SYSTEMIC INEQUALITY, SUSTAINABILITY AND COVID-19

Edited by Seela Aladuwaka, Barbara Wejnert and Ram Alagan

RESEARCH IN POLITICAL SOCIOLOGY

VOLUME 29

SYSTEMIC INEQUALITY, SUSTAINABILITY AND COVID-19

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RESEARCH IN POLITICAL SOCIOLOGY VOLUME 29

SYSTEMIC INEQUALITY, SUSTAINABILITY AND COVID-19

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Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2022

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-80117-733-7 (Print)
ISBN: 978-1-80117-732-0 (Online)
ISBN: 978-1-80117-734-4 (Epub)

ISSN: 0895-9935 (Series)

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INVESTOR IN PEOPLE

With thanks, the editors dedicate this volume to COVID-19's essential workers, including medical personnel and our children, Sandhu, Camille, and Cyprian.

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ABOUT THE CONTRIBUTORS

Seela Aladuwaka is an Associate Professor of Geography at Alabama State University and serves as a member of the W.E.B. DuBois Honors Program Advisory Board at Alabama State University. Seela is a past recipient of the Fulbright Scholarship at the American University, Washington DC, where she had earned a Master's Degree in International Development. Her research focuses on Regional Geography, Gender and Development, poverty and microfinance, and poverty and health disparity, including health disparity in Alabama's Black Belt region. She has conducted research for nearly 25 years in Social Geography. She has published 23 papers in peer-reviewed academic journals and books, including most recently on (1) *A Geospatial Analysis of Superfund Sites, Ethnicity and Poverty in Alabama* in *FRONTIERS in Science, Technology, Engineering and Mathematics*, Alabama State University, 2019; and (2) *Women, Micro-Finance, and Repayments Challengers: Sri Lankan Experience*. A Handbook of Gender and Development. Ed. Anne Coles, Leslie Gray, and Janet Momsen, London: Routledge, 2015. She is also a co-editor of *Environment, Politics, and Society*, a special volume of the *Research in Political Sociology*, published by Emerald Press in 2018.

Ram Alagan is a Professor of Geography and the Interim Director of the W.E.B. DuBois Honors Program at Alabama State University. Dr Alagan's research focuses on GIS, Civil Rights GIS, Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Regional Studies and Heath Disparity, and Cancer Mapping. As a researcher and educator, Ram is a human-environmental geographer by training with more than 25 years of experience in GIS, Participatory GIS (PGIS), EIA, SIA, and regional development. During the last six years at ASU, he has been heavily involved in Health Disparity, Cancer, and Environmental Justice research using GIS and PGIS in minority communities (African American) in the Black Belt regions of the Southeastern United States. He has published and presented his research widely, including six coauthored recent publications. The two most recent coauthored publications are (1) *A Geospatial Analysis of Superfund Sites, Ethnicity and Poverty in Alabama* in *FRONTIERS in Science, Technology, Engineering and Mathematics*, Alabama State University, 2019; and (2) *Empowering the Disempowered through Civil Rights Geographic Information Systems: The Case of Black Belt Region of Alabama*. 25th Volume of Research in Political Sociology: *Environment, Politics, and Society*, Emerald Publication. Ram was a Fulbright Scholar to Ohio University, Athens, OH in 1994–1996.

Aristoteles Alencar received his medical degree at the University of Amazonas and his PhD in Public Health from the University of Sao Paulo. He is a Robert Wood Johnson Fellow – a training through which he learned about healthcare systems and community health problems in several countries in South America and in the United States. He is the Past President of the Amazonas Chapter of Partners of the Americas and participated in professional exchanges through which he observed medical treatment at Vanderbilt University Medical Center and in Department of Veteran Affairs facilities. Currently, he is a faculty member of the University of Amazonas Medical School in Manaus and the NIMBioS Foundation of the University of Tennessee, Knoxville. He has many publications in medical journals in Brazil and the United States. For over 30 years, he has been in private medical practice in Manaus, Brazil, and has witnessed as a clinician, academician, and community leader the severe impact of COVID-19 on the population of the Amazonian region and its healthcare facilities. This recent clinical experience with COVID-19 is detailed and analyzed through a public health framework in his paper, "The other Face of Covid-19." Dr Alencar's insights into the personal and community outcomes of COVID-19 inform and enrich our analysis of the Chilean situation.

