

The Changing Face of COVID-19



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Abstract Ever since it began in 2019, the COVID-19 pandemic has been continuously evolving. Simultaneously, our understanding of the virus and its pathogenesis has advanced significantly. The authors track the changes that the pandemic has undergone over the last two years. In addition, they provide an overview of the chapters in the book which cover the health, economic, political, and educational dimensions of COVID-19 in several different countries.

Introduction

The novel human Coronavirus Disease 2019 (COVID-19) was first reported in Wuhan, China, in 2019 and rapidly spread globally to become the fifth documented pandemic since the Spanish flu in 1918. As on January 2021, COVID-19 had infected nearly 300 million people and caused more than five and a half million deaths across almost 200 countries [1]. Numbers of infections are breaking records almost every day and a constant pandemic threat with new mutations of the viral agent (SARS-CoV-2) continues to create and reveals a myriad of socio-economic and human security challenges.

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The Initial Response

The earliest cases of COVID-19 were documented on December 31, 2019. At the time, the World Health Organization (WHO) was informed of cases of pneumonia in Wuhan, China, with no known cause. On January 7, 2020, the Chinese authorities identified a novel coronavirus, which they temporally named 2019-nCoV, as the cause of the recently reported pneumonia cases. Four weeks on, on January 30, 2020, the WHO declared the rapidly spreading COVID-19 outbreak as a Public Health Emergency of International Concern. A few days later, on February 11, 2020, the novel coronavirus got its official name, COVID-19. Nine days later, the US Centers for Disease Control and Prevention (CDC) confirmed the first COVID-19 death in Washington State in the United States [2].

Emergence of the COVID-19 Pandemic

In the initial days, global health professionals, government authorities, and citizens were unsure of how the infection would spread and how it would impact daily life. On March 1, 2020, the United Nations disbursed USD 15 million to support the response to COVID-19. In just a week, on March 7, 2020, cases of COVID-19 reached 100,000. Days after that, on March 11, 2020, COVID-19 was declared a pandemic by the WHO. Thus, COVID-19 transformed from being a public health concern seemingly confined to China to a global health emergency in a matter of days.

During this period, the situation in Wuhan had been diffused to an extent following unprecedented lockdown measures affecting almost a billion people, to reign in the virus. At the start of the outbreak, China was seeing thousands of new infections a day, which had dropped to dozens by March 2020. In Europe, on the other hand, cases were rising sharply, with Italy reporting a record number of 250 deaths in a 24-h period between March 12 and March 13, 2020. As a result, on March 13, 2020, the WHO declared that Europe had become the epicenter of the COVID-19 pandemic. On the same day, the US declared a state of public health emergency [2].

The Race to Develop a Vaccine

In response to the pandemic, lockdown measures were put in place globally with varying degrees of restrictions in countries achieving different degrees of success to contain the spread of the virus. The impact of these lockdowns crippled economies. Some countries went to the other extreme adopting starkly contrasting strategies based on protecting the economy at the cost of higher infection and mortality rates. For example, Brazil, which defied lockdowns, had 50 cases of COVID-19 on 11

March, 2020 and in just 63 days this figure reached 177,589 cases [3]. Widespread social distancing and travel restrictions were enforced in March 2020 along with proper hand washing guidance issued by WHO. However, these measures promised only to slow rather than arrest the spread of the virus. Scientific and medical communities pointed to the urgent need to develop a vaccine in order to overcome the pandemic. A significant hurdle to achieving this, though, was that the fastest a vaccine that has ever developed, the mumps vaccine in 1967, took four years. Nevertheless, it was apparent that a post-COVID-19 world would certainly include some sort of an immunization program. The first COVID-19 human vaccine trials began with the Moderna mRNA vaccine on March 17, 2020.

Vaccine development is a long and arduous process often taking decades to achieve. But with imminent concern surrounding the COVID-19 pandemic putting unprecedented pressure on global healthcare systems and economies, exceptional measures were deployed to support vaccine development. Through a series of announcements beginning on March 30, 2020, the U.S. Department of Health and Human Services (HHS) started a program they called “Operation Warp Speed” (OWS), in an attempt to expedite COVID-19 vaccine development.

