



# Impacts of the COVID-19 pandemic on the social sphere and lessons for crisis management: a literature review

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## Abstract

The COVID-19 pandemic is the most difficult challenge that has affected humanity in recent decades. It has disrupted many features of development with domino effects in the social sphere. This study reviews the literature on the social effects of the COVID-19 pandemic and identifies the affected social areas that have undergone dramatic changes during the pandemic. We use inductive content analysis and thematic analysis to review the literature. The results show that there are seven major areas that have been negatively affected by the COVID-19 pandemic: health, social vulnerability, education, social capital, social relationships, social mobility, and social welfare. The literature has reported dramatic psychological and emotional effects, exacerbation of segregation and poverty, disruption in educational systems and formation of an information gap, as well as a declining trends of social capital among communities. We highlight some lessons that can be learned from the pandemic to enhance social resilience in future. Among others, to effectively respond to the pandemic and other potential future adverse events, governments should adopt fair policies, identify the required changes in the socially affected contexts and take necessary responsive actions, and adopt collaboratively designed approaches to increase social resilience.

**Keywords** Social consequences · COVID-19 · Pandemic · Vulnerability · Social capital · Resilience

## 1 Introduction

The COVID-19 pandemic is the greatest crisis since the Second World War II that has dramatically challenged the human society (Al-Omouh et al. 2020; Chakraborty and Maity 2020). As a health crisis and a threat, the COVID-19 pandemic has dramatically impacted societies, economies, and vulnerable populations worldwide (Kithiia et al. 2020). The pandemic has affected more than 100 countries, resulting in millions of reported deaths (Wassler and Talarico 2021; Yang et al. 2020). By the spring of 2020, it is estimated that

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up to one billion individuals were either in lockdown or quarantine (Wassler and Talarico 2021). By November 2022, over 630 million confirmed cases and over 6.5 million deaths were reported globally (WHO 2021). According to the World Health Organization (WHO), Americas, Europe, and Southeast Asia have had the most COVID-19-confirmed cases in the world (WHO 2021).

It is clear that many aspects of human life have been disrupted under these circumstances. The COVID-19 pandemic has imposed massive health, economic, environmental, and social difficulties worldwide (Chakraborty and Maity 2020). Meanwhile, long-term lockdowns and restrictions, known as effective measures to limit the spread of the virus, have intensified some of the consequences of the pandemic (Brady and Wilder-Smith 2021; Mofijur et al. 2020). These consequences have manifested more prominently in the social sphere (Motamed-Jahromi and Kaveh 2021). Disruption and chaos in social life and livelihood (Agarwal 2021; Paul et al. 2021) and a significant reduction in the quality and dynamism of basic social indicators such as mobility (Kim and Kwan, 2022), social capital (Pitas and Ehmer 2020; Elgar et al., 2021), education (Pokhrel and Chhetri 2021; Chaturvedi et al. 2021), and an alarming intensification of inequality and social vulnerability (Kim and Bostwick 2020; Robinson et al. 2021) are among the major consequences. As a result, social livelihood and human coexistence indicators have been severely affected during the pandemic (Laurencin and McClinton 2020; Van Dorn et al. 2020).

Although there is a considerable body of literature focused on various consequences of the COVID-19 pandemic, there is a lack of studies that holistically assess the social consequences of the pandemic in various domains. Indeed, existing literature reviews on the social effects of the pandemic are rather sector-based (i.e., mobility and health-based consequences). This study aims to fill this gap by reviewing literature on various social consequences of the pandemic. Specifically, we focus on issues related to health, social vulnerability, education, social capital, social mobility, social relationships, and social welfare. There is no single definition for these terms in the literature. We list the definitions that guided our study in Table 1.

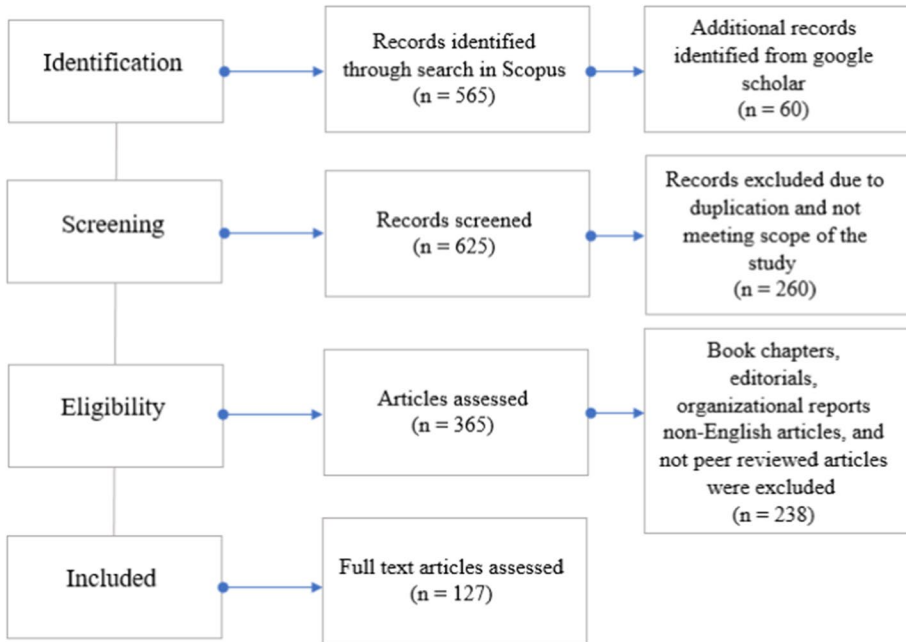
Our findings can provide a more complete view of the effects of the pandemic in the social sphere and offer useful insights for policymakers. These may assist them in taking appropriate steps to enhance community resilience.

## 2 Materials and methods

To accomplish the objective of this research, a literature review was conducted focusing on the social consequences of the pandemic. As shown in Fig. 1, literature search was conducted in Scopus and Google Scholar. This figure summarizes the processes for literature search and selection. In order to identify relevant literature, the following search string that is composed of a combination of keywords related to social impacts and the pandemic was used: TITLE-ABS (("covid" OR "coronavirus" OR "pandemic" OR "COVID-19") W/10 ("social impact\*" OR "social effect\*" OR "social consequence\*" OR "social ramification\*" OR "social implication\*")) OR AUTHKEY (("covid" OR "coronavirus" OR "pandemic" OR "COVID-19") W/10 ("social impact\*" OR "social effect\*" OR "social consequence\*" OR "social ramification\*" OR "social implication\*")) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020)). The number of articles obtained from this string on March 15, 2022, was 565. Also, we added 60 documents from Google Scholar and totally screened 625 documents. We selected those related

**Table 1** Definitions for key terms used in this study

Term	Definition	Reference(s)
Health	Refers to the impacts of the pandemic on human health and well-being. It is linked to the number of COVID-19 cases and deaths and other impacts (e.g., mental and emotional) caused by the pandemic and the associated restrictions	Dai et al. (2021), Pedrosa et al. (2020), Murphy et al. (2021)
Social vulnerability	Refers to the harms and negative effects caused to minorities and sensitive and vulnerable groups in different regions due to differences in the level of access to facilities and benefits, and injustices	Kim, (2022), Fallah-Aliabadi et al. (2022), Qiao and Huang, (2022)
Education	Refers to damages suffered by educational systems in the affected areas and the changes that the educational systems need to go through to adapt to the new conditions	Farcnik et al. (2021), Azorín, (2020); Pokhrel and Chhetri, (2021)
Social capital	Refers to the destructive effects of the pandemic on social capital and its indicators such as participation and trust and its different qualities in affected communities	Wong & Kohler, (2020), Hao et al. (2021), Borgonovi et al. (2021)
Social mobility	Refers to the negative impacts of mobility restrictions related to the pandemic on society. Among other things, such restrictions have disrupted human interactions and the ability to grow	Aloui et al. (2020), Yabe et al. (2020), Dobusch and Kreissl, (2020)
Social relationships	Refers to the destructive effects and consequences of the pandemic on social relationships and coexistence in the world	Gao et al. (2020), Bostrom, (2021), Dahlberg, (2021)
Social welfare	Refers to the destructive effects and consequences of the pandemic on the economy, livelihood, and social welfare in various aspects	Wang et al. (2020a, b, c), Mok et al. (2021), Canto et al. (2021)



**Fig. 1** Processes for the literature search and selection, adapted from Moher et al. (2009)

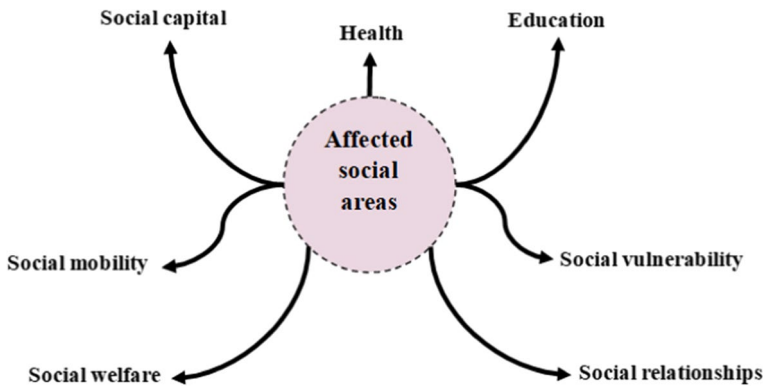
to the scope of this study (i.e., studies focused on the social impacts of the pandemic) for the final analysis.

An inductive content analysis approach was used to review the final 127 articles. In this approach, the data extraction, collection, and analysis processes occur simultaneously and in an incremental way (Elo and Kyngäs, 2008). To maintain consistency, the content analysis was completely conducted by the lead author. During the review process, the interpretive coding approach was used to find information about the social consequences of COVID-19 and record them in several tables. Whenever we assessed an article, we checked whether the discussed information (related to the social consequences of the pandemic) was new or could be combined with an existing record. At the end, we classified the extracted information to develop overarching themes and categories via the “thematic analysis” approach (Vaismoradi et al. 2013).

### 3 Results and discussion

The thematic analysis highlighted seven social areas that were affected the most during the pandemic. These are shown in Fig. 2. Subsections 3.1 to 3.7 will discuss these areas in detail.