Dariush Boostani is Associate Professor of Sociology in the Social Sciences department, college of literature and humanities at Shahid Bahonar University of Kerman, Iran, where he has been a faculty member since 2009. He completed his PhD and undergraduate studies at Shiraz University. His research interest is social problems, women studies, and social identity. One of his methodological interests is qualitative research, especially Grounded Theory. Most of his research has been carried out via this method.

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Sharon Everhardt is an Associate Professor of Sociology at Troy University. Her main research interests include the study of race, class, and gender, especially disenfranchised populations of women. In 2020, Dr Everhardt earned certification as an AACS Clinical Sociologist who helps organizations and institutions resolve social issues related to the human condition. She is currently researching the impact of horticultural programs on nutritional knowledge and food insecurity among female inmates in women's correctional facilities. She has secured over $75,000 in USDA funding to support her gardens projects.

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Dr Kamalaveni is an Assistant Professor at the Department of Women Studies. Her research focuses on women and health, gender empowerment, reproductive health, and women's empowerment. She has authored one book, published 30 research papers, and co-edited five books. She has guided three doctoral students, attended 25 seminars, workshops, conferences, orientation programs, refreshers courses, and training programs. She also served as a resource in 150 programs and addressed 30,000 college students, 2,500 school students, 1,000 rural women,

and 750 college teachers. She has coordinated 20 seminars, conferences, and training programs. She has completed two projects on women farmers and working women problems. Currently she is working on cervical and breast cancer awareness project.

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Fattah Hatami Maskouni is a Lecturer in the Department of Geography, University of Tehran. He holds an MS Degree in Remote Sensing and GIS from the University of Tehran (Geography Department). He has also taught Remote Sensing and GIS courses at different local universities as a lecturer. His current research interest is to use remote sensing techniques, GIS, and deep learning to investigate patterns of human behavior with respect to online data, technology, and new cyber movements.

Ligaya Lindio McGovern is a Professor of Sociology at Indiana University, USA. In Fall 2017, she received a Fulbright Fellowship to conduct research on the impact of corporate mining on the indigenous people in the Philippines from August to December. In collaboration with KATRIBU she interviewed 20 indigenous people affected by corporate mining during the Lakbayan (caravan) of the indigenous people in September 2017, where close to 3,000 indigenous

people came down to Metro-Manila. With the cooperation of ANNVIK and SAPAKKMI she also visited the open-pit mining site of OceanaGold in Didipio, Kasibu, Nueva Vizcaya. She was able to interview 14 indigenous men and women affected by the mining operations there. This paper is part of a book-length manuscript she has completed from her research that could be useful for the educational and informational campaign.

Manoj Mishra is a Professor of Biological Sciences at Alabama State University. Dr Mishra is the founding Director of Cancer Biology Research and Training and Freshmen Biology Programs at Alabama State University. Additionally, Dr Mishra's Cancer Biology Research and Training lab is currently supported by research and educational grants from the U.S. Department of Defense, National Institutes of Health, and National Science Foundation. He has several awards and recognition for his teaching and research. In 2015, he received the faculty of the year award at Alabama State University, and in 2013, he was selected as a top 25 professor among mid-sized universities in the United States. Dr Mishra has widely published his research findings in international and national medical and science journals. Dr Mishra's research interest focuses on broader areas of immunology, tumor biology, and health disparity in Alabama.

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Andria Moore received her BA in Journalism from Auburn University in 2016. She completed her Master's Degree in 2021 from the Walter Cronkite School of Journalism and Mass Communications in Digital Audience Strategy at Arizona State University. She has worked for the International Center for Journalists and has published as a journalist for *The Washington Post*, *Insider, The Lily* and the Motion Picture Association. Andria is currently a resident writer at Buzzfeed where she covers a variety of topics, including race, culture, health and wellness, and entertainment.

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Narratives of Life under Communism in Poland, Romania and Former East Germany, Poznań 2018; with Ch. Lavrence, Performing the Past, Poznań 2014.