The crucial piece of OWS, beyond allocating large funding for vaccine development and research, was that it fundamentally changed how pharmaceutical and biotechnology companies assess the risk of conducting large-scale clinical trials on a brand-new vaccine. This was achieved through the HHS putting in place the requisite infrastructure and guaranteeing the manufacture of any successful vaccine candidates. It also bought allotments of the vaccines prior to knowing whether any of the OWS-funded companies would be successful. Since putting vast resources into manufacturing billions of doses of a vaccine which is still in the infancy of its development would be unviable for pharmaceutical companies, the HHS’ decision to substantially free this process of risk in order to expedite the development of candidate vaccines proved to be a game-changer [4].

As many around the world were preoccupied with bearing the brunt of the first wave of the pandemic, COVID-19 vaccine development quickly began. It was clear that initial restrictions were not sufficient to stop the spread of COVID-19. Quickly, lockdowns in most regions became more stringent, with the UK enforcing a stay-at-home rule on March 26, 2020. Many European countries implemented their own national lockdown measures around the same time. By April 2, 2020, the total number of global COVID-19 cases climbed to one million. The seriousness of the pandemic came into sharp focus with this number, and governments raced to do what they could to slow the spread of the virus before a vaccine could be developed and declared safe for human use. On April 6, 2020, the WHO announced guidance on mask wearing, as increased evidence pointed to the role of aerosols in the spread of the disease [2].

New Variants and Changing Pandemic Dynamics

Over the Summer of 2020, many countries experienced a drop in cases, hospitalizations, and deaths as a result of restrictions imposed to prevent the spread of the virus. However, toward the end of the Summer, in August of 2020, the Lambda variant was first detected in Peru. A month later, the Alpha variant was first found in the UK in September 2020. The Beta strain surfaced in South Africa and the Gamma variant was identified in Brazil soon after. New naming conventions for the variants were established by the WHO as an alternative to names based on numbers and countries to avoid public confusion and stigma. The discovery of these variants demonstrated that the virus was evolving. As a result, symptoms, disease severity, and outcomes were changing, as well [2].

With the emergence of new variants, cases of COVID-19 began to rise dramatically in many countries. In late 2020, the Delta Variant, which was first detected in India, swept rapidly through that country and the U.K. before reaching the U.S., where it quickly spread. It was until late 2021, the predominant SARS-CoV-2 variant accounted for more than 99% of COVID-19 cases (at the time) and spiraling overwhelming numbers of hospitalizations [5]. Delta is believed to be more than twice as infectious as previous variants, and research shows that it may be more likely than the original virus to result in hospitalizations [6].

Efficacy of Multiple Vaccines

Shortly after the Delta variant was first identified, concerns over the potential increased transmissibility of the variants, fueled by a rise in cases in some countries such as the UK, forced many governments to reinstate lockdown measures. However, efforts to develop vaccines in record time, underway simultaneously, began to reap results. On November 9, 2020, trials demonstrated the Pfizer and BioNTech vaccines to be over 90% effective and safe. The Moderna vaccine was also approved just a week later. The UK became the first Western country to license a vaccine against COVID-19. The Pfizer/BioNTech vaccine was authorized for emergency use by the Medicines and Healthcare Products Regulatory Authority or the MHRA in the U.K. The vaccine was initially given to those most at risk. On November 23, 2020, the University of Oxford's AstraZeneca COVID-19 vaccine was also shown to be effective. Finally, on December 31, 2020, the WHO issued its first emergency use approval for a COVID-19 vaccine, making the Pfizer/BioNTech vaccine the first to be available for use. The emergency validation was seen as a positive step toward making COVID-19 vaccines globally available, an important move toward ending the pandemic.

Soon after, the Moderna vaccine and the Oxford/AstraZeneca vaccine were approved for use, and national vaccine roll-out initiatives began with full force. By April 27, 2021, one billion COVID-19 vaccine doses were administered. While

it is clear that continued roll-out of vaccines in all countries is vital for bringing the pandemic under control and preventing future outbreaks, vaccine inequity, vaccine hesitancy, misinformation, and denialism remain critical barriers to the uptake of the COVID-19 vaccine. People who are not vaccinated are most at risk, and the highest spread of cases and severe outcomes is happening in places with low vaccination rates. This could prolong the pandemic and also raise the risk of further mutations of the virus, possibly undermining the efficacy of existing vaccines in the process [7].