As shown in Fig. 2, our thematic analysis identified seven thematic areas, namely health, education, social vulnerability, social capital, social relationship, social mobility, and social welfare. The most discussed theme in the reviewed documents was social vulnerability (23% of the documents), and the least discussed themes were education and



**Fig. 2** Social areas affected by COVID-19

social mobility (10% of documents). Table 2 provides more information on the number of studies related to the seven identified areas and their geographical focus.

### 3.1 Health

The most glaring health impacts of the pandemic were many cases and deaths (Lambert et al. 2020). As stated by the COVID-19 Dashboard of the Centre for Systems Science and Engineering (CSSE) of Johns Hopkins University (JHU), so far, the USA, India, and Brazil with the highest number of confirmed cases and deaths are the three hard-hit countries around the world. Moreover, an estimated number of almost 10 thousand deaths and about 500 thousand cases are reported daily in the world (JHU 2021).

In addition to impacts on physical health, COVID-19 has also caused dramatic psychological effects, major disorders, and other negative side effects, such as stress, anxiety, depression, and fear (Li et al. 2020; Bendau et al. 2021; Akbari et al. 2021). In fact, the high number of infections and death tolls and the governments' inability to find a reliable vaccine and sustainable solutions, along with the difficult living conditions and restrictions, have aggravated mental disorders and caused psychological impacts among affected communities (WHO, 2022).

According to global evidence, the psychological impacts of the pandemic have increasingly manifested among the most vulnerable groups, such as children, women, and health-care workers who have shown the greatest susceptibility to post-traumatic stress and anxiety (Saladino et al. 2020; Guadagni et al., 2020; Xiong et al., 2020). As a case in point, symptoms of exacerbated anxiety and depression among American adults in the early 2020s were three times higher than the corresponding period in 2019. This has also been the case in other countries like Germany (Bendau et al. 2021). As another psychologically negative impact, depression is considered to be one of the major disorders during the pandemic (Ettman et al., 2020). Adverse events such as epidemics, natural disasters, and the current pandemic intensify the issue of long-term depression (Rodríguez-Hidalgo et al. 2020; Pedrosa et al. 2020). It has been reported that, during the pandemic, among US adults, the prevalence of depression signs was three times higher than before the COVID-19 pandemic (Ettman et al. 2020).

**Table 2** Frequency of studies related to seven identified areas

Identified areas	Number of studies	%	The contextual focus of the studies
Health	20	16	USA, Canada, China, Ecuador, Italy, Finland, Poland, Iran
Education	12	10	USA, Spain, Portugal, India, Brazil, Slovenia, Arab countries (UAE, Sudan, Saudi Arabia, Jordan, Egypt, Kuwait)
Social vulnerability	28	23	USA, China, Sweden, Spain, Brazil, South Asia (India, Nepal, Bangladesh, Bhutan, Afghanistan, Pakistan, Sri Lanka, Maldives), Kenya, Puerto Rico, East Asia, South Asia, and Southeast Asia countries
Social capital	17	14	USA, China, UK, Italy, Iran, Japan, South Korea, European countries (Austria, Germany, Great Britain, Netherlands, Sweden, and Switzerland)
Social relationships	17	14	USA, Canada, UK, China, Italy, Jordan
Social mobility	12	10	USA, Italy, Spain, UK, Poland, Hungary, Portugal, Austria, Japan, Colombia
Social welfare	21	17	USA, UK, Austria, China, Portugal, Sweden, France, Italy, Spain, India, Bangladesh, African countries, Nordic countries
Sum	127	100	–

From the lens of major disorders, some studies have highlighted that in response to COVID-19, anxiety has been the most common reaction among vulnerable groups, such as children, women, and elderly people, as well as among individuals with chronic illnesses (Li et al. 2021; Malesza & Kaczmarek 2021; Wang et al. 2020a, b, c). Based on Raesi et al. (2020), severe and prolonged anxiety originating from COVID-19 may result in psychological distress and lead to disruption in daily life. They mention that among Iranian people, anxiety, worry, and confusion were the main emotional issues at the beginning of the virus outbreak (Raesi et al. 2020). Khan et al. 2021a, b have pointed out that “a combination of increased anxiety, diminished social opportunities, and the shift to telehealth service provision presents particular challenges for the treatment of social anxiety in youth, which relies heavily on exposures to social situations with peers, adults, or other feared social stimuli” (Khan et al. 2021a, b, p. 1). In addition to health-based anxiety, Timming et al. (2021) point to anxiety linked to economic difficulties, which has led to physiological disorders (Timming et al. 2021). Global evidence indicates that the outbreak of the COVID-19 pandemic is associated with massive negative effects on mental health in the affected communities in addition to the effects in terms of large numbers of confirmed cases and deaths (Bao et al. 2020; Cannito et al. 2020).

### 3.2 Social vulnerability

A key issue emphasized in the literature is the differential impacts of the pandemic on certain groups such as ethnic and linguistic minorities and low-income households (Fu and Zhai 2021). According to the literature, social vulnerability refers to the harms and negative effects caused to minorities and sensitive and vulnerable groups due to differences in the level of access to services and facilities (Fallah-Aliabadi et al., 2022; Qiao and Huang 2022).

Evidence from previous pandemics vulnerable groups faces greater risk as well as lower access to testing and treatment (Quinn et al. 2011). This includes groups such as low-income residents, minorities, women, and the elderly (Calderón-Larrañaga et al. 2020a, b, Benavides et al., 2020; Bauer et al. 2021).

While the pandemic has affected all communities and social groups worldwide, some studies show that it has disproportionately affected poor and highly segregated social groups at the local level (Karaye and Horney 2020; Duarte et al. 2021). It is reported that regions and cities with a larger share of racial and ethnic minority residents and high residential density have become the hotspots of vulnerability during the pandemic (Calderón-Larrañaga et al. 2020a, b; Dasgupta et al. 2020; Sharifi 2022). Recent studies in the USA (Karaye & Horney 2020), European Union (Marí-Dell’Olmo et al. 2021), and South Asia (Rasul et al. 2021) have confirmed this hypothesis. As a case in point, in some US cities, such as Chicago, patterns of increasing racial inequality have been observed as a result of the COVID-19 pandemic (Kim and Bostwick 2020). Likewise, another study indicates that, in the most vulnerable counties of the USA, the risk of diagnosis and death was, on average, 1.63 and 1.73 times higher than normal, respectively (Khazanchi et al. 2020). Moreover, another study on African-Americans shows a higher amount of infection rate (threefold) and death rate (sixfold) in black counties compared with white counties (Yancy 2020). In general, several studies have confirmed the increase in social vulnerabilities in the USA during the pandemic (Biggs et al. 2020; Boserup et al. 2020; Wang et al. 2020a, b, c).

Among other things, limited progress on human development indicators and socioeconomic factors have been key determinants of social vulnerability of affected communities during the pandemic. In Brazil, 52% of municipalities with high numbers of confirmed cases feature very low levels of human development (de Souza et al. 2020). Regarding socioeconomic status, the results of a study in Wuhan, China, indicate that socioeconomic status shapes health inequalities, and vulnerability and resilience to COVID-19. The study shows that people with better socioeconomic status are less likely to get coronavirus and have less mental distress. Also, it highlights the relationship between differential socioeconomic status and health inequality and reveals that the COVID-19 pandemic exacerbates pre-existing socioeconomic inequalities (Wu et al., 2020). Drefahl et al. (2020) illustrated that some features such as “having less individual income, lower education, not being married and being an immigrant from a low- or middle-income country predict a higher risk of death and vulnerability from COVID-19” (p. 1).

Another major factor affecting social vulnerability during the pandemic is the role of upstream policies that may increase inequalities in communities. Thomas et al. (2020) used a conceptual model known as “CHASMS” and highlighted the role of governmental policies in exacerbating social vulnerability. They assessed the conflict between local governments and higher authorities that has led to social injustices at different levels (Thomas et al. 2020). Similarly, Mehta (2020) highlights inefficient and insufficient governmental support and policies and some other challenges such as inefficient health infrastructure and misinformation of citizens that have led to inefficiencies in controlling the transmission of the virus in some Asian countries. Regarding this, the lack of appropriate regulatory policies has also fueled social vulnerability. For instance, Robinson et al. (2021) pointed out that, due to the lack of regulations, the rental and financial markets have increased socio-spatial and racial/ethnic inequalities during the pandemic (Robinson et al. 2021). Besides these, ineffective local policies in urban areas and rapid and unsustainable urbanization have also resulted in the exacerbation of inequalities amid the pandemic, especially in urban slums and informal settlements. In this regard, some studies such as Hoernke (2020) and Wilkinson (2020) state that a significant number of cities across the world have largely failed to adopt effective policies to deal with inequalities and protect their vulnerable residents during the pandemic. They reveal that the pandemic has disproportionately affected nearly one billion people living in informal settlements due to ineffective management practices and the lack of access to health facilities and other necessary infrastructures (Wilkinson 2020; Hoernke 2020). Due to such deficiencies, some studies have pointed out that homeless people suffer more from the pandemic (Lima et al. 2020; Benavides et al. 2020; Racionero-Plaza et al. 2021). As a case in point, Abhinav et al. (2021) state that the physio-social effects of the pandemic in India have been dramatic for homeless people with mental illness (Abhinav et al. 2021).

Overall, socially vulnerable communities (particularly those grappling with racial disparity and lower levels of human development) are less resilient in their capacities to plan for and recover from disruptive events in times of crisis, such as the current pandemic, compared with other communities.

### 3.3 Education

Education and educational systems have been one of the areas that have been severely affected by the pandemic across the globe. Evidence shows that the pandemic has disrupted education systems and nearly 1.6 billion learners have been severely affected worldwide



(Pokhrel and Chhetri 2021). This has happened mainly due to long-term lockdowns and restrictions imposed by local governments (Khan et al. 2021a, b).

The disruption in the educational systems has led to many challenges in the affected communities. Closures of schools and other educational centers have influenced over 94% of the world's student population, resulting in an enormous impact at both societal and educational levels (Al Lily et al. 2020; Pokhrel and Chhetri 2021). In Australia, many students have faced problems and inequalities, such as educational poverty, digital deprivation, and psychological stress (Drane et al. 2020). Moreover, Farcnik et al. (2021) pointed out that the pandemic has led students to accept the risk of delays in education, dropping out, or changing the field of education due to concerns about their future employment (Farcnik et al. 2021).