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Barbara Wejnert is a Professor in the Department of Environment and Sustainability and Department of Global Gender Studies and a former founding chair of the Global Gender Studies Department at the University at Buffalo. She is an award-winning author of research papers specializing in political sociology, political economics, economic sociology, environmental sustainability, and gender. Her interdisciplinary, transnational research focuses on the worldwide diffusion of democracy and globalization and the effects of these changes on environmental sustainability and gender equality. She is an author and editor of 14 books, including *Diffusion of Democracy* published by Cambridge University

Press in 2014 (paperback edition in 2016) that received nominations for three academic book awards. She is an author of near 70 peer-reviewed articles in professional journals, including award-winning articles. In 2016 she received the prestigious Inaugural Arlene Kaplan Daniels Paper Award for a paper "Turning Globalization and the Diffusion of Democracy into Opportunities for Women and Girls." Her paper "Diffusion, Development and Democracy, 1800–1999" was honored by its presentation at the US Congressional Reception as a poster highlighting sociological research with national policy significance.

Camille Wejnert-Depue is a graduate student in Johns Hopkins University's MS degree program in Environmental Sciences and Policy, and also a Post-Masters Research Associate with Pacific Northwest National Laboratory and University of Maryland's Joint Global Change Research Initiative. He also holds a Master of Public Policy degree with a focus in Environmental Policy from American University in Washington, DC. Camille's current work revolves around decarbonizing the District Heating sector in many European countries. Professionally, Camille has worked as a Fellow with the American Lung Association, a Fellow with Montgomery County Maryland's Office of the Executive's Climate Team, and a Summer Intern with the United States Environmental Protection Agency Office of Air and Radiation.

PREFACE

Introduction to the Collection: Understanding the Scope of COVID-19 Effect on Social and Health Inequalities and on the Environment

The global spread of COVID-19 has had devastating effects on countries worldwide in terms of population health, economy, politics, and countries' sustainable development. This particular volume of Research in Political Sociology provides an opportunity to engage in a critical dialogue on the consequences and interactions of COVID-19 with social inequalities and environmental sustainability. The volume explores the pandemic's global devastating effects on countries' development, including populations' health, economy, and politics, and demonstrates COVID-19's impact on the environment. This book's chapters address how the pandemic amplified the already profound social inequalities in developed and developing countries and exposed limitations to environmental protection and vulnerabilities of ecological sustainability and environmental justice.

In particular, understanding that it is critical to determine the scope, magnitude, and scale of the COVID-19 pandemic effects on the most vulnerable groups, this volume addresses the pandemic's impact on countries' development, exploring the consequences and interactions of COVID-19 with social, economic, and health inequalities. Simultaneously the book addresses the problem of sustainability engaging in a dialogue of whether the sustainable development and environmental sustainability were jeopardized or enforced by the pandemic. Chapters of the volume represent studies conducted across major geographic regions from North America, and South America, to Europe, Asia, and the Middle East.

The volume is organized into two sections; the first section describes the effects of COVID-19 on social inequality, and the second focuses on environmental sustainability. Subsequently, the first part of the volume addresses the impact of COVID-19 on countries' development, exploring the consequences and interactions of COVID-19 with social inequalities concentrating on pandemic's exposure of the enduring social-economic and health inequalities existing across the globe. From Southeast Asia, South American to Europe and North America, the pandemic overwhelmingly impacted poor communities and disadvantaged minority populations. This section is organized into two subresearch categories (1) healthcare inequality and COVID-19, and (2) socio-economic inequality and COVID-19.