Regulators are expected to authorize, approve, and license several more COVID-19 vaccines for human use in the near future. Yet, having licensed vaccines is not enough. They also need to be produced at scale, priced affordably, and equitably distributed globally so that they are available where needed and are widely deployed in local communities while keeping with their efficacy and validity requirements. Promoting knowledge about vaccines, boosting community awareness, and building trust are essential measures needed to mitigate vaccine hesitancy and refusal. While the COVID-19 pandemic has made a significant impact on preventive healthcare through enforced distancing and lockdown measures, self-care strategies, such as mask wearing and hand washing, and vaccine mandates and penalties have been rapid and predominantly accelerated by global politics, policies, and economics. Developments in COVID-19 treatment, also underway, have been slower and largely focused on decreasing viral load and limiting disease severity.

Virus Variants Continue

On November 26, 2021, the WHO delved deeper into the Greek alphabet to declare Omicron a new SARS-CoV-2, a Variant of Concern (VOC) [8]. Limited evidence to date indicates that Omicron is more infectious, evades prior immunity to a greater degree, and causes less severe disease, all relative to the, thus far, dominant Delta Variant [9]. The WHO warns that the two variants can combine and cause what it calls a “Tsunami of infections around the world”. Despite this, the Director General, Tedros Adhanom Ghebreyesus, believes the pandemic could end in 2022 if countries work together. Overcoming the acute stage of the pandemic and building on health and human security will mean sharing successes and failures faster, while ensuring equity, and wider access to vaccines and new treatments, while sharply departing from pro-nationalistic policies.

Before the emergence of Omicron, the past months have witnessed global debates about the importance of vaccine mandates, the adoption of vaccine passports, testing requirements, mask mandates, limitations on social gatherings, and travel restrictions. Societies have been trying to find consensus through the transition of the pandemic and multiple waves of infection, with some maintaining minimal public health restrictions in the face of rising case counts and others reinstating more stringent lockdown measures. Achieving some degree of global consensus on public health measures, cooperation, and global solidarity will, undoubtedly, be an important step toward curbing the pandemic, addressing its impacts, and preparing for

potential future pandemics. The future of the COVID-19 pandemic, which is in its third year now, depends on the ways in which societies respond together. Much can be learned from the story of the COVID-19 pandemic, and many hope lessons learned will prepare us for future infectious disease outbreaks to prevent future pandemics.

This book makes a unique contribution to the field to expand our understanding about the pandemic by encapsulating diverse, global perspectives and responses about the multitude of pandemic dimensions and its dynamics.

Context of the Book

The pandemic has evolved significantly since the first book on COVID-19 entitled “Health Dimensions of COVID-19 in India and Beyond” was written by the authors [10]. In this section, the multiple health, economic, political, and educational aspects of the pandemic in several different countries are summarized. In this edited volume, the authors have contributed chapters on a range of factors related to COVID-19. These include the health system response to the pandemic by improving the resilience of the healthcare workforce, employment of the systems approach, implementing women-led maternal and child health services, setting up a sustainable health system, and organizing a comprehensive care approach to stem the pandemic. The impact of the pandemic on education is examined. The economics and politics of COVID-19 are discussed with a focus on its economic impact, socio-economic disparities, and long-term impact. COVID-19 vaccination programs and vaccine equity are analyzed. The authors have contributed chapters on media and communications including media consumption and audience perceptions and concerns, the impact of social media, and communications to reach vulnerable populations. The authors discuss the special problem of vulnerable populations focusing on the unprecedented rise in suicides, experience of asylum seekers, stigma and discrimination, and the impact of COVID-19 on adolescents. In addition, the authors present the COVID-19 experiences of several countries including the United Kingdom, Ethiopia, Mexico, Iran, Brazil, and Taiwan. The chapters of this book contain data and content that were accurate up to 2021, but significant changes have occurred since then. The authors made every effort to provide the most up-to-date information related to their respective topics before submitting their final drafts to the publishers.