Adapting to educational changes is reported to be one of the biggest challenges faced by families and students during the pandemic. Many families and educational centers, such as schools, need to rapidly adapt to new teaching and learning methods that are done via new smart technologies. In this process, one of the main challenges has been the differences among families in light of economic, social, and cultural capital that led to significant difficulties in terms of learning opportunities for children from different backgrounds (Bonal and González 2020). On this, Seabra et al. (2021) highlight “the importance of promoting parents’ digital competence and directing support policies, particularly to parents of younger children” (p. 1).

Reliance on traditional educational systems and outdated methods made adapting to the conditions created during the pandemic difficult. Due to the lack of necessary infrastructure and capacities, transition to new learning and teaching methods based on smart solutions has been challenging (Adedoyin and Soykan 2020; Khan et al. 2021a, b; Cavus et al., 2021; Dhawan 2020; Muthuprasad et al. 2021). Varma and Jafri (2021) highlighted the issues of access injustices and low satisfaction with the effectiveness of online learning among students in India. They emphasized the need to pay attention to blended learning in an integrated way. Likewise, a study in Brazil shows structural inequalities in the use of digital and online technologies for learning and teaching; millions of students have unreliable access to new educational technologies (Silva et al. 2021). The evidence shows that the occurrence of some injustices, concerns about changing traditional methods, the lack of necessary facilities, and insufficient skills in using new methods have caused a kind of reluctance to accept new changes in educational systems (Adedoyin and Soykan 2020). Despite this, in India, many academic institutions that were reluctant to change their outdated pedagogical approaches at first had no choice but to completely shift to online teaching and learning (Dhawan 2020).

Overall, some of the most significant challenges during the pandemic include the existence and exacerbation of socioeconomic inequalities, school dropouts and academic failure, a poor culture of networking and collaboration, the information gap, the challenge of non-conducive environments for learning at home, the lack of efficient smart tools and the capacity for distance learning, the lack of multimodal education plans, and teachers’ failure to use new smart methods and update their digital skill (Azorín, 2020; Pokhrel and Chhetri 2021).

### 3.4 Social capital

Social capital is a key aspect that has been severely affected during the pandemic. Social capital is a major determinant of resilience and could also predict the capacity to deal with

the pandemic. Regarding this, a growing body of evidence indicates that adverse situations are better handled in communities with high social capital (Wu 2021). During outbreaks, social capital and trust can facilitate and collective action and community-based risk management (Makridis & Wu 2021, Kye and Hwang, 2020; Alizadeh and Sharifi 2021). Hao et al. (2021) argue that communities with higher social capital are more likely to follow protective and hygienic rules during the pandemic (Hao et al. 2021). Evidence shows that without adequate levels of social capital and the power to control complicated situations, it will be difficult to create social cohesion for following restrictive orders and participating in constructive programs and strategies (Barrios et al. 2021; Bartscher et al. 2020). In fact, in communities with high levels of relational and cognitive social capital, successful trends in diminishing the consequences of COVID-19 have been observed (Borgonovi et al. 2021; Wong and Kohler 2020). Some studies have shown higher testing rates, better compliance with rules regarding restrictions and social distancing, and slower infection rates in US cities with higher levels of social capital (Borgonovi & Andrieu 2020; Ding et al. 2020; Barrios et al. 2021). Elsewhere, a study in China shows that residents of areas with high levels of social capital act better and are more flexible in the face of the COVID-19 pandemic than others (Bian et al. 2020). Also, Bartscher et al. (2020) and Durante et al. (2021) show that, in Italy, regions with higher social capital have lower mortality rates.

Some studies indicate that the low quality of social capital is associated with the intensification of vulnerabilities and a higher risk of mortality in affected communities. Pitas and Ehmer demonstrate that the process of dealing with the consequences of the coronavirus is difficult in American societies whose social capital has been disrupted by a long process of social distancing and restrictions (Pitas and Ehmer 2020). Bazzi et al. (2021) argue that “rugged individualism” in American culture has led to disobedience to restrictive requirements and the failure of local government efforts to control the spread of the virus. A study conducted in the UK shows that there is a reluctance to observe social distancing and restrictions in those areas with low levels of political and social trust (Woelfert and Kunst 2020). On the other hand, the study of Elgar et al. (2020) via a time-series analysis of cross-national differences shows that COVID-19 mortality is higher in countries with more unequal economic situations and lower levels of trust, social cohesion, and civic responsibility (Elgar et al. 2020).

It is argued that social capital may be affected during the pandemic depending on how governments respond to the spread of the disease, the level of public trust in the policies adopted, the situation of social relations and networks, and the impacts that the disease has on the physical and mental health of people (Borgonovi and Andrieu 2020; Wu 2021; Hao et al. 2021). According to Pitas and Ehmer (2020), many of the restrictive rules and protective plans introduced in response to COVID-19 have led to a decline in social capital, especially due to disruption in bridging and linking relationships (Pitas and Ehmer 2020). Overall, further research is needed to understand better the dynamic linkages between pandemic and social capital (Araghchi and Managi, 2021).

### 3.5 Social relationships

Disruption in social relationships is another key manifestation of the impacts of the pandemic on the social sphere. Social relationships can be thought of as relationships that exist between family, friends, neighbors, and other associates (Naser et al. 2020). Social relations, from both quantitative and qualitative perspectives, have a major impact on our well-being and health. So much so that a lack of such relationships can

increase the risk of morbidity and mortality (Smith et al. 2020). There have been arguments that social relationships have declined dramatically due to social isolation during the pandemic (Toscano and Zappala, 2020). Recently, the WHO declared that disruption in social relationships is a major public health crisis, and the continuation of this process has led to long-term and profound impacts on the communities' health and well-being (Naser et al. 2020; Wu 2020). This disruption in social relationships has strongly affected the economic, cultural, and behavioral aspects of social life around the world.

One of the most important causes of disruption in social relationships has been extensive restrictions and strict laws to prevent the spread of the coronavirus. Evidence shows that restrictions on social relationships have resulted in a dramatic increase in disorders such as stress, loneliness, and domestic violence (Wu 2020). Additionally, Philpot et al. (2021) and Folk et al. (2020) have shown that restrictions imposed on social relationships have led to some challenges, such as a diminishing sense of emotional and instrumental support, increasing loneliness, a decreased feeling of friendship and belonging, and perceived hostility among communities.

The negative impacts of disruption in social relations on vulnerable groups have been reported in the literature. It is shown that some social groups (children and adolescents in particular) are probably more likely to experience negative consequences of forced isolation such as depression and anxiety (Loades et al. 2020). Domestic violence, especially against women (Roesch et al. 2020; Davies et al. 2022), and loneliness and depression among adolescents (Cooper et al. 2021; Liu et al. 2022) are some of the major negative impacts of the pandemic on social relationships.

In many cases, the pandemic transformed face-to-face interactions to interactions enabled by social media and online platforms (Nguyen et al. 2020; Okabe-Miyamoto et al. 2021). Regarding this, “people turned to remote methods of communication, with increased use of phone calls. For example, average call duration increased from 3.7 to 5.4 min from January to April 2020 in the UK—and higher use of mobile messaging and video-calling in the UK and throughout Europe” (Sommerlad et al. 2021, p. 2). Bostrom (2021), by highlighting the creation of online communities and digitalized interaction rituals states that the pandemic has forced people to create new ways to keep social relations alive. In fact, people have tried to maintain and expand social relations through online platforms by inventing some online events, such as “virtual dinner parties, religious services, weddings and music performances” (Bostrom, 2021, p. 3).

Technology-based solutions for addressing the issues mentioned above, particularly for addressing loneliness, can be considered a potential for maintaining social relations, even though there is a risk of excluding people with less access to online technologies (Dahlberg 2021; Sharifi et al. 2021). Also, Gao et al. (2020) show that online forms of relationships, especially using social media can bring major mental health problems after controlling for covariates (Gao et al. 2020). Therefore, it is suggested to take measures to support the affected groups (Hechanova et al., 2021; Mano 2020).

To sum up, as Long et al. (2021) argue, despite the inevitability of accepting changes in social relationships such as the trend toward online relationships, there are inequalities in this area, especially for individuals with a large number of newly established relationships. Switching to online relations may be challenging in such cases, and this may increase the risk of social isolation (Long et al. 2021).

### 3.6 Social mobility

Mobility has also been directly affected by the COVID-19 pandemic. Reduced social relationships, imposed restrictions, and long-term lockdowns have reduced individuals' mobility and out-of-home activities (Gouveia et al. 2021; Yabe et al. 2020). A global survey shows that respondents have reduced their travel time by 60% during the pandemic compared to before (Kellermann et al. 2022). For instance, mobility was reduced up to 76% in Santander, Spain (Aloi et al. 2020) and up to 65% in Budapest, Hungary (Bucsky 2020).

There is a consensus that the pandemic has caused unprecedented changes in mobility habits in many countries. Growing trends in travel by private cars (Campisi et al. 2020), e-commerce and online shopping and work (Villa and Monzon, 2021; Primecz 2021), less desire for public transportation (Tirachini & Cats 2020), and connecting and meeting online (Nabity-Grover et al. 2020) have been observed in many countries. Advances in smart solutions and technologies have played a major role in creating these changes (Nabity-Grover et al. 2020). The tendency to teleworking and teleshopping has been a part of these changes driven by the use of social media and online methods (de Palma et al. 2022). Restrictions on social mobility in the affected communities have been associated with some challenges and negative impacts. A study in Italy argues that mobility restrictions have acted as an exogenous shock to the economy. This study shows that the impact of lockdowns on mobility "is stronger in municipalities with higher fiscal capacity; second, they induce a segregation effect: mobility contraction is stronger in municipalities where inequality is higher and income per capita is lower" (Bonaccorsi et al. 2020, p. 15,530). In some cases, such inequalities have made it difficult to enforce mobility restrictions. For instance, Chang et al. (2021) have found that due to the negative economic effects, disadvantaged groups were reluctant to reduce their mobility and they regularly visited more crowded areas, thereby increasing the risk of infection (Chang et al. 2021). Moreover, Glodeanu et al. (2021) have found a relationship between mobility changes and deprivation in Madrid. They concluded that mobility has declined sharply during the economic hibernation caused by the pandemic, particularly in the deprived areas of the city. Similarly, Dobusch and Kreissl (2020) point out that restrictions in Austria have exacerbated the existing inequalities. They discuss a "governance of im-/mobility" in Austria that leads to the strengthening of an unequal regime of relations based on socioeconomic class, gender, and immigration (Dobusch & Kreissl 2020, p. 709).

Overall, restrictions imposed on social mobility have led to different results in both high- and low-income countries. The differences stem from issues such as extreme poverty, understanding of risk, unsustainable employment, and other infrastructural and support deficiencies (Duenas et al., 2021; Iio et al. 2021).

### 3.7 Social welfare

Social welfare has a multidimensional nature and depends on some basic aspects of development and quality of life. Financial and economic conditions as key determinants of social welfare have suffered a major shock during the pandemic, resulting in financial stress in communities (Rodrigues et al. 2021). In fact, the unprecedented global crisis triggered by the COVID-19 pandemic has resulted in a global economic downturn, and consequently, has put social welfare at risk (Mok et al. 2021; Wang et al. 2020a, b, c). Under these circumstances, countries worldwide have experienced the loss of millions of jobs and

excessive difficulties in social livelihood and welfare (Ceylan et al. 2020). For example, a report by the OECD shows that the annual GDP in the early months decreased by 2% per month globally. Also, the International Labour Organization reported that the pandemic has increased global unemployment by 3–13% (Canto et al., 2022). At the national level, for example, national data in China indicate that as the coronavirus peaked in the first quarter of 2020, GDP fell 6.8% (Wang et al. 2020a, b, c). Canto et al. (2022) state that “between the first and second quarter of 2020, GDP fell drastically in some European countries—by 11.8 percent in Belgium, 13 percent in Italy, 17.9 percent in Spain and 18.8 percent in the UK, making them some of the worst affected countries economically in Europe” (p. 294).

One of the most important consequences of the COVID-19 pandemic in the context of social welfare is the spread of poverty in the world (Sumner et al., 2020; Patel et al., 2020). As a case in point, the World Bank has estimated that nearly 11 million people could fall into poverty in East Asia and the Pacific regions during the pandemic (Martin et al. 2020). Also, “according to the World Bank’s latest estimates of the impact of COVID-19 on global poverty, COVID-19 will push 71–100 million people into extreme poverty (<US \$1.90 per day), mostly in sub-Saharan Africa, and propel an additional 176–231 million to join the ranks of the poor (calculated at <US \$3.20 per day), mostly in South Asia” (Johri et al. 2021, p. 1717). A study conducted on a global scale using two main parameters, namely the number of “years of life lost (LY)” and “years spent in poverty (PY),” estimates that the pandemic had caused “at least 68 million extra poverty years and 4.3 million years of life lost across 150 countries” since early June 2020 (Decerf et al. 2021, p. 1). Likewise, a study in China shows that COVID-19 has imposed severe economic and social stress on poor families. This situation has resulted in issues such as child labor (Owusu & Frimpong-Manso 2020).

Considering the pandemic’s impacts on social welfare, some studies highlight the role of the pandemic in increasing food insecurity around the world (Nguyen et al., 2020; Das et al., 2020; Smith, and Wesselbaum, 2020). For instance, Das et al. (2020) state that households in both urban and rural areas in Bangladesh suffered from food insecurity during the long-term lockdown. Also, Wolfson and Leung (2020) address the issue of food insecurity during the pandemic in the USA, where 44% of individuals were food insecure. Besides the heightened food insecurity, the pandemic has created difficulties in social livelihood. It has caused issues such as a lack of basic amenities and healthcare facilities, economic stress and shock, and diminished psychological support (Bhagat et al. 2020). Despite the negative impacts of the pandemic on social welfare, Freidman et al. (2021) argue that such a dire situation can be an opportunity for governments’ welfare systems to support their populations, particularly vulnerable groups, and reduce livelihood and social welfare inequalities (Freidman et al., 2021). Regarding this, evidence from Central and Eastern Europe shows that governments in Hungary, Lithuania, Poland, and Slovakia reacted to the COVID-19 crisis by providing extensive protection for jobs and enterprises (Aidukaite et al. 2021). Similarly, in Nepal and India, locally elected governments have taken basic steps to coordinate responses and deliver social support (Gupta et al. 2021).

Recent studies conclude that even if the pandemic is contained, it is likely that the economic impacts would be long-lasting (Ceylan et al. 2020; Coccia 2021). Given the direct effects of the economic conditions on social welfare, this may impose negative impacts on future policies and schemes related to the quality of life and welfare in vulnerable communities (Tisdell 2020; Pak et al. 2020). Therefore, some studies state the need for changing welfare regimes (Mok et al. 2021). Mok et al. (2021) argue that such changes cannot be considered in isolation from the economic structure and its background. They also suggest rethinking and creating new structures in the relationship between the three major

dimensions of welfare provision triangles, namely state, market, and society (Mok et al. 2021). To this end, some studies suggest digitizing the service provision process (Ingaldi and Klimecka-Tatar 2022; Lips & Eppel 2022). As a case in point, it has been reported that due to the lack of an efficient digital social welfare system, public health measures may fail to reduce the consequences of the pandemic (Ebuenyi 2020).

## 4 Summary and conclusions

### 4.1 Summary

This study attempted to identify and highlight the community social dimensions affected by the COVID-19 pandemic. Using an inductive content analysis of the literature, seven social areas were identified that were remarkably affected and changed during the pandemic. These include, social vulnerability, education, social capital, social relationships, social mobility, and social welfare. Based on the results, each of the featured areas has faced drastic changes during the pandemic, and the long-term lockdowns have intensified the problems.

In the health area, in addition to the high number of infections and deaths worldwide, the results showed that the affected communities were involved in mental and psychological disorders. Anxiety, fear, and depression are the most common disorders in affected communities. As for social vulnerability, inequalities in the availability of resources and facilities have intensified vulnerabilities, especially among minorities and vulnerable groups. In the education area, similar trends have also led to widespread disruptions. The primary challenges in this area are the existence of some injustices in access to online and smart educational methods and tools, the lack of smart facilities and related skills, as well as the reluctance of traditional educational systems to accept smart methods. In the social capital area, we discussed that high levels of social capital are associated with low levels of infection and death across the globe. Further, it is confirmed that compliance with restrictions and preventive laws has been very low in places where social capital is low. From the perspective of social relationships, the disruptions during the pandemic period have been tremendous. Mental disorders, loneliness and depression, and domestic violence, especially against women have increased, and online methods and social networks have replaced face-to-face relationships and social events. As for issues related to mobility, significant decrease has been reported that reach up to 70% in some areas. This has had negative impacts on local economies. Finally, in light of social welfare, evidence indicated that the pandemic had caused the loss of millions of job opportunities and has negatively impacted the livelihood of families. This challenge has caused the spread of poverty and reduced food security worldwide.

Overall, our results indicate that in addition to massive infection rates and death tolls, the world has experienced dramatic social consequences with major implications for other domains (economic, environmental, cultural, etc.). Table 3 shows a summary of the major social consequences of COVID-19 pandemic reported in this study.

### 4.2 Implications for public policy

Considering the remarkable changes and adverse effects in different social areas during the pandemic, the findings confirm the need for paradigm shifts in the discussed areas

**Table 3** Summary of major social consequences of COVID-19 pandemic

The affected areas	Major consequences	Lessons that can be learned	References
Health	<p>Massive infection rates and dead tolls</p> <p>Dramatic psychological and mental effects (depression, anxiety, stress, fear, etc.)</p>	<p>Community participation and adherence to health requirements and mobility restrictions are essential in affected communities</p> <p>Planning to implement community-based policies is essential to support the resilience of psychologically vulnerable individuals</p>	<p>Hyland-Wood et al. (2021), Alizadeh and Sharifi, (2022), Venkatraman and Manoharan, (2023)</p>
Social vulnerability	<p>Increased poverty and segregation</p> <p>Worrying trends of inequality, especially among minorities and vulnerable groups (ethnic and linguistic minorities, women, and low-income groups)</p>	<p>Financial support and other subsidies to the poor and those who lost their jobs during the pandemic can effectively reduce poverty trends in affected communities</p> <p>Having good governance to ensure equitable access to health and economic facilities and services can effectively promote resilience and reduce social vulnerability</p> <p>Reducing racial disparities by providing access to housing, good-paying jobs, and quality food and healthcare services could help increase the resilience of minorities and vulnerable groups</p>	<p>Sun et al. (2022), Lak et al. (2020), Alizadeh and Sharifi, (2022), Duque, (2021), Parolin et al. (2022)</p>
Education	<p>Long-term educational disruptions</p> <p>Digital deprivation</p> <p>Poor technology management</p> <p>Increased psychosocial difficulties</p> <p>Information gaps</p> <p>Poor culture of networking and collaboration</p> <p>Reluctance of traditional educational systems to adapt to new conditions</p>	<p>It is necessary to accept the change in educational processes in the transition to digital approaches</p> <p>Empowering human resources and increasing their skills is essential to use technological tools to improve the teaching and learning process</p> <p>Local governments must invest in digital and smart infrastructure and tools and new educational technologies (distance learning, digital platform learning, and virtual networks)</p> <p>Equitable distribution of technological and smart infrastructures and facilities and enhancing the capacity of underprivileged groups are essential</p>	<p>Stoian et al. (2022), DeCoito and Estaitteyeh, (2022), Pozo et al. (2021), Morgghan, (2020); Azorin, (2020), Pokhrel &amp; Chhetri, (2021)</p>

**Table 3** (continued)

The affected areas	Major consequences	Lessons that can be learned	References
Social capital	Declining social capital, especially among vulnerable groups and minorities Low level of trust among minorities and vulnerable societies	Transparent and responsible governance and effective civic participation can promote social capital and contribute to crisis management Continued investment in infrastructure can help increase social capital in poor communities A fair distribution of economic and healthcare infrastructure and facilities among all sections of society increases social trust and cohesion. It leads to better compliance with the laws and restrictions imposed Governments are obliged to build strong social capital because communities with high social capital can better manage difficult conditions	Chen et al. (2020), Hao et al. (2021), Alizadeh and Sharifi, (2022), Barrios et al. (2021), Liu and Wen, (2021),
Social relationships	Increased social isolation Behavioral changes (shifting from face-to-face interactions to interactions in social media and online platforms) The risk of increasing social isolation Increased levels of stress, loneliness, and domestic violence	Facilitating the provision of complementary platforms such as safe social media and online infrastructure is essential in reducing the effects of social isolation Proper planning to monitor and control social media's and online platforms' negative effects, especially among teens and young people is essential Provision of social and physical resources to individuals who have suffered from long-term isolation and restrictions should be prioritized	Khan et al. (2021a, b), Susanto et al. (2021), Nguyen et al. (2020), Okabe-Miyamoto et al. (2021), Bostrom (2021)



**Table 3** (continued)

The affected areas	Major consequences	Lessons that can be learned	References
Mobility	<p>Behavioral changes (e.g., increase in travel by private cars, online shopping, remote working, etc.)</p> <p>Failure to comply with mobility restrictions between minorities and vulnerable groups and higher risks of infection</p> <p>Rising economic and educational inequalities</p> <p>Different outcomes in terms of adherence to restrictions among high- and low-income communities</p>	<p>Due to the restrictions and changes in the business process and social communication, investment and provision of platforms based on cyberspace and online networks is essential to help economic prosperity and job creation</p> <p>Although long-term restrictions and lockdowns have caused many socioeconomic problems, paying attention to social distancing and providing flexible and participatory methods could help overcome some mobility limitations</p> <p>Having programs to increase financial, medical, etc., support for the affected and poor individuals, and strengthen social trust can increase compliance with restrictions, especially in low-income communities</p>	<p>Rani and Dhir, (2020), Zhang et al. (2022), Singh et al. (2021), Nability-Grover et al. (2020), Bonaccorsi et al. (2020), Dobusch &amp; Kreissl (2020)</p>
Social welfare	<p>Unprecedented economic disruptions (e.g., millions of job losses, rising unemployment rates, etc.)</p> <p>Decrease in the level of quality-of-life</p> <p>Food and livelihood insecurities</p> <p>Vulnerability of low-income groups and social groups who have temporary jobs and/or are self-employed</p> <p>Increased child labor</p>	<p>Continuous and participatory efforts of world governments on economic recovery are essential</p> <p>Special attention should be paid to poor countries and minorities to provide subsidies and financial support for their socioeconomic resilience</p> <p>Proper provision of resources and services to poor and vulnerable groups and promoting the culture of mutual support are essential</p> <p>It is necessary to change welfare regimes, especially in affected communities. Updated regimes be flexible, participatory, and supportive of vulnerable groups</p>	<p>Mok et al. (2021), Wang et al. (2020a, b, c), Canto et al. (2022); Sumner et al. (2021), Patel et al. (2021), Decerf et al. (2021)</p>

to enhance community resilience (Mok et al. 2021). To reach this goal and respond effectively to the COVID-19 consequences, creating synergies and collaborative planning mechanisms between local governments and global institutions should be prioritized. These should be based on fair policies to empower minorities that have been more severely affected by the pandemic. Based on the results of the study, these major policy implications could be highlighted:

- A recurring issue across different social aspects was the disproportionate impact of the pandemic on vulnerable groups. To enhance resilience against future pandemics and other adverse events, reducing inequalities should be prioritized. In addition, improving the accessibility of vulnerable groups to services and facilities during times of crisis is essential and contributes to better absorption and recovery capacities.
- Adaptation capacity is a key determinant of resilience. It is important to acknowledge that not all risks can be avoided. Having the capacity to adapt to emerging needs and conditions is, therefore, essential for communities to survive and thrive. Enhancing adaptive capacity is particularly important in communities with traditional educational and economic systems.
- Engaging and empowering citizens and social groups through good governance approaches must be prioritized. Such measures will contribute to social capital, which is a key indicator of resilience.
- Paying attention to virtual community building, fostering solidarity between social groups, and building trust between policymakers and the public are other measures that can contribute to resilience through improving social capital. These need special attention as our review shows that many communities do not perform well in these regards.
- The review showed that welfare is a key social determinant of health. Therefore, adopting integrated approaches to health and social welfare to ensure better resilience to future pandemics and other potential adverse events is important.
- Advances in smart city solutions and technologies offer many opportunities to plan and prepare for, absorb, recover from, and adapt to adverse events. Successful utilization of such technologies, however, requires caution to avoid issues such as the digital divide and spread of misinformation.

### 4.3 Limitation and Future studies

Overall, this study improved our understanding of the social consequences of the COVID-19 pandemic identified several affected areas in the social context. However, there are limitations that need to be acknowledged. Although this review was successful in demonstrating that COVID-19 has had great impacts on the social sphere and has led to drastic changes in many aspects of human life, more detailed studies are needed to understand potential contextual differences better. Therefore, future studies could explore how contextual environmental, economic, physical, and political differences may influence the patterns and dynamics of social impacts. Also, as the pandemic is not yet over and some impacts may take a longer time to emerge, updated literature reviews will be necessary.

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## References

- Abhinav A, Priti A, Chandra B, Jatwinder G (2021) Not all who wander are lost: fate of homeless persons with mental illness during COVID-19 pandemic in North India—case series. *J Psychosoc Rehabil Mental Health*. <https://doi.org/10.1007/s40737-021-00249-1>
- Adedoyin OB, Soykan E (2020) Covid-19 pandemic and online learning: the challenges and opportunities. *Interact Learn Environ*. <https://doi.org/10.1080/10494820.2020.1813180>
- Agarwal B (2021) Livelihoods in COVID times: Gendered perils and new pathways in India. *World Dev* 139:105312
- Aidukaite J, Saxonberg S, Szelewa D, Szikra D (2021) Social policy in the face of a global pandemic: policy responses to the COVID-19 crisis in central and Eastern Europe. *Soc Policy Admin* 55(2):358–373
- Akbari M, Seydavi M, Zamani E, Nikčević AV, Spada MM (2021) The persian COVID-19 anxiety syndrome scale (C-19ASS): Psychometric properties in a general community sample of Iranians. *Clin Psychol Psychother* 29:906
- Al Lily AE, Ismail AF, Abunasser FM, Alqahtani RHA (2020) Distance education as a response to pandemics: coronavirus and Arab culture. *Technol Soc* 63:101317
- Alizadeh H, Sharifi A (2021) Analysis of the state of social resilience among different socio-demographic groups during the COVID-19 pandemic. *Int J Disaster Risk Reduct* 64:102514
- Alizadeh H, Sharifi A (2022) Social resilience promotion factors during the COVID-19 pandemic: insights from Urmia. *Iran Urban Sci* 6(1):14
- Aloi A, Alonso B, Benavente J, Cordera R, Echaniz E, Gonzalez F, Ladisa C, Lezama-Romanelli R, Lopez-Parra A, Mazzei V, Perrucci L, Prieto-Quintana D, Rodriguez A, Sanudo R (2020) Effects of the COVID-19 lockdown on urban mobility: empirical evidence from the city of santander (Spain). *Sustainability* 12(9):5
- Al-Omoush KS, Simón-Moya V, Sendra-García J (2020) The impact of social capital and collaborative knowledge creation on e-business proactiveness and organizational agility in responding to the COVID-19 crisis. *J Innov Knowl* 5(4):279–288
- Arachchi JL, Managi S (2021) The role of social capital in COVID-19 deaths. *BMC Public Health* 21(1):1–9
- Azorín C (2020) Beyond COVID-19 supernova Is another education coming? *J Prof Capital Commun*. 5(3):381–390
- Bao Y, Sun Y, Meng S, Shi J, Lu L (2020) 2019-nCoV epidemic: address mental health care to empower society. *The Lancet* 395(10224):e37–e38
- Barrios JM, Benmelech E, Hochberg YV, Sapienza P, Zingales L (2021) Civic capital and social distancing during the Covid-19 pandemic. *J Public Econ* 193:104310
- Bartscher AK, Seitz S, Slotwinski M, Sieglösch S, & Wehrhöfer N (2020) Social capital and the spread of Covid-19: Insights from European countries. SSRN Electronic Journal, ZEW - Centre for European Economic Research Discussion Paper No. 20–023. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3616714](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3616714)
- Bauer A, Garman E, McDaid D, Avendano M, Hessel P, Díaz Y (2021) Integrating youth mental health into cash transfer programmes in response to the COVID-19 crisis in low-income and middle-income countries. *Lancet Psychiatry* 8:340–346
- Bazzi S, Fiszbein M, Gebresilasie M (2021) “Rugged individualism” and collective (in) action during the COVID-19 pandemic. *J Public Econ* 195:104357
- Benavides AD, Nukpezah JA (2020) How local governments are caring for the homeless during the COVID-19 pandemic. *Am Rev Public Admin* 50(6–7):650–657
- Bendau A, Kunas S, Wyka S, Petzold M, Plag J, Asselmann E, Ströhle A (2021) Longitudinal changes of anxiety and depressive symptoms during the COVID-19 pandemic in Germany: The role of pre-existing anxiety, depressive, and other mental disorders. *J Anxiety Disorders* 79:102377
- Bhagat RB, Reshmi RS, Sahoo H, Roy AK, Govil D (2020) The COVID-19, migration and livelihood in India: challenges and policy issues. *Migr Lett* 17(5):705–718
- Bian Y, Miao X, Lu X, Ma X, Guo X (2020) The emergence of a COVID-19 related social capital: the case of China. *Int J Sociol* 50(5):419–433

- Biggs EN, Maloney PM, Rung AL, Peters ES, Robinson WT (2020) The relationship between social vulnerability and COVID-19 incidence among louisiana census tracts. *Front Public Health*. <https://doi.org/10.3389/fpubh.2020.617976>
- Bonaccorsi G, Pierri F, Cinelli M, Flori A, Galeazzi A, Porcelli F, Schmidt AL, Valensise CM, Scala A, Quattrocioni W (2020) Economic and social consequences of human mobility restrictions under COVID-19. *Proc Natl Acad Sci* 117(27):15530–15535
- Bonal X, González S (2020) The impact of lockdown on the learning gap: family and school divisions in times of crisis. *Int Rev Educat* 66:1–21
- Borgonovi F, Andrieu E (2020) Bowling together by bowling alone: Social capital and Covid-19. *Soc Sci Med* 265:113501
- Borgonovi F, Andrieu E, Subramanian SV (2021) The evolution of the association between community level social capital and COVID-19 deaths and hospitalizations in the United States. *Soc Sci Med* 278:113948
- Boserup B, McKenney M, Elkbuli A (2020) Disproportionate Impact of COVID-19 Pandemic on Racial and Ethnic Minorities. *Am Surg* 86(12):1615–1622
- Boström M (2021) Social relations and everyday consumption rituals: barriers or prerequisites for sustainability transformation? *Front Sociol*. <https://doi.org/10.3389/fsoc.2021.723464>
- Brady O, Wilder-Smith A (2021) What Is the Impact of Lockdowns on Dengue? *Current Infectious Disease Rep* 23(2):1–8
- Bucsky P (2020) Modal share changes due to COVID-19: The case of Budapest. *Transp Res Interdiscip Perspect* 8:100141
- Calderón-Larrañaga A, Dekhtyar S, Vetrano DL, Bellander T, Fratiglioni L (2020a) COVID-19: risk accumulation among biologically and socially vulnerable older populations. *Ageing Res Rev* 63:101149
- Calderón-Larrañaga A, Vetrano DL, Rizzuto D, Bellander T, Fratiglioni L, Dekhtyar S (2020b) High excess mortality in areas with young and socially vulnerable populations during the COVID-19 outbreak in Stockholm Region, Sweden *BMJ Global Health* 5(10):e003595
- Campisi T, Basbas S, Skoufas A, Akgün N, Ticali D, Tesoriere G (2020) The impact of COVID-19 pandemic on the resilience of sustainable mobility in sicily. *Sustainability* 12(21):8829
- Cannito L, Di Crosta A, Palumbo R, Ceccato I, Anzani S, La Malva P, Di Domenico A (2020) Health anxiety and attentional bias toward virus-related stimuli during the COVID-19 pandemic. *Sci Rep* 10(1):1–8
- Canto O, Figari F, Fiorio CV, Kuypers S, Marchal S, Romaguera-de-la-Cruz M, Verbist G (2022) Welfare resilience at the onset of the COVID-19 pandemic in a selection of European countries: impact on public finance and household incomes. *Rev Income Wealth* 68(2):293–322
- Cavus N, Sani AS, Haruna Y, Lawan AA (2021) Efficacy of social networking sites for sustainable education in the era of COVID-19: a systematic review. *Sustainability* 13(2):808
- Ceylan R, Ozkan B, Mulazimogullari E (2020) Historical evidence for economic effects of COVID-19. *Eur J Health Econ* 21:817–823
- Chakraborty I, Maity P (2020) COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Sci Total Environ* 728:138882
- Chang S, Pierson E, Koh PW, Gerardin J, Redbird B, Grusky D, Leskovec J (2021) Mobility network models of COVID-19 explain inequities and inform reopening. *Nature* 589(7840):82–87
- Chaturvedi K, Vishwakarma DK, Singh N (2021) COVID-19 and its impact on education, social life and mental health of students: A survey. *Child Youth Serv Rev* 121:105866
- Chen Q, Min C, Zhang W, Wang G, Ma X, Evans R (2020) Unpacking the black box: How to promote citizen engagement through government social media during the COVID-19 crisis. *Comput Hum Behav* 110:106380
- Coccia M (2021) The relation between length of lockdown, numbers of infected people and deaths of Covid-19, and economic growth of countries: lessons learned to cope with future pandemics similar to Covid-19 and to constrain the deterioration of economic system. *Sci Total Environ* 775:145801
- Cooper K, Hards E, Moltrecht B, Reynolds S, Shum A, McElroy E, Loades M (2021) Loneliness, social relationships, and mental health in adolescents during the COVID-19 pandemic. *J Affect Disord* 289:98–104
- Dahlberg L (2021) Loneliness during the COVID-19 pandemic. *Ageing Ment Health* 25(7):1161–1164
- Dai J, Sang X, Menhas R, Xu X, Khurshid S, Mahmood S, Alam MN (2021) The influence of covid-19 pandemic on physical health–psychological health, physical activity, and overall well-being: the mediating role of emotional regulation. *Front Psychol* 12:667461
- Das S, Rasul MG, Hossain MS, Khan AR, Alam MA, Ahmed T, Clemens JD (2020) Acute food insecurity and short-term coping strategies of urban and rural households of Bangladesh during the

- lockdown period of COVID-19 pandemic of 2020: report of a cross-sectional survey. *BMJ Open* 10(12):e043365
- Dasgupta S, Bowen VB, Leidner A, Fletcher K, Musial T, Rose C, Cha A, Kang G, Dirlikov E, Pevzner E (2020) Association between social vulnerability and a county's risk for becoming a COVID-19 hotspot—united states, June 1–July 25, 2020. *Morb Mortal Wkly Rep* 69(42):1535
- Davies RL, Rice K, Rock AJ (2022) The effects of COVID-19 social restrictions and subsequent informal support limitations on intimate partner violence: an opinion piece. *Front Global Women's Health*. <https://doi.org/10.3389/fgwh.2022.829559>
- de Souza CDF, Machado MF (2020) Human development, social vulnerability and COVID-19 in Brazil: a study of the social determinants of health. *Infect Dis Poverty* 9(1):1–10
- Decerf B, Ferreira FH, Mahler DG, Sterck O (2021) Lives and livelihoods: estimates of the global mortality and poverty effects of the Covid-19 pandemic. *World Dev* 146:105561
- DeCoito I, Estaiteyeh M (2022) Transitioning to online teaching during the COVID-19 pandemic: An exploration of STEM teachers' views, successes, and challenges. *J Sci Educ Technol* 31(3):340–356
- Dhawan S (2020) Online learning: a panacea in the time of COVID-19 crisis. *J Educ Technol Syst* 49(1):5–22
- Ding W, Levine R, Lin C, Xie W (2020). Social distancing and social capital: why US counties respond differently to COVID-19 (0898–2937).
- Dobusch L, Kreissl K (2020) Privilege and burden of im-/mobility governance: on the reinforcement of inequalities during a pandemic lockdown. *Gend Work Organ* 27(5):709–716
- Drane CF, Vernon L, O'Shea S (2020) Vulnerable learners in the age of COVID-19: a scoping review. *Aust Educat Res*. 48:1–20
- Drefahl S, Wallace M, Mussino E, Aradhya S, Kolk M, Brandén M, Andersson G (2020) A population-based cohort study of socio-demographic risk factors for COVID-19 deaths in Sweden. *Nat Commun* 11(1):1–7
- Duarte R, Aguiar A, Pinto M, Furtado I, Tiberi S, Lönnroth K, Migliori GB (2021) Different disease, same challenges: Social determinants of tuberculosis and COVID-19. *Pulmonology*. <https://doi.org/10.1016/j.pulmoe.2021.02.002>
- Durante R, Guiso L, Gulino G (2021) Asocial capital: Civic culture and social distancing during COVID-19. *J Public Econ* 194:104342
- Duque RB (2021) Black health matters too... especially in the era of Covid-19: how poverty and race converge to reduce access to quality housing, safe neighbourhoods, and health and wellness services and increase the risk of co-morbidities associated with global pandemics. *J Racial Ethn Health Disparities* 8:1012–1025
- Ebuenyi ID (2020) COVID-19: an opportunity for African governments to rethink social welfare benefits and protection. *Pan Afr Med J* 35(Suppl 2):64
- Elgar FJ, Stefaniak A, Wohl MJ (2020) The trouble with trust: Time-series analysis of social capital, income inequality, and COVID-19 deaths in 84 countries. *Soc Sci Med* 263:113365
- Elo S, Kyngäs H (2008) The qualitative content analysis process. *J Adv Nurs* 62(1):107–115
- Ettman CK, Abdalla SM, Cohen GH, Sampson L, Vivier PM, Galea S (2020) Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw Open* 3(9):e2019686–e2019686
- Fallah-Aliabadi S, Fatemi F, Heydari A, Khajehaminian MR, Lotfi MH, Mirzaei M, Sarsangi A (2022) Social vulnerability indicators in pandemics focusing on Covid-19: A systematic literature review. *Public Health Nurs* 39(5):1142–1155
- Farcnik D, Muren PD, Franca V (2021) Drop-out, stop-out or prolong? The effect of COVID-19 on students' choices. *Int J Manpower*. Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/IJM-06-2021-0353>
- Folk D, Okabe-Miyamoto K, Dunn E, Lyubomirsky S (2020) Did social connection decline during the first wave of COVID-19? the role of Extraversion. *Collabra: Psychology*.
- Fu X, Zhai W (2021) Examining the spatial and temporal relationship between social vulnerability and stay-at-home behaviors in New York City during the COVID-19 pandemic. *Sustain Cities Soc* 67:102757
- Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, Dai J (2020) Mental health problems and social media exposure during COVID-19 outbreak. *PLoS ONE* 15(4):e0231924
- Glodeanu A, Gullón P, Bilal U (2021) Social inequalities in mobility during and following the COVID-19 associated lockdown of the Madrid metropolitan area in Spain. *Health Place* 70:102580
- Gouveia R, Ramos V, Wall K (2021) Household Diversity and the Impacts of COVID-19 on Families in Portugal. *Front Sociol* 6:175

- Guadagni V, Umilta A, Iaria G (2020) Sleep quality, empathy, and mood during the isolation period of the COVID-19 pandemic in the Canadian population: females and women suffered the most. *Front Global Women's Health* 1:13
- Gupta D, Fischer H, Shrestha S, Ali SS, Chhatre A, Devkota K, Rana P (2021) Dark and bright spots in the shadow of the pandemic: Rural livelihoods, social vulnerability, and local governance in India and Nepal. *World Dev* 141:105370
- Hao F, Shao W, Huang W (2021) Understanding the influence of contextual factors and individual social capital on American public mask wearing in response to COVID-19. *Health Place* 68:102537
- Hoerlke K (2020) A socially just recovery from the COVID-19 pandemic: a call for action on the social determinants of urban health inequalities. *J R Soc Med* 113(12):482–484
- Hyland-Wood B, Gardner J, Leask J, Ecker UK (2021) Toward effective government communication strategies in the era of COVID-19. *Human Soc Sci Communications*, 8(1).
- Iio K, Guo X, Kong X, Rees K, Wang XB (2021) COVID-19 and social distancing: disparities in mobility adaptation between income groups. *Transport Res Interdiscip Perspect* 10:100333
- Ingaldi M, Klimecka-Tatar D (2022) Digitization of the service provision process—requirements and readiness of the small and medium-sized enterprise sector. *Procedia Computer Science* 200:237–246
- JHU (2021) The COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) of Johns Hopkins University. Johns Hopkins University. <https://coronavirus.jhu.edu/map.html>.
- Johri, M., Agarwal, S., Khullar, A., Chandra, D., Pratap, V. S., Seth, A., & Gram Vaani Team. (2021). The first 100 days: how has COVID-19 affected poor and vulnerable groups in India?. *Health Promot Int*, 36(6), 1716–1726
- Karaye IM, Horney JA (2020) The impact of social vulnerability on COVID-19 in the US: an analysis of spatially varying relationships. *Am J Prev Med* 59(3):317–325
- Kellermann R, Conde DS, Rößler D, Kliever N, Dienel HL (2022) Mobility in pandemic times: Exploring changes and long-term effects of COVID-19 on urban mobility behavior. *Transport Res Interdiscip Perspect* 15:100668
- Khan MN, Ashraf MA, Seinen D, Khan KU, Laar RA (2021a) Social media for knowledge acquisition and dissemination: the impact of the COVID-19 pandemic on collaborative learning driven social media adoption. *Front Psychol* 12:648253
- Khan AN, Bilek E, Tomlinson RC, Becker-Haimes EM (2021b) Treating social anxiety in an era of social distancing: adapting exposure therapy for youth during COVID-19. *Cogn Behav Pract*. <https://doi.org/10.1016/j.cbpra.2020.12.002>
- Khazanchi R, Beiter ER, Gondi S, Beckman AL, Bilinski A, Ganguli I (2020) County-level association of social vulnerability with COVID-19 cases and deaths in the USA. *J Gen Intern Med* 35(9):2784–2787
- Kim D (2022) Exploring spatial distribution of social vulnerability and its relationship with the coronavirus disease 2019: the capital region of South Korea. *BMC Public Health* 22(1):1–17
- Kim SJ, Bostwick W (2020) Social Vulnerability and Racial Inequality in COVID-19 Deaths in Chicago. *Health Educ Behav* 47(4):509–513
- Kithiia J, Wanyonyi I, Maina J, Jefwa T, Gamoyo M (2020) The socio-economic impacts of Covid-19 restrictions: Data from the coastal city of Mombasa. *Kenya Data in Brief* 33:106317
- Kye B, Hwang SJ (2020) Social trust in the midst of pandemic crisis: Implications from COVID-19 of South Korea. *Res soc stratification and mobility* 68:100523
- Lak A, Asl SS, Maher A (2020) Resilient urban form to pandemics: Lessons from COVID-19. *Med J Islam Repub Iran* 34:71
- Lambert H, Gupte J, Fletcher H, Hammond L, Lowe N, Pelling M, Raina N (2020) *Lancet Planet. Health* 4:e312–e314
- Laurencin CT, McClinton A (2020) The COVID-19 pandemic: a call to action to identify and address racial and ethnic disparities. *J Racial Ethn Health Disparities* 7(3):398–402
- Li J, Yang Z, Qiu H, Wang Y, Jian L, Ji J, Li K (2020) Anxiety and depression among general population in China at the peak of the COVID-19 epidemic. *World Psychiatry* 19:249–250
- Li Q, Zhang H, Zhang M, Li T, Ma W, An C (2021) Prevalence and risk factors of anxiety, depression, and sleep problems among caregivers of people living with neurocognitive disorders during the COVID-19 pandemic. *Front Psychiatry* 11:590343
- Lima NNR, de Souza RI, Feitosa PWG, Moreira JLDS, da Silva CGL, Neto MLR (2020) People experiencing homelessness: Their potential exposure to COVID-19. *Psychiatry Res* 288:112945
- Lips M, Eppel E (2022) Understanding public service provision using digital technologies during COVID-19 lockdowns in New Zealand through a complexity theory lens. *Global Public Policy Gover* 24:1–20
- Liu Q, Wen S (2021) Does social capital contribute to prevention and control of the COVID-19 pandemic? Empirical evidence from China. *Int J Disaster Risk Reduct* 64:102501

- Liu Y, Hu J, Liu J (2022) Social support and depressive symptoms among adolescents during the COVID-19 pandemic: the mediating roles of loneliness and meaning in life. *Front Public Health* 20:1778
- Loades ME, Chatburn E, Higson-Sweeney N, Reynolds S, Shafran R, Brigden A, Linney C, McManus MN, Borwick C, Crawley E (2020) Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J Am Acad Child Adolesc Psychiatry* 59(11):1218–1239
- Long E, Patterson S, Maxwell K, Blake C, Pérez RB, Lewis R, Mitchell KR (2021) COVID-19 pandemic and its impact on social relationships and health. *J Epidemiol Community Health*.
- Makridis CA, Wu C (2021) How social capital helps communities' weather the COVID-19 pandemic. *PLoS ONE* 16(1):e0245135
- Malesza M, Kaczmarek MC (2021) Predictors of anxiety during the COVID-19 pandemic in Poland. *Personality Individ Differ* 170:110419
- Mano R (2020) Social media and resilience in the COVID-19 crisis. *Adv Appl Sociol* 10(11):454
- Marí-Dell'Olmo M, Gotsens M, Pasarín MI, Rodríguez-Sanz M, Artazcoz L, Garcia de Olalla P, Rius C, Borrell C (2021) Socioeconomic inequalities in COVID-19 in a European urban area: two waves, two patterns. *Int J Environ Res Public Health* 18(3):1256
- Martin A, Markhvida M, Hallegatte S, Walsh B (2020) Socio-economic impacts of COVID-19 on household consumption and poverty. *Econ of Disast Clim Change* 4(3):453–479
- Mehta P (2020) The Asian region and COVID-19: approaches and gaps in controlling the virus. *Asian Educ Develop Stud* 10(2):185–197
- Mofijur M, Fattah IR, Alam MA, Islam AS, Ong HC, Rahman SA, Mahlia TMI (2020) Impact of COVID-19 on the social, economic, environmental and energy domains: Lessons learnt from a global pandemic. *Sustain Product Consump* 26:343–359
- Moher D, Liberati A, Tetzlaff J, Altman DG, Prisma Group. (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*, 6(7): e1000097
- Mok KH, Ku YW, Yuda TK (2021) Managing the COVID-19 pandemic crisis and changing welfare regimes. *J Asian Public Policy* 14(1):1–12
- Motamed-Jahromi M, Kaveh, MH (2021) The Social Consequences of the Novel Coronavirus Disease (COVID-19) Outbreak in Iran: Is Social Capital at Risk? A Qualitative Study. *Interdisciplinary Perspectives on Infectious Diseases*
- Murphy L, Markey K, O'Donnell C, Moloney M, Doody O (2021) The impact of the COVID-19 pandemic and its related restrictions on people with pre-existent mental health conditions: A scoping review. *Arch Psychiatr Nurs* 35(4):375–394
- Muthuprasad T, Aiswarya S, Aditya K, Jha GK (2021) Students' perception and preference for online education in India during COVID-19 pandemic. *Social Sci Human Open* 3(1):100101
- Nabity-Grover T, Cheung CM, & Thatcher JB (2020) Inside out and outside in: How the COVID-19 pandemic affects self-disclosure on social media. *Int J Inform Manage*, 55: 102188
- Naser AY, Al-Hadithi HT, Dahmash EZ, Alwafi H, Alwan SS, Abdullah ZA. (2020) The effect of the 2019 coronavirus disease outbreak on social relationships: a cross-sectional study in Jordan. *Int J Soc Psychiatry*
- Nguyen MH, Gruber J, Fuchs J, Marler W, Hunsaker A, Hargittai E (2020) Covid19 changes in digital communication during the COVID-19 global pandemic: implications for digital inequality and future research. *Soc Med Soc* 6(3):20
- Okabe-Miyamoto K, Folk D, Lyubomirsky S, Dunn EW (2021) Changes in social connection during COVID-19 social distancing: It's not (household) size that matters, it's who you're with. *PLoS ONE* 16(1):e0245009
- Owusu LD, Frimpong-Manso K (2020) The impact of COVID-19 on children from poor families in Ghana and the role of welfare institutions. *J Children's Serv* 15(4):185–190
- Pak A, Adegboye OA, Adekunle AI, Rahman KM, McBryde ES, Eisen DP (2020) Economic consequences of the COVID-19 outbreak: the need for epidemic preparedness. *Front Public Health* 8:241
- de Palma A, Vosough S, Liao, F (2022) An overview of effects of COVID-19 on mobility and lifestyle: 18 months since the outbreak. *Transport Res Part A: Policy and Practice*.
- Patel JA, Nielsen FBH, Badiani AA, Assi S, Unadkat VA, Patel B, Wardle H (2020) Poverty, inequality and COVID-19: the forgotten vulnerable. *Public Health* 183:110
- Paul A, Nath TK, Mahanta J, Sultana NN, Kayes AI, Noon SJ, Paul S (2021) Psychological and livelihood impacts of COVID-19 on Bangladeshi lower income people. *Asia Pacific J Public Health* 33(1):100–108

- Pedrosa AL, Bitencourt L, Fróes ACF, Cazumbá MLB, Campos RGB, de Brito SBCS, Simões e Silva AC (2020). Emotional, behavioral, and psychological impact of the COVID-19 pandemic. *Frontiers Psychol*, 2635.
- Philpot LM, Ramar P, Roellinger DL, Barry BA, Sharma P, Ebbert JO (2021) Changes in social relationships during an initial “stay-at-home” phase of the COVID-19 pandemic: A longitudinal survey study in the US. *Soc Sci Med* 274:113779
- Pitas N, Ehmer C (2020) Social Capital in the Response to COVID-19. *Am J Health Promot* 34(8):942–944
- Pokhrel S, Chhetri R (2021) A literature review on impact of COVID-19 pandemic on teaching and learning. *Higher Educat Future* 8(1):133–141
- Pozo JI, Pérez Echeverría MP, Cabellos B, Sánchez DL (2021) Teaching and learning in times of COVID-19: Uses of digital technologies during school lockdowns. *Front Psychol* 12:656776
- Primecz H (2021) Radical changes in the lives of international professional women with children: from airports to home offices. *J Global Mobility: Home of Expatriate Manage Res.* 10:226
- Qiao M, Huang B (2022) Assessment of community vulnerability during the COVID-19 pandemic: Hong Kong as a case study. *Int J Appl Earth Obs Geoinf* 113:103007
- Quinn SC, Kumar S, Freimuth VS, Musa D, Casteneda-Angarita N, Kidwell K (2011) Racial disparities in exposure, susceptibility, and access to health care in the US H1N1 influenza pandemic. *Am J Public Health* 101(2):285–293
- Racionero-Plaza S, Vidu A, Diez-Palomas J, Gutierrez Fernandez N (2021) Overcoming Limitations for research during the COVID-19 pandemic via the communicative methodology: the case of homelessness during the spanish home confinement. *Int J Qual Methods* 20:16094069211050164
- Raesi A, Hajebi A, Rasoulian M, Abbasinejad M (2020) The effects of COVID-19 on mental health of the society: A dynamic approach in Iran. *Med J Islam Repub Iran* 34:102
- Rani U, Dhir RK (2020) Platform work and the COVID-19 pandemic. *Indian J Labour Econ* 63:163–171
- Rasul G, Nepal AK, Hussain A, Maharjan A, Joshi S, Lama A, Gurung P, Ahmad F, Mishra A, Sharma E (2021) Socio-economic implications of COVID-19 pandemic In South Asia: emerging risks and growing challenges. *Front Sociol* 6:629693
- Robinson L, Schulz J, Ragnedda M, Pait H, Kwon KH, Khilnani A (2021) An unequal pandemic: vulnerability and COVID-19. *Am Behav Sci.* <https://doi.org/10.1177/00027642211003141>
- Roesch E, Amin A, Gupta J, García-Moreno C (2020) Violence against women during covid-19 pandemic restrictions. *Bmj* 369
- Rodrigues M, Silva R, Franco M (2021) COVID-19: financial stress and well-being in families. *J Family Issues.* <https://doi.org/10.1177/0192513X211057009>
- Rodríguez-Hidalgo AJ, Pantaleó Y, Dios I, Falla D (2020) Fear of COVID-19, stress, and anxiety in university undergraduate students: a predictive model for depression. *Front psychol* 11:591797
- Saladino V, Algeri D, Auriemma V (2020) The psychological and social impact of Covid-19: new perspectives of well-being. *Front Psychol* 11:2550
- Seabra F, Abelha M, Teixeira A, Aires L (2021) Learning in troubled times: Parents’ perspectives on emergency remote teaching and learning. *Sustainability* 14(1):301
- Sharifi A (2022) An overview and thematic analysis of research on cities and the COVID-19 pandemic: toward just, resilient, and sustainable urban planning and design. *Science* 25(11):105297
- Sharifi A, Khavarian-Garmsir AR, Kummitha RKR (2021) Contributions of smart city solutions and technologies to resilience against the COVID-19 pandemic: a literature review. *Sustainability* 13(14):8018
- Silva AJD, Silva CCD, Tinôco RDG, Araújo ACD, Venâncio L, Sanches Neto, L Lazaretti da Conceição W (2021) Dilemmas, challenges and strategies of physical education Teachers-researchers to combat Covid-19 (SARS-CoV-2) in Brazil. In *Frontiers in Education* (Vol. 6, p. 200). *Frontiers*.
- Singh J, Steele K, Singh L (2021) Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post vaccine, & post-pandemic world. *J Educ Technol Syst* 50(2):140–171
- Smith ML, Steinman LE, Casey EA (2020). Combatting social isolation among older adults in a time of physical distancing: the COVID-19 social connectivity paradox. *Frontiers in public health*, 8, 403.
- Smith MD, Wesselbaum D (2020) COVID-19, food insecurity, and migration. *J Nutr* 150(11):2855–2858
- Sommerlad A, Marston L, Huntley J, Livingston G, Lewis G, Steptoe A, Fancourt D (2021) Social relationships and depression during the COVID-19 lockdown: longitudinal analysis of the COVID-19 Social Study. *Psychol Med* 52:1–10
- Stoian CE, Fărcașiu MA, Dragomir GM, Gherheș V (2022) Transition from online to face-to-face education after COVID-19: The benefits of online education from students’ perspective. *Sustainability* 14(19):12812
- Sumner A, Ortiz-Juarez E, Hoy C (2022) Measuring global poverty before and during the pandemic: a political economy of overoptimism. *Third World Quarterly* 43(1):1–17




- Sun YY, Li M, Lenzen M, Malik A, Pomponi F (2022) Tourism, job vulnerability and income inequality during the COVID-19 pandemic: A global perspective. *Annals Tourism Res Empirical Insights* 3(1):100046
- Susanto H, Fang Yie L, Mohiddin F, Rahman Setiawan AA, Haghi PK, Setiana D (2021) Revealing social media phenomenon in time of COVID-19 pandemic for boosting start-up businesses through digital ecosystem. *Appl Syst Innovat* 4(1):6
- Thomas DS, Jang S, Scandlyn J (2020) The CHASMS conceptual model of cascading disasters and social vulnerability: the COVID-19 case example. *Int J Disaster Risk Reduct* 51:101828
- Timing AR, French MT, Mortensen K (2021) Health anxiety versus economic anxiety surrounding COVID-19: an analysis of psychological distress in the early stages of the pandemic. *J Affective Disorders Rep* 5:100152
- Tirachini A, Cats O (2020) COVID-19 and public transportation: Current assessment, prospects, and research needs. *J Public Transp* 22(1):1
- Tisdell CA (2020) Economic, social and political issues raised by the COVID-19 pandemic. *Econ Anal and Policy* 68:17–28
- Toscano F, Zappalà S (2020) Social isolation and stress as predictors of productivity perception and remote work satisfaction during the COVID-19 pandemic: The role of concern about the virus in a moderated double mediation. *Sustainability* 12(23):9804
- Vaismoradi M, Turunen H, Bondas T (2013) Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nurs Health Sci* 15(3):398–405
- Van Dorn A, Cooney RE, Sabin ML (2020) COVID-19 exacerbating inequalities in the US. *Lancet (london, England)* 395(10232):1243
- Varma A, Jafri MS (2021) COVID-19 responsive teaching of undergraduate architecture programs in India: learnings for post-pandemic education. *Archnet-Int J Architectu Res* 15(1):189–202
- Venkatraman K, Manoharan A (2023) Public engagement as the fifth dimension of outbreak communication: Public's perceptions of public health communication during COVID-19 in India. *Health Commun* 38(2):285–297
- Villa R, Monzón A (2021) Mobility restrictions and e-commerce: Holistic balance in madrid centre during COVID-19 lockdown. *Economies* 9(2):57
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC (2020b) Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health* 17(5):1729
- Wang Y, Hong A, Li X, Gao J (2020c) Marketing innovations during a global crisis: a study of China firms' response to COVID-19. *J Bus Res* 116:214–220
- Wang C, Li Z, Clay Mathews M, Praharaj S, Karna B, Solís, P (2020a) The spatial association of social vulnerability with COVID-19 prevalence in the contiguous United States. *Int J Environ Health Res*, 1–8.
- Wassler P, Talarico C (2021) Sociocultural impacts of COVID-19: a social representations perspective. *Tour Manage Perspect* 38:100813
- WHO. (2021). WHO Coronavirus (COVID-19) Dashboard. World Health Organization <https://covid19.who.int/>
- Wilkinson A (2020) Local response in health emergencies: key considerations for addressing the COVID-19 pandemic in informal urban settlements. *Environ Urban* 32(2):503–522
- Woelfert FS, Kunst JR (2020) How political and social trust can impact social distancing practices during COVID-19 in unexpected ways. *Front Psychology* 11:57
- Wolfson JA, Leung CW (2020) Food insecurity and COVID-19: disparities in early effects for US adults. *Nutrients* 12(6):1648
- Wong AS, Kohler JC (2020) Social capital and public health: responding to the COVID-19 pandemic. *Glob Health* 16(1):1–4
- Wu C (2021) Social capital and COVID-19: a multidimensional and multilevel approach. *Chin Sociol Rev* 53(1):27–54
- Wu X, Li X, Lu Y, Hout M (2021) Two tales of one City: unequal vulnerability and resilience to COVID-19 by socioeconomic status in Wuhan, China. *Res Soc Stratificat Mobil* 72:100584
- Wu B (2020) Social isolation and loneliness among older adults in the context of COVID-19: a global challenge. *Global Health Res Policy* 5(1):1–3
- Xiong J, Lipsitz O, Nasri F, Lui LM, Gill H, Phan L & McIntyre RS (2020). Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affective Disorders*
- Yabe T, Tsubouchi K, Fujiwara N, Wada T, Sekimoto Y, Ukkusuri SV (2020) Non-compulsory measures sufficiently reduced human mobility in Tokyo during the COVID-19 epidemic. *Sci Rep* 10(1):1–9
- Yancy CW (2020) COVID-19 and African Americans. *JAMA* 323(19):1891–1892

- Yang Y, Peng F, Wang R, Guan K, Jiang T, Xu G, Sun J, Chang C (2020) The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *J Autoimmun* 109:102434
- Zhang J, Zhao W, Cheng B, Li A, Wang Y, Yang N, & Tian Y (2022) The impact of digital economy on the economic growth and the development strategies in the post-COVID-19 era: evidence from countries along the “Belt and Road”. *Front Public Health*, 10.

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