The first three chapters of the volume address interactions of COVID-19 with the systematic health inequalities. Unequal allocation of resources, inadequate access to healthcare service, and unfavorable to the poorer population healthcare

policies have created an unprecedented disparity among rich and poor populations' access the healthcare system across the world. Systematic inequalities in access to healthcare services are one of the leading factors responsible for the loss of millions of lives due to the COVID-19 pandemic. Subsequently, a paper by Aladuwaka, Alagan, and Mishra (Alabama State University, Montgomery, AL) and Wejnert (University at Buffalo, NY) demonstrates the effects of social determinants of health on outcomes of COVID-19 in Black Belt communities in Alabama. This paper uses geo-spatial analysis (Geographic Information Systems) to examine the association between COVID-19, social determinants of health, and the systematic health disparity to open a debate on the influence of poverty and racial inequality on outcomes of COVID-19 in the Black Belt region in Alabama. The Black Belt region is home to a predominantly African American population, with limited access to medical care and limited use of preventive healthcare services. As the authors claim, substantial poverty, limited economic resources, mistrust of healthcare professionals, and vaccine hesitancy amplified the severity of COVID-19 effects.

Continuing the focus on minority populations' unequal access to health care, Żaklina Skrenty, from Adam Mickiewicz University in Poznań, Poland, explores existing discrimination against the elderly in the Polish healthcare system and intensification of the unequal treatment of older patients during the COVID-19 pandemic. As the author argues, protective policies are urgently needed to prevent insufficient access to health care by the elderly population; measures are especially needed during health crises with more severe consequences to older populations. The need for policies correcting existing inequalities in the healthcare system also addresses Jagriti Upadhyaya from Sardar Patel University of Police, Security & Criminal Justice, Jodhpur, India, studying frontline healthcare workers in India. She demonstrates the irreplaceable role of community healthcare workers, the Accredited Social Health Activists (ASHA), whom the author considers the invisible frontline warriors of COVID-19. Moreover, Upadhyaya addresses discrimination against frontline healthcare workers in India, illustrating the ASHA workers' pivotal role in securing communities' access to health care during the COVID-19 pandemic but being rarely appreciated for their services and remaining underpaid by the administration of the Indian government.

Another timely research on healthcare policies and practices during COVID-19 are chapters discussing uneven healthcare and food distribution policies during the pandemic. In many countries, the lack of uniform healthcare policies added to the spread of the pandemic and augmented healthcare crisis. It generated distrust of the government and public confusion concerning public health safety measures and prevention, including mask-wearing requirements and availability of personal protective equipment (PPE). In particular, Rossi (Alabama State University) and Andria Moore (Arizona State University) explore "a naturalistic observation of mask-wearing behavior" during the COVID-19 2020–2021 pandemic in a southeastern town of the United States. Authors conclude that the mask-wearing requirement has generated an unprecedented hesitance among some groups in the U.S., believing that this requirement violates personal freedoms. Sunita George's (Western Illinois University, IL) study

focuses on unequal food distribution policies and food provision during the pandemic in Chennai, India.

Several chapters of this volume focus on social inequalities that broadened during COVID-19. The chapter by Jeeva Niriella, from the University of Colombo, Sri Lanka, discusses the critical issue of gender-based violence and COVID-19. Niriella's research mainly focuses on the legislative and judicial measures for protecting and supporting victims of domestic violence in Sri Lanka during the COVID-19 situation. Kamalaveni from Bharathiar University in India explores gender relations and gender inequality within administrative institutions. Using case studies from private and public institutions in India, Kamalaveni assesses the perpetuation of gender discriminatory practices among the members of institutional committees and the dynamics and constitution of internal committees in government and private offices magnified during the pandemic. Naima Mohammadi (Padova University, Italy) and Fattah Hatami (University of Tehran, Iran) discuss the experiences, seclusion, and discrimination of married Muslim women resorting to online dating sites for psychological support during the COVID-19 pandemic. Finally, a paper by Malik, Prakash, and Suman addresses growth of existing social inequalities among disadvantaged populations, i.e., the rural, impoverished communities in India showing the "Impact of Covid-19 on Employment in Himachal Pradesh" addressed a critical aspect of COVID-19 and economic disparity in India.

The second part of the volume focuses on sustainability, including environmental sustainability and practices of sustainable living as affected by the spread of COVID-19. A chapter by Camille Wejnert-Depue from John Hopkins University focuses on ecological sustainability exploring two examples of biodiversity loss (1) the tragedy of the commons and (2) deforestation. The author provides potential policy solutions to combat the tragedy of the commons and deforestation, especially while considering implications of the COVID-19 pandemic on biodiversity supportive policies and their execution. Following the sustainability topic, Profs. Jauk, Gill, and Everhardt with graduate student Caruana argued that the global spread of COVID-19 continues to have devastating effects in all the world's societies, and it has also exacerbated existing social inequalities within the US carceral complex. Authors demonstrate the inequality while providing a sociological exploration of women's prison gardens in pandemic times.

A chapter by Ligaya Lindio McGovern from Indiana University (USA) examines the interconnection between environmental sustainability and sustainable development. She argues that countries' sustainable development must include human rights observed by political regimes, including economic, social, cultural, and political rights and environmental rights. Nevertheless, as the author argues, in the Philippines, the experience of indigenous communities with corporate mining shows a tremendous disjuncture between environmental sustainability and human rights and sustainable development. The indigenous people's fundamental, inalienable rights are set aside, violated as if they do not matter. Such violations put barriers to realizing the U.N. 2030 Sustainable Development Goals (SDGs), and these barriers are particularly highlighted during the COVID-19 pandemic. While COVID-19 provides a risk to people's

health, militarization, and suppression of dissent movement defending rights of indigenous populations compound the risk to health with an extreme violation of indigenous populations' right to life.

The sustainable development issue is addressed in a paper by James Linn from the U.S., Jorge Chuaqui University of Valparaiso, Chile, and Aristoteles Alencar from the Federal University of Amazonas, Brazil, exploring Chile's political and economic sustainable development during COVID-19. In particular, the authors provide a comprehensive description and in-depth analysis of Chile's COVID-19 pandemic and political crisis, considering a structural analysis of the Chilean economy and discussing how Chileans in different social strata are coping with both COVID-19 and the social revolution. Similar in character is a paper by Izabela Skorzynska, from Adam Mickiewicz University, in Poland, reflecting on whether today's consumer attitudes promoted and practiced as the pursuit of sustainable development have their genealogy in the everyday life of Polish women. Skorzynska argues that women's past practices of sawing wardrobe, canning, and economic frugality that constituted a segment of living conditions during communism can teach a lesson on using modest resources frugally and inventively, to ensure sustainable development living. The author asserts that old everyday practices of saving resources through ingenious, creative use are returning to favor in a time of sustainable development. With the awareness of contemporary civilization threats, their usefulness may once again turn out to be helpful for humanity.

Overall, this volume contributes to studies on this extraordinary moment in human history using a global perspective. Such analyses are vital to understanding countries' progress during and after the pandemic to build a future where opportunities and advancement rise for all and environmental sustainability flourishes.

Seela Aladuwaka
Barbara Wejnert
Ram Alagan

PART I

HEATH AND SOCIAL INEQUALITY AND COVID-19

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SOCIAL DETERMINANTS OF HEALTH DISPARITIES AND COVID-19 IN BLACK BELT COMMUNITIES IN ALABAMA: GEOSPATIAL ANALYSES

Seela Aladuwaka, Barbara Wejnert, Ram Alagan and Manoj Mishra

ABSTRACT

The COVID-19 pandemic has impacted every community across the globe, but the global COVID-19 data show that the United States remains the most affected country where well over 666,000 people died, and approximately 40 million citizens became ill due to the virus' spread by mid-2021 (CDC, 2021). It is also noteworthy that extreme racial disparities in rates of COVID-19 cases and deaths are high in the United States, specifically among African American population. This situation is particularly evident among African American population in Alabama's Black Belt. Subsequently, COVID-19, racial disparities, and health inequalities have become central to the national and regional conversation. This chapter examines the associations between COVID-19, social determinants of health, and the systematic health disparity in African American population in Alabama's Black Belt region using Geographic Information Systems and the concept of uneven spatial development. Understanding the relationship between COVID-19 and these disparities within a spatial context vital to developing pathways to overcome the pandemic's effects and combat the systemic discrimination in this region. The derived policy recommendation could apply to other regions experiencing social inequality and health disparity.

Systemic Inequality, Sustainability and COVID-19
Research in Political Sociology, Volume 29, 3–32

ISSN: 0895-9935/doi:10.1108/S0895-993520220000029005

Keywords: COVID-19; GIS; uneven development; African American community; inequalities; Black Belt region

INTRODUCTION

The COVID-19 global pandemic has exceeded 228 million cases and is approaching 4.7 million deaths worldwide (worldometers.info, 2021). Not only has the global pandemic affected every aspect of human existence but also altered and transformed human relationships, economy, and politics around the globe, the tragic cost to human lives and diminished health conditions for millions foreshadow weakness in global public health. The enormous societal and economic costs underline the magnitude of current and future challenges.

Undoubtedly the pandemic has left scars worldwide; however, the United States remains the most impacted country, reaching over 45 million cases and 721,000 COVID-19 related deaths in October 2021 (CDC, 2021; worldometers.info, 2021). In the United States, it is also noticeable that racial disparities in rates of COVID-19 cases and deaths are substantial. Several scholars and policymakers underscore that African Americans are most affected compared to other ethnic and racial groups. This group includes African Americans living in southern states, especially in the Black Belt region.

The Black Belt region is located in the southeastern part of the United States, and it extends from Virginia on the Atlantic coast to the state of Texas in the mid-south part of the country. The name Black Belt refers to the black, rich soil in this region, historically known for its economic dependency on agricultural production and long history of enslaved labor of black people who used to work on the southern plantations. It is also a region of low social and economic development, high poverty level, and profound health inequalities. This region is home to a large African American population.

In Alabama, the Black Belt region passes through the south-central part of the state in the east-west direction. As in other Black Belt counties, most of Alabama's Black Belt countries residents are African Americans; for example, in Green County, 81% of the population are African Americans, in Summer County 71%, in Wilcox 72%, and in Lowndes 75%. A large part of Alabama's Black Belt residents lives in rural communities (41%). Alabama's Black Belt region is unique by its cultural, socioeconomic, historical, and political characteristics, with vibrant and deep intersecting social and cultural heritage layers. Nevertheless, it is also a region marked by a high concentration of poverty, substantial discrepancies in economic opportunities, racial inequality, and health disparities. This region also exceptionally high in cardiovascular diseases, obesity, cancer, diabetes, and other chronic diseases. Many scholars claim that the root causes of these health issues are mainly systematic racial discrepancies in economic, social opportunities, and health protection (e.g., Lopez, Hart, & Katz, 2021). The current COVID-19 pandemic worsened these health disparities.

The severe effects of COVID-19 on African American communities in Alabama's Black Belt region indicate the pandemic's interactions with socioeconomic inequalities, the process called the effect of *Social Determinants of Health*

(SDH) on health disparity. According to the World Health Organization (2021, p. 1), SDH are "the non-medical factors that influence health outcomes." These include "the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life." According to the US Department of Health and Human Services (2020a), several indicators measure aspects of SDH, including economic stability, education, general wellbeing, access to healthcare, housing quality, food quality, and the conditions of the surrounding natural environment. The American College of Cardiology Magazine (2020) explains that the SDH influences the level of mortality, morbidity, life expectancy, health care expenditures, socioeconomic status, and functional limitations of the community. Socioeconomic status is perhaps the central concept that determines the velocity and strength of effects of social determinants on people's health (Stringhini et al., 2017). The socioeconomic status is controlled by income distribution, financial and other resources, and economic and professional opportunities. The SDH, therefore, are not uniformly distributed across states or countries; instead, they are dispersed unequally, leading to the unequal spatial development of communities where underrepresented minority communities encounter hardships without essential economic, social, and health support systems.

Indeed, in the United States, the pandemic and its recovery further highlight disproportionate impacts of COVID-19 on historically marginalized communities, including African Americans. In Alabama's Black Belt counties, African Americans experience significantly higher infection rates, hospitalization, and deaths than the more privileged, usually white population (Lopez et al., 2021). Even though the explanations of root causes of health disparities rarely address economic and racial inequalities and uneven geographical (spatial) development of a region, the outcomes of the COVID-19 pandemic illustrate the magnitude of SDH's destructive effect on African American communities, including in the Black Belt region of Alabama (Maness et al., 2021). The high level of poverty, low standards of living, deprived socioeconomic conditions, shortage of economic opportunities, limited economic resources, and the limited number of health care facilities led to a higher number of COVID-19 cases and deaths in Alabama's Black Belt communities. Unsurprisingly, scholars argue that an "increase [in] the possible exposure to, and higher death rates from, COVID-19 among African American people across the United States" attest to the effects of systemic racism (Maness et al., 2021, p. 18). Such statements are consistent with the US Department of Health and Human Services (2020b, p. 28) definition of health disparity as "a particular type of health difference that is closely linked with social, economic, and environmental disadvantage." Health disparities, therefore, adversely impact people of color in the United States. They have systematically experienced obstacles in obtaining high-quality health care support because of their racial or ethnic characteristics, religion, socioeconomic status, geographic location, and other socioeconomic causes linked historically to discrimination and exclusion.

Indeed, Alabama's Black Belt region has some of the highest health disparities in the nation that result from a long-standing low social and economic

development and limited economic and social resources, magnified by prolonged racial discrimination. Specific discrepancies in available resources and opportunities include deficiency of proper public transportation, low number of ownerships of private cars that could transport family members to medical facilities, limited educational opportunities, a limited number of medical personnel per population's size, and limited number of health centers and hospitals across Black Belt counties. Studies have shown that the unequal distribution of resources and limited access to health care facilities have lasting effects on the community's health, especially those living in poor social and economic conditions (Rollston & Galea, 2020). The health care inequality, low access to nutritious food, unemployment, low access to transportation, and poor living conditions augment the impact of SDH on outcomes of COVID-19 across Black Belt communities.

Additionally, the deep division in public attitudes between pro and anti-vaccination stems from mistrust of government, misleading social media information, and countrywide political divisions, further enlarges the profound impacts of the COVID-19 pandemic on minority communities in Alabama, regardless of readily available COVID-19 vaccines. According to the Alabama's COVID-19 Dashboard Hub (2021), although 6.3 million Alabama received COVID-19 vaccine doses, only 4.2 million in Alabama have been fully vaccinated (Alabama Department of Public Health, 2021). Hence, despite the significant advancements in health care in the United States, the disparity in vaccination rate augments the uneven effects of COVID across Alabama's population (Alabama College of Osteopathic Medicine, 2020; Alabama Department of Public Health, 2021).

Moreover, most of the minority communities impacted by COVID-19 are front-line service workers, also called essential workers, with limited opportunities to work remotely, e.g., employed in sales, restaurants, transportation, grocery shops, and other in-person customer services. Thus political, cultural, historical, and economic factors and personal hesitance to vaccination have played a significant role in high COVID-19 infection rate and in making a recovery unwieldy across counties of Alabama (Alabama College of Osteopathic Medicine, 2020; Alabama Department of Public Health, 2021). Unsurprisingly, health disparities are brought to the center of public and policy discussions nationally and in Alabama, and it is expected that recovery from COVID-19 in the Black Belt region would be more challenging than in other Alabama's regions. The Black Belt communities need a sustainable solution, argue health experts from CDC (2021) and the Alabama Department of Public Health (2020), to protect minority populations from health catastrophe.

The rural-urban division marked by *uneven spatial development* and unequal distribution of health care facilities and medical centers enlarges the existing disparities. The majority of rural communities in Alabama Black Belt counties where predominantly African Americans live are located far from health care centers. Rural populations, therefore, experience higher levels of severe illness and death during the COVID-19 pandemic in part due to insufficient access to primary health care facilities – a tragic outcome of residency in less affluent areas. Also, hospitals are being closed at alarming rates across the Black Belt region.

Archibald (2019) observed that out of over 12 hospitals closed in Alabama since 2000, the majority were in rural communities. Therefore, the concept of *uneven spatial development* offers an additional critical lens to examine the systemic health discrepancies in the Black Belt region that led to uneven outcomes of COVID-19 across the Alabama state.

On a microscale, the discrepancies mirror an uneven pattern of spatial development (Slater, 1975) across the United States, where the Southern regions remain far behind the Northern or West coast states in terms of development of socioeconomic and industrial infrastructures, economic opportunities, and medical infrastructures, all of which determine regions response to the health crisis, including the recent pandemic (Manduca, 2021). The pandemic's wake reveals how deeply ingrained socioeconomic and historical obstacles to healthy wellbeing are in the Black Belt region. Thus, it is vital to recognize the historical, racial, cultural, and social conditions that shape the spatial development of this region. The spatial development lenses help contextualize development trends among various communities and pinpoint the weakest links in social, economic, and medical infrastructures.

This chapter aims to examine the relationship between COVID-19, effects of SDH on health disparities, and *spatial development* of communities in Alabama's Black Belt region, arguing for the detrimental role of SDH in recovery from the outcomes of the COVID-19 pandemic. Understanding the relationship between COVID-19 and effects of SDH and spatial development on health disparities present a critical step in helping to strive to end the existing effects of COVID-19 and persistent health problems (including the high rate of cancer, diabetes, cardiovascular diseases, obesity, and other chronic illnesses) in African American communities in Alabama. Understanding these relationships is also vital to developing future pathways to overcome the long-term pandemic's effects and combat the systemic discrimination that persists in this region. This chapter employs Geographic Information System (GIS) and the concept of uneven spatial development to assess the effects of social determinants (SDH) on the outcomes of COVID-19.

DATA AND METHODS

Geographic Information System and Population Health Data

The GIS has become a state-of-the-art technology in understanding health care, social inequality, and health policy problems during the last four decades.[1] According to the ESRI (2021), the GIS improves the acquisition of timely, accurate, and relevant information, which is necessary for effective and high-quality health care services. It includes geospatial technology applications for strategic planning, protection, access, location, and community relations. These are all critical aspects that health care improvement depends on. For example, the GIS enhances locating health care facilities, estimates demand for a new service, provides information about distances between communities' households and health care facilities, and maps the availability of health services. It is currently

one of the most effective technologies that use health care, community data, and health care infrastructure data to assist the decision-making process regarding public health. According to the World Health Organization of Regional Office for the Eastern Mediterranean (2007), health mapping supports and indicates the plans, procedures, and mechanisms needed to integrate spatiality as the common determinant that integrates health and community data. The organization also underlines that combining data sets reveals insightful causal links between the distribution of diseases and accessibility of health care services.

The GIS refers to the concept of geographic location. The severity of health issues and the ability to combat illnesses drastically differ between countries and regions within any country. As research shows, whether a region is urban or rural, humid, or arid, the spatial location changes the illness patterns, life expectancy, mortality rate, and population's wellbeing. The GIS can utilize various information and display the interconnectivity of the population's health, health care systems, and unequal distribution of socioeconomic and financial resources, accurately projecting the challenges and opportunities for sustainable health care actions.

Khashoggi and Murad (2020) underline that research has been conducted for decades to comprehend this spatial relationship between health care systems and geographical location, which has led to identifying healthcare policies and development planning. Since GIS can produce location-based decision-making models, addressing such issues has become a much more accessible and easier task in the epidemiological examination. According to Sara and McLafferty (2003), the GIS, by capturing, managing, analyzing, and displaying data, provides a solid foundation of spatial analysis explaining the changing spatial organization of health care support that informs decision-making concerning health provision. Health data maps and GIS information are essential resources for health care policy planning and service delivery, particularly at the local level (Hanjagi, Srihari, & Rayamane, 2006).

The spatial analysis nature of the GIS thus opened opportunities for the enhancement of medical research with significant public health consequences. The GIS employed in epidemiological research allows finding successful and most sustainable solutions to the existing health problems. Noticeably, an exploration of the relationship between social conditions and COVID-19 data in a spatial context is vital to a broader understanding of the ongoing health care challenges during the pandemic, mainly because effects of COVID-19 on the population's health vary across the geospatial location. Showing distance and direction of cases of illnesses and death in a given community is imperative to the assessments of sufficient provision of health care support at the time of pandemic and a critical source for mobilizing community action to improve the health of residents. The use of GIS helps understand the spatial distribution of health disparities and provides answers to why, where, how, and when health disparity occurs. As discussed in the prior section of this chapter, the spatial distribution of sufficient health care support lacks in the Black Belt region of Alabama, adding to already significant health disparities generated by the Social Determinants of Health (SDH).