Health Systems Response

The COVID-19 pandemic generated an unexpected and unprecedented impact on health service systems. Its impact was greater in low- and middle-income countries where the health systems are more fragile. Governments designed several health strategies in response to the onslaught of the pandemic. The authors discuss these strategies as well as the experiences of countries with these programs.

Addressing the Urgency and Magnitude of the COVID-19 Pandemic in India by Improving Healthcare Workforce Resilience

Bulbul Sood and co-authors examine the problems caused by the sudden surge in COVID-19 cases during the second wave and highlighted India's lack of preparedness for critical care requirements in terms of infrastructure and human resources. It is the need of the hour to make efforts to build resilient and responsive health systems that are well-prepared to handle the current COVID-19 pandemic and similar future threats. The challenges in the healthcare system during the second wave of COVID-19 included overstressed human resources in tertiary facilities, lack of trained healthcare workers, inadequate infrastructure at secondary-level facilities, and a shortage of beds, ventilators, medicines, and other requirements for tertiary-level care. Other challenges were lack of resources/capacity for setting up intensive care units (ICUs), unutilized ICU equipment at secondary-level facilities, and lack of operational planning, coordination, and support.

Through the United States Agency for International Development (USAID) supported Reaching Impact, Saturation, and Epidemic Control (RISE) Program, Jhpiego is providing technical assistance in 20 states across India to respond to the urgency and magnitude of the second wave of COVID-19. It is identifying areas and modalities of implementation and aligning these to the country's response to the surge. The project's focus is on health system preparedness for present and future waves of COVID-19 including activities for strengthening critical care services, medical oxygen management, strengthening molecular testing laboratory, strengthening the health system to respond to future waves, and enabling effective planning and management of critical logistics. This is being done in coordination with the Government of India (GoI) and state governments and by involving both public and private sector/faith-based institutions and non-government organizations (NGOs).

Comprehensive Care Response and Systematic Management of COVID-19 in Querétaro, Mexico

Adriana Aguilar Galarza and co-authors analyze the health impact of the pandemic in México. They focus on the state of Queretaro and examine the social conditions of the population and health policies implemented at the federal and state levels as well as in the Universidad Autonoma de Queretaro.

The work is presented in three parts: In the first part, epidemiological data referring to the prevalences, incidence, and mortality from COVID-19 in Mexico and Querétaro are presented. In the second part, the epidemiological panorama of Queretaro is presented as an analysis tool to direct the epidemiological behavior of the pandemic in the population. And the social, economic, and health conditions in the state are analyzed. Finally, in the third part, health policies implemented by the state

university, including the experience of an integrative care model implemented in the “*Clinica de Atencion Integral COVID*” which provides multidisciplinary assessment and treatment of COVID-19, are presented.

Bridge over Troubled Waters: Women-Led Community Response to Maternal and Child Health Services in India Amidst COVID-19

Aastha Kant and Avishek Hazra discuss the problems caused by the pandemic on the delivery of essential health services in general and reproductive, maternal, newborn, child health, and nutrition (RMNCHN) services in particular. They argue that the degree of disruption varies disproportionately. It is more in low- and middle-income countries than in high-income countries. Focusing on India, the authors draw on various demand and supply side factors that hampered RMNCHN service provision and thus adversely affected many families across the country. Coupled with the gendered aspects of the social determinants of health, the pandemic intensified social vulnerabilities by impacting pregnant and lactating women and children the most. Modeling studies suggest that the progress India made over a decade on various maternal and child health and nutrition indicators could go in vain unless focused efforts are made to address this slide. Complementing government efforts to mitigate the health risks of the pandemic by strengthening disrupted health services, community initiatives have played a promising role. Some of the women-led initiatives portray how women’s collectives and women in leadership could be like a bridge over troubled waters in the times of a pandemic.

COVID-19: An Accelerant to a Sustainable Health System in Kenya

Daniella Munene discusses supply chain inadequacies, human resource constraints, and pervasive false narratives that misinform the public. The COVID-19 pandemic directed our individual and collective focus on the adequacy of our health system. Was it resilient enough? Had the deficiencies that we were seeing been there all along? Why were they not noticed? Why did voices were not raised earlier about the gaps? Perhaps they were. But, why have the proposed changes not been made? Was it resource constraints? Was it poor policies? Was it weak enforcement? These were some of the questions that were going through our minds, the nature of the question reflecting the position each actor had within the system. Action was taken. People organized themselves into task forces and committees and implemented strategies and work plans. And they started to see results.

Face masks and assembling ventilators have now been manufactured in the country. Critical care capacity has been increased. Oxygen plants have been built. Policies have been drafted to spur the growth of the local pharmaceutical manufacturing sector. Drug supply chains have been diversified to prevent stock-outs. The general public has tremendously increased its health literacy. Countries are in a much better place than when it began.

Economics, Politics, and Education

COVID-19 has impacted the economic and political fabric of our society. It is expected to have long-term consequences on both developed and developing countries. The authors discuss the economic impact of the pandemic on the economy. They analyze how socio-economic disparities have amplified the disease. The impact on education is assessed. The authors also discuss the experience with vaccines in several countries as well as the intractable problem of vaccine inequity.

COVID-19 and the Economy: Constructing Roadmaps to An Inclusive Recovery

Mithali Nikore and co-authors discuss the economic impact of the COVID-19 pandemic which has driven the highest share of economies into recession in modern times and is expected to bring about the largest contraction in the global gross domestic product (GDP) per capita since World War II. The uncertainty it has spawned is driving governments and institutions into a conundrum, as they are tasked with charting out a course for recovery. While India's GDP contracted 7.3% in FY 2020–21, COVID-19 deepened and exposed the fault lines of its economy. The authors highlight the phase of slowdown in India prior to the pandemic and how COVID-19-related lockdowns reinforced the slowdown. They demonstrate historical trends for a set of indicators for three sectors: agriculture, manufacturing, and services. They display the extent of damage that the pandemic-induced economic slowdown has caused while also identifying underlying factors that existed pre-COVID. Finally, the authors present a macro-economic outlook covering trends and linkages across demand drivers, employment, and investment. They conclude with a roadmap for inclusive growth advocating strategies that seek to advance equality of access, sustainability of resources, and state capacity for governance.

Crafting Data-Driven Strategies to Understand the Amplification of Disease Spread due to Socio-economic Disparities

Ayan Paul states that as a disease whose spread is correlated with mobility patterns of the susceptible, understanding how COVID-19 affects a population is by no means a univariate problem. Akin to other communicable diseases like HIV, SARS, MERS, Ebola, etc., the nuances of the socio-economic strata of the vulnerable population are important predictors and precursors of how certain parts of society will be differentially affected by the spread of the disease. In this work, the author delineates the use of multivariate analyses in the form of interpretable machine learning to understand the causal connection between socio-economic disparities and the initial spread of COVID-19. He shows why this is still a concern in a developed nation like the USA with a world leading healthcare system and emphasizes why data quality is important for such methodologies and what a developing nation like India can do to build a framework for data-driven methods for policy-building in the event of a natural crisis like the ongoing pandemic. The hope is that realistic implementation of this work can lead to more insightful policies and directives based on real-world statistics rather than on subjective modeling of disease spread.

The Long Shadow of COVID-19

Mukesh Kapila states that the sudden arrival of COVID-19 shook the world and evoked varied—sometimes contradictory—reactions from communities, countries, and institutions around the world. The pandemic brought out the best and worst of humanity even as the complex of factors underpinning the spread of the coronavirus collided in myriad ways to both facilitate and obstruct effective responses. The experience has generated much angst that questions the way we are organized and relate to each other and, most of all, it has the potential to re-shape our fundamental premises. The effects will be profound going well beyond the pandemic itself to the notions of collective health as a common global good.

COVID-19 Vaccination: A Necessitated Drive Becoming an Unsolved Puzzle

Drishya Pathak discusses how the scientific community has achieved a remarkable feat by developing COVID-19 vaccines in a record duration of twelve months. The fastest vaccine, developed and deployed previously, had been within a time-frame of

four years to prevent mumps in the 1960s. The speedy approach to prevent SARS-CoV-2 has changed the future of vaccine science with several vaccines being developed showing excellent results in large trials. The COVID-19 vaccination strategy has crucial importance. As the vaccination mandate has been faster than information dissemination, and even faster than the clinical trial results in some regions, numerous challenges emerged during its execution. The author discusses the objectives of the vaccination drive that include reduction of overall COVID-19 severity and mortality against various strains of the virus; re-opening of society and disease elimination; reduction of pressure on the healthcare system; and equitable distribution of vaccines across all regions of the globe. While reflecting on these objectives, the author emphasizes the importance of transparency in vaccination surveillance data.

Impact of COVID on Adolescents, Nodal Teachers, and Frontline Workers

Aparajita Gogoi and co-authors emphasize that adolescence is a critical period that shapes the future of young people's lives. Young people were severely impacted by the COVID-19 pandemic. Closures of schools and non-formal education deprived them of learning opportunities and also of social engagement with their peers and educators. Prolonged lockdowns/closures and movement restrictions led to emotional and mental unrest and anxiety. Adolescents and youth, especially adolescent girls and young women, experienced higher levels of violence due to quarantine and isolation. The authors discuss the ground realities and their effect on health services and access to education of adolescents during the COVID-19 lockdown. They highlight important issues and make recommendations for policy dialogue and advocacy around key critical areas like vulnerability to COVID-19 infection, physical abuse, limited access to mobile phones, disruption of supply chains around sanitary napkins, adolescent-friendly counseling, dealing with violence, early marriage, school drop-outs, and trafficking. Recommendations are made to decision-makers and program implementers for addressing barriers to ensure access to timely and appropriate care.

Impact of COVID on Our Digital Lives

Sharon Pithawalla and Anshul Chhabra discuss how the COVID-19 pandemic ripped through our society like a tornado, displacing and destroying everything in its wake. This is no different from the multitudes of pandemics that have hit throughout the history of humanity... except for one new dimension that did not exist earlier, the digital dimension. According to a Pew Research Center survey, only 7% of U.S. adults say they do not use the Internet, which means 93% use the Internet in some manner.

COVID-19 has irrevocably shifted human attitudes and technology/cybersecurity direction on our planet. Whether it is our wide acceptance of technologies like Zoom as a natural way to interact with each other in a variety of social, educational, and work settings, or the mind shift around acceptance of remote work or Zoom parties, etc., or even the boost to the upcoming virtual, augmented, and hybrid reality of a metaverse, COVID-19 marks the beginning of another epoch in the modern history of humankind. In a seemingly contradictory way, COVID-19 has further exacerbated the digital divide, while also providing a fresh new boost to further innovation and the inevitable merging of our physical and digital lives. It is at once a very anxious and a deeply exciting time that we are all living through. Those of us who lived through this pandemic will clearly remember the answer to the question—where were you during the pandemic?

Media and Communications

The authors discuss the important role that media and communications have played during the pandemic. They analyze audience perceptions and fears of the unknown that have been generated due to misinformation and discuss the impact of public health communications and of social media on the pandemic.

Unmasking Realities: Public Health Communication During India's COVID-19 Pandemic

Sonalini Mirchandani and Sunitha Chitrapu take a critical look at India's public health communications during COVID-19. The case study method is used. Data include what was gleaned from interviews with key informants engaged in outreach communications and from news reports and artefacts from select COVID campaigns as they evolved through the first and second waves of the pandemic. Learnings are drawn from previous health communication campaigns that focus on behavior change including India's successful and well-recognized communication interventions during its HIV and AIDS campaigns, as well as its remarkable Pulse Polio efforts.

Social Media in the Time of a Pandemic

Anjali Nayyar and co-authors state that social media has evolved from being a set of rudimentary tools to a complex instrument that has had both positive and negative consequences, often leading to the widespread circulation of misinformation impacting societies and institutions.

The COVID-19 pandemic, significantly, is the first health crisis, witnessed globally in the age of social media and amidst unprecedented connectivity. Throughout the pandemic, the world has witnessed widