484–490. <https://doi.org/10.1080/14616688.2020.1760928>.
- Brydges, T., L. Heinze, and M. Retamal. 2021. "Changing Geographies of Fashion During the Covid-19: The Australian Case." *Geographical Research* 59, no. 2: 206–216. <https://doi.org/10.1111/1745-5871.12460>.
- Bryson, J. R., and V. Vanchan. 2020a. "COVID-19 and Alternative Conceptualisations of Value and Risk in GPN Research." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 530–542. <https://doi.org/10.1111/tesg.12425>.
- Bryson, J. R., and V. Vanchan. 2020b. "COVID-19 and Alternative: Conceptualisations of Value and Risk in GPN Research." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 530–542. <https://doi.org/10.1111/tesg.12425>.
- Burton, A. L., and A. Harwood. 2023. "Hope and Everyday Crisis: Young Adult Experiences in COVID-Free Tasmania." *Geographical Research* 61, no. 1: 81–92. <https://doi.org/10.1111/1745-5871.12567>.
- Butsch, C., J. Everts, and T. Bork-Hüffer. 2024. "Uneven Geographies of COVID-19: Reviewing Geographical Research Agendas and Concepts from a Syndemics Perspective." *Geography Compass* 18, no. 6: e12764. <https://doi.org/10.1111/gec3.12764>.
- Butollo, F., & C. Staritz. 2022. "Deglobalization, Reconfiguration, or Business as Usual?: COVID-19 and the Limits of Reshoring of Globalized Production." <https://doi.org/10.34669/WI.WS/30>.
- Cao, M., Q. Yao, B. Chen, Y. Ling, Y. Hu, and G. Xu. 2023. "Development of a Composite Regional Vulnerability Index and its Relationship With the Impacts of the COVID-19 Pandemic." *Computational Urban Science* 3, no. 1: 1. <https://doi.org/10.1007/s43762-023-00078-x>.
- Cerqua, A., and M. Letta. 2022. "Local Inequalities of the COVID-19 Crisis." *Regional Science and Urban Economics* 92: 103752. <https://doi.org/10.1016/j.regsciurbeco.2021.103752>.
- Cockayne, D. 2021. "The Feminist Economic Geographies of Working From Home and 'Digital by Default' in Canada before, During, and After COVID-19." *Canadian Geographer-Geographe Canadien* 65, no. 4: 499–511. <https://doi.org/10.1111/cag.12681>.
- Cross, K., J. Evans, J. MacLeavy, and D. Manley. 2022. "Analysing the Socio-Economic Impacts of COVID-19: A New Regional Geography or Pandemic Enhanced Inequalities?" *Regional Studies Regional Science* 9, no. 1: 461–485. <https://doi.org/10.1080/21681376.2022.2084447>.
- Dannenberg, P., M. Fuchs, T. Riedler, and C. Wiedemann. 2020. "Digital Transition by COVID-19 Pandemic? The German Food Online Retail." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 543–560. <https://doi.org/10.1111/tesg.12453>.
- De Cos Guerra, O., V. Castillo Salcines, and D. Cantarero Prieto. 2024. "Geodemographic Profiles of COVID-19 Mortality Inside/Outside Nursing Homes. Spatial Analysis From Microdata in North Spain." *Applied Geography* 162: 103153. <https://doi.org/10.1016/j.apgeog.2023.103153>.
- Dzawanda, B., M. Matsa, and M. Nicolau. 2021. "Poverty on the Rise: The Impact of the COVID-19 Lockdown on the Informal Sector of Gweru, Zimbabwe." *International Social Science Journal* 71, no. S1: 81–96. <https://doi.org/10.1111/issj.12285>.
- Florida, R., and C. Mellander. 2022. "The Geography of COVID-19 in Sweden." *Annals of Regional Science* 68, no. 1: 125–150. <https://doi.org/10.1007/s00168-021-01071-0>.
- Fortaleza, C. M. C. B., R. B. Guimarães, R. D. C. Catão, et al. 2021. "The Use of Health Geography Modeling to Understand Early Dispersion of COVID-19 in São Paulo, Brazil." *PLoS One* 16, no. 1: e0245051. <https://doi.org/10.1371/journal.pone.0245051>.
- Galanis, G., and A. Georgiadis. 2024. "Socioeconomic Conditions and Contagion Dynamics of the COVID-19 Pandemic With and Without Mitigation Measures: Evidence From 185 Countries." *World Development* 175: 106477. <https://doi.org/10.1016/j.worlddev.2023.106477>.
- Galvani, A., A. A. Lew, and M. S. Perez. 2020. "COVID-19 Is Expanding Global Consciousness and the Sustainability of Travel and Tourism." *Tourism Geographies* 22, no. 3: 567–576. <https://doi.org/10.1080/14616688.2020.1760924>.

- Gianella, C., J. Gideon, and M. J. Romero. 2021. "What Does COVID-19 Tell Us About the Peruvian Health System?" *Canadian Journal of Development Studies-Revue Canadienne D Etudes Du Developpement* 42, no. 1-2: 55–67. <https://doi.org/10.1080/02255189.2020.1843009>.
- Gibson, C., C. Carr, C. Lyons, L. Taksa, and A. Warren. 2021. "COVID-19 and the Shifting Industrial Landscape." *Geographical Research* 59, no. 2: 196–205. <https://doi.org/10.1111/1745-5871.12462>.
- Gong, H. W., R. Hassink, C. Foster, M. Hess, and H. Garretsen. 2022. "Globalisation in Reverse? Reconfiguring the Geographies of Value Chains and Production Networks." *Cambridge Journal of Regions, Economy and Society* 15, no. 2: 165–181. <https://doi.org/10.1093/cjres/rsac012>.
- Gonzalez, R. C. L., A. M. Carballada, Y. M. J. M. Paez, and M. J. P. Rosello. 2021. *Editorial Team for the Special Issue "Geography against COVID-19. Territorial Analysis and Multidisciplinary Perspectives"*, Vol. 91. Boletín De La Asociacion De Geografos Espanoles.
- González-Domingo, A., A. P. Russo, and M. I. Pastor Gosálbez. 2023. "Reassembling Tourism Labour and Housing Precarity: Barcelona During COVID-19." *Tourism Geographies* 25, no. 7: 1778–1796. <https://doi.org/10.1080/14616688.2023.2290014>.
- Grekousis, G., Y. Lu, and R. Wang. 2022. "Exploring the Socioeconomic Drivers of COVID-19 Mortality Across Various Spatial Regimes." *Geographical Journal* 188, no. 2: 245–260. <https://doi.org/10.1111/geoj.12436>.
- Grekousis, G., R. Wang, and Y. Liu. 2021. "Mapping the Geodemographics of Racial, Economic, Health, and COVID-19 Deaths Inequalities in the Conterminous US." *Applied Geography* 135, no. 102558: 1–10. <https://doi.org/10.1016/j.apgeog.2021.102558>.
- Grove, K., L. Rickards, B. Anderson, and M. Kearnes. 2022. "The Uneven Distribution of Futurity: Slow Emergencies and the Event of COVID-19." *Geographical Research* 60, no. 1: 6–17. <https://doi.org/10.1111/1745-5871.12501>.
- Grubestic, T. H., J. R. Nelson, D. Wallace, J. Eason, S. Towers, and J. Walker. 2021. "Geodemographic Insights on the COVID-19 Pandemic in the State of Wisconsin and the Role of Risky Facilities." *GeoJournal* 87, no. 5: 4311–4333. <https://doi.org/10.1007/s10708-021-10503-5>.
- Herod, A., S. Gialis, S. Psifis, K. Gourzis, and S. Mavroudeas. 2022. "The Impact of the COVID-19 Pandemic Upon Employment and Inequality in the Mediterranean EU: An Early Look From a Labour Geography Perspective." *European Urban and Regional Studies* 29, no. 1: 3–20. <https://doi.org/10.1177/09697764211037126>.
- Hesse, M., and M. Rafferty. 2020. "Relational Cities Disrupted: Reflections on the Particular Geographies of COVID-19 for Small but Global Urbanisation in Dublin, Ireland, and Luxembourg City, Luxembourg." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 451–464. <https://doi.org/10.1111/tesg.12432>.
- Houston, D. 2020. "Local Resistance to Rising Unemployment in the Context of the COVID-19 Mitigation Policies Across Great Britain." *Regional Science Policy and Practice* 12, no. 6: 1189–1209. <https://doi.org/10.1111/rsp3.12364>.
- Howe, P. D., O. V. Wilhelmi, M. H. Hayden, and C. O'Lenick. 2023. "Geographic and Demographic Variation in Worry About Extreme Heat and COVID-19 Risk in Summer 2020." *Applied Geography* 152: 102876. <https://doi.org/10.1016/j.apgeog.2023.102876>.
- Huang, X., X. Q. Bao, Z. L. Li, S. Z. Zhang, and B. Zhao. 2023. "Black Businesses Matter: A Longitudinal Study of Black-Owned Restaurants in the COVID-19 Pandemic Using Geospatial Big Data." *Annals of the American Association of Geographers* 113, no. 1: 189–205. <https://doi.org/10.1080/24694452.2022.2095971>.
- Hughes-McLure, S., and E. Mawdsley. 2022. "Innovative Finance for Development? Vaccine Bonds and the Hidden Costs of Financialization." *Economic Geography* 98, no. 2: 145–169. <https://doi.org/10.1080/00130095.2021.2020090>.
- Iaquinto, B. L. 2020. "Tourist as Vector: Viral Mobilities of COVID-19." *Dialogues in Human Geography* 10, no. 2: 174–177. <https://doi.org/10.1177/2043820620934250>.
- Jeanne, L., S. Bourdin, F. Nadou, and G. Noiret. 2022. "Economic Globalization and the COVID-19 Pandemic: Global Spread and Inequalities." *GeoJournal* 88, no. 1: 1181–1188. <https://doi.org/10.1007/s10708-022-10607-6>.
- Joiner, A., C. McFarlane, L. Rella, and M. Uriarte-Ruiz. 2024. "Problematising Density: COVID-19, the Crowd, and Urban Life." *Social & Cultural Geography* 25, no. 2: 181–198. <https://doi.org/10.1080/14649365.2022.2143879>.
- Kapitsinis, N. 2020. "The Underlying Factors of the COVID-19 Spatially Uneven Spread. Initial Evidence From Regions in Nine EU Countries." *Regional Science Policy and Practice* 12, no. 6: 1027–1045. <https://doi.org/10.1111/rsp3.12340>.
- Katta, S., A. Badger, M. Graham, K. Howson, F. Ustek-Spilda, and A. Bertolini. 2020. "(Dis)embeddedness and (De)commodification: COVID-19, Uber, and the Unravelling Logics of the Gig Economy." *Dialogues in Human Geography* 10, no. 2: 203–207. <https://doi.org/10.1177/2043820620934942>.
- Kaushal, J., and P. Mahajan. 2021. "Asia's Largest Urban Slum-Dharavi: A Global Model for Management of COVID-19." *Cities* 111: 103097. <https://doi.org/10.1016/j.cities.2020.103097>.
- Keil, R. 2020. "The Density Dilemma: There Is Always Too Much and Too Little of it." *Urban Geography* 41, no. 10: 1284–1293. <https://doi.org/10.1080/02723638.2020.1850025>.
- Kiaka, R., S. Chikulo, S. Slootheer, and P. Hebinck. 2021. "'The Street Is Ours'. A Comparative Analysis of Street Trading, Covid-19 and New Street Geographies in Harare, Zimbabwe and Kisumu, Kenya." *Food Security* 13, no. 5: 1263–1281. <https://doi.org/10.1007/s12571-021-01162-y>.
- Krzysztofik, R., I. Kantor-Pietraga, and T. Sporna. 2020. "Spatial and Functional Dimensions of the COVID-19 Epidemic in Poland." *Eurasian Geography and Economics* 61, no. 4-5: 573–586. <https://doi.org/10.1080/15387216.2020.1783337>.
- Kuebart, A., and M. Stabler. 2020. "Infectious Diseases as Socio-Spatial Processes: The COVID-19 Outbreak in Germany." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 482–496. <https://doi.org/10.1111/tesg.12429>.
- Kuus, M. 2021. "Bureaucratic Sociability, or the Missing Eighty Percent of Effectiveness: The Case of Diplomacy." *Geopolitics* 28, no. 1: 174–195. <https://doi.org/10.1080/14650045.2021.1934672>.
- Landman, T., and M. Smallman-Raynor. 2023. "The Politics of COVID-19: Government Response in Comparative Perspective." *Political Geography* 106: 102957. <https://doi.org/10.1016/j.polgeo.2023.102957>.
- Lawreniuk, S. 2020. "Necrocapitalist Networks: COVID-19 and the 'Dark Side' of Economic Geography." *Dialogues in Human Geography* 10, no. 2: 199–202. <https://doi.org/10.1177/2043820620934927>.
- Leyshon, A. 2023. "Economic Geography II: The Economic Geographies of the COVID-19 Pandemic." *Progress in Human Geography* 47, no. 2: 926. <https://doi.org/10.1177/03091325231156926>.
- Lim, S. H. 2021. "Promissory Shock, Broken Future: COVID-19 and State-Led Speculations in Biotechnology and Pharmaceutical Industries in South Korea." *Applied Geography* 136, no. 102560: 1–8. <https://doi.org/10.1016/j.apgeog.2021.102560>.
- Lin, W. Q. 2022a. "Atmospheric Conditioning: Airport Automation, Labour and the COVID-19 Pandemic." *Transactions of the Institute of British Geographers* 47, no. 1: 214–228. <https://doi.org/10.1111/tran.12499>.
- Lin, W. Q. 2022b. "Automated Infrastructure: COVID-19 and the Shifting Geographies of Supply Chain Capitalism." *Progress in Human Geography* 46, no. 2: 463–483. <https://doi.org/10.1177/03091325211038718>.

- Makkonen, T., and T. Mitze. 2022. "The Geography of Innovation in Times of Crisis: A Comparison of Rural and Urban RDI Patterns During COVID-19." *Geografiska Annaler Series B-Human Geography* 106, no. 1: 96–118. <https://doi.org/10.1080/04353684.2022.2093252>.
- Moreno-Tabarez, U. 2020. "Rural Pandemic: The Afterlives of Slavery and Colonialism in Costa Chica, Mexico." *Dialogues in Human Geography* 10, no. 2: 230–233. <https://doi.org/10.1177/2043820620935681>.
- Mostafanezhad, M. 2020. "Covid-19 Is an Unnatural Disaster: Hope in Revelatory Moments of Crisis." *Tourism Geographies* 22, no. 3: 639–645. <https://doi.org/10.1080/14616688.2020.1763446>.
- Mostafanezhad, M., J. M. Cheer, and H. L. Sin. 2020. "Geopolitical Anxieties of Tourism: (Im)mobilities of the COVID-19 Pandemic." *Dialogues in Human Geography* 10, no. 2: 182–186. <https://doi.org/10.1177/2043820620934206>.
- Nasiri, R., S. Akbarpour, A. R. Zali, et al. 2022. "Spatio-Temporal Analysis of COVID-19 Incidence Rate Using GIS: A Case Study-Tehran Metropolitan, Iran." *GeoJournal* 87, no. 4: 3291–3305. <https://doi.org/10.1007/s10708-021-10438-x>.
- Neuhann, F., S. Ginzel, M. Buess, et al. 2022. "Die zeitlich-räumliche Verteilung von COVID-19 in Köln und beeinflussende soziale Faktoren im Zeitraum Februar 2020 bis Oktober 2021." *Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz* 65, no. 9: 853–862. <https://doi.org/10.1007/s00103-022-03573-4>.
- Olusola, A., B. Olusola, O. Onafeso, F. Ajiola, and S. Adelabu. 2022. "Early Geography of the Coronavirus Disease Outbreak in Nigeria." *GeoJournal* 87, no. 2: 733–747. <https://doi.org/10.1007/s10708-020-10278-1>.
- Otterstrom, S. M., and L. Hochberg. 2021. "Relative Concentrations and Diffusion of COVID-19 Across the United States in 2020." *Cartographica* 56, no. 1: 27–43. <https://doi.org/10.3138/cart-2020-0029>.
- Praharaj, S., and H. Han. 2022. "Human Mobility Impacts on the Surging Incidence of COVID-19 in India." *Geographical Research* 60, no. 1: 18–28. <https://doi.org/10.1111/1745-5871.12502>.
- Pranzo, A. M. R., E. Dai Prà, and A. Besana. 2022. "Epidemiological Geography at Work: An Exploratory Review About the Overall Findings of Spatial Analysis Applied to the Study of CoViD-19 Propagation Along the First Pandemic Year." *GeoJournal* 88, no. 1: 1103–1125. <https://doi.org/10.1007/s10708-022-10601-y>.
- Ramirez, M. D., P. Veneri, and A. C. Lembcke. 2022. "Where Did it Hit Harder? Understanding the Geography of Excess Mortality During the COVID-19 Pandemic." *Journal of Regional Science* 62, no. 3: 889–908. <https://doi.org/10.1111/jors.12595>.
- Rao, F., H. Zhao, S. S. Han, Y. Kong, D. Lai, and T. Lu. 2024. "Transformative Resilience of Wuhan's City-Center Main Streets in the Post-COVID Era." *Nature Cities* 1, no. 5: 378–389. <https://doi.org/10.1038/s44284-024-00063-3>.
- Recio, R. B., L. N. Lata, and I. Chatterjee. 2021. "Rising Inequalities, Deepening Divides: Urban Citizenship in the Time of COVID-19." *Geographical Research* 59, no. 4: 500–513. <https://doi.org/10.1111/1745-5871.12495>.
- Reuschke, D., and A. Felstead. 2020. "Changing Workplace Geographies in the COVID-19 Crisis." *Dialogues in Human Geography* 10, no. 2: 208–212. <https://doi.org/10.1177/2043820620934249>.
- Rodriguez-Pose, A., and C. Burlina. 2021. "Institutions and the Uneven Geography of the First Wave of the COVID-19 Pandemic." *Journal of Regional Science* 61, no. 4: 728–752. <https://doi.org/10.1111/jors.12541>.
- Rogerson, C., and J. Rogerson. 2022. "The Impacts of COVID-19 on Urban Tourism Destinations: The South African Experience." *African Journal of Hospitality, Tourism and Leisure* 11, no. 1: 1–13. <https://doi.org/10.46222/ajhtl.19770720.207>.
- Santos, A. P., K. Heider, S. Gresse Junior, and J. M. Rodriguez Lopez. 2024. "The Uneven Burden of COVID-19 in the Metropolitan Region of São Paulo, Brazil – Risk Analysis From a Bottom-Up Perspective." *Applied Geography* 162: 103146. <https://doi.org/10.1016/j.apgeog.2023.103146>.
- Santos, A. P., J. M. Rodriguez Lopez, K. Heider, L. Steinwärdner, J. Scheffran, and J. C. B. Vargas. 2022. "One Year of the COVID-19 Pandemic in the Global South: Uneven Vulnerabilities in Brazilian Cities." *Erdkunde* 76, no. 2: 75–91. <https://doi.org/10.3112/erdkunde.2022.02.02>.
- Shatkin, G., V. Mishra, and M. Khristine Alvarez. 2023. "Debates Paper: COVID-19 and Urban Informality: Exploring the Implications of the Pandemic for the Politics of Planning and Inequality." *Urban Studies* 60, no. 9: 1771–1791. <https://doi.org/10.1177/00420980221141181>.
- Shearmur, R., P. Ananian, U. Lachapelle, et al. 2022. "Towards a Post-COVID Geography of Economic Activity: Using Probability Spaces to Decipher Montreal's Changing Workscapes." *Urban Studies* 59, no. 10: 2053–2075. <https://doi.org/10.1177/00420980211022895>.
- Shirgaokar, M., D. Reynard, and D. Collins. 2021. "Using Twitter to Investigate Responses to Street Reallocation During COVID-19: Findings From the U.S. And Canada." *Transportation Research Part A: Policy and Practice* 154: 300–312. <https://doi.org/10.1016/j.tra.2021.10.013>.
- Singer, M. 2009. *Introduction to Syndemics: A Critical Systems Approach to Public and Community Health*. Wiley.
- Singer, M., and S. Clair. 2003. "Syndemics and Public Health: Reconceptualizing Disease in Bio-Social Context." *Medical Anthropology Quarterly* 17, no. 4: 423–441. <https://doi.org/10.1525/maq.2003.17.4.423>.
- Sokol, M., and L. Pataccini. 2020. "Winners and Losers in Coronavirus Times: Financialisation, Financial Chains and Emerging Economic Geographies of the Covid-19 Pandemic." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 401–415. <https://doi.org/10.1111/tesg.12433>.
- Stankov, U., and V. Filimonau. 2021. "Here and Now - the Role of Mindfulness in Post-pandemic Tourism." *Tourism Geographies* 25, no. 1: 374–389. <https://doi.org/10.1080/14616688.2021.2021978>.
- Straughan, E. R., and D. Bissell. 2022. "Working in the Gig Economy Is Boring: Non-Encounters and the Politics of Detachment in Platform Capitalism." *Geographical Journal* 188, no. 4: 534–545. <https://doi.org/10.1111/geoj.12453>.
- Sufian, A., and M. J. Hoque. 2022. "Impact of COVID-19 Pandemic on Tourism Geographies of Bangladesh: Study on Sylhet Region." *GeoJournal* 88, no. 2: 1355–1367. <https://doi.org/10.1007/s10708-022-10690-9>.
- Sultana, F. 2021. "Climate Change, COVID-19, and the Co-Production of Injustices: A Feminist Reading of Overlapping Crises." *Social & Cultural Geography* 22, no. 4: 447–460. <https://doi.org/10.1080/14649365.2021.1910994>.
- Sumartojo, S., and D. Lugli. 2021. "Lively Robots: Robotic Technologies in COVID-19." *Social & Cultural Geography* 23, no. 9: 1220–1237. <https://doi.org/10.1080/14649365.2021.1921245>.
- Thanh, P. T., and P. B. Duong. 2022. "The COVID-19 Pandemic and the Livelihood of a Vulnerable Population: Evidence From Women Street Vendors in Urban Vietnam." *Cities* 130, no. 103879: 1–12. <https://doi.org/10.1016/j.cities.2022.103879>.
- Truman, M., and E. Sarmiento. 2023. "'When This Thing Hit': Examining the Impacts of the COVID-19 Pandemic in the Blues-Based Cultural Economy of Clarksdale, Mississippi." *Social & Cultural Geography* 25, no. 7: 1–20. <https://doi.org/10.1080/14649365.2023.2245799>.
- Vandelli, V., L. Palandri, P. Coratza, et al. 2024. "Conditioning Factors in the Spreading of Covid-19 – Does Geography Matter?" *Heliyon* 10, no. 3: e25810. <https://doi.org/10.1016/j.heliyon.2024.e25810>.
- Verfürth, P., T. Neise, M. Franz, and F. Sohns. 2022. "The Uneven Effects of Covid-19 on the German Restaurant and Bar Industry." *Erdkunde* 76, no. 2: 127–140. <https://doi.org/10.3112/erdkunde.2022.02.05>.
- Wang, H. Y. 2021. "Why the Navajo Nation Was Hit So Hard by Coronavirus: Understanding the Disproportionate Impact of the

COVID-19 Pandemic." *Applied Geography* 134: 102526. <https://doi.org/10.1016/j.apgeog.2021.102526>.

Wilkinson, T., and T. Coles. 2024. "Do Tourists Want Sustainability Transitions? Visitor Attitudes to Destination Trajectories During COVID-19." *Tourism Geographies* 26, no. 2: 274–291. <https://doi.org/10.1080/14616688.2023.2249423>.

Willen, S. S., M. Knipper, C. E. Abadía-Barrero, and N. Davidovitch. 2017. "Syndemic Vulnerability and the Right to Health." *Lancet* 389, no. 10072: 964–977. [https://doi.org/10.1016/S0140-6736\(17\)30261-1](https://doi.org/10.1016/S0140-6736(17)30261-1).

Wójcik, D., and S. Ioannou. 2020. "COVID-19 and Finance: Market Developments So Far and Potential Impacts on the Financial Sector and Centres." *Tijdschrift voor Economische en Sociale Geografie* 111, no. 3: 387–400. <https://doi.org/10.1111/tesg.12434>.

Wu, Y., Y. D. Wei, and M. Liu. 2023. "Urban Form and Spatiotemporal Vulnerability of Local Communities to Covid-19." *Geographical Review* 113, no. 4: 482–501. <https://doi.org/10.1080/00167428.2022.2155519>.

Yang, L., X. Yu, Y. Yang, Y. L. Luo, and L. Zhang. 2024. "The Transmission Network and Spatial-Temporal Distributions of COVID-19: A Case Study in Lanzhou, China." *Health & Place* 86: 103207. <https://doi.org/10.1016/j.healthplace.2024.103207>.

Zhai, W., M. Liu, X. Fu, and Z.-R. Peng. 2021. "American Inequality Meets COVID-19: Uneven Spread of the Disease Across Communities." *Annals of the American Association of Geographers* 111, no. 7: 2023–2043.

Zhou, L., W. Xiao, Z. Zheng, and H. Zhang. 2023. "Commercial Dynamics in Urban China During the COVID-19 Recession: Vulnerability and Short-Term Adaptation of Commercial Centers in Shanghai." *Applied Geography* 152: 102889. <https://doi.org/10.1016/j.apgeog.2023.102889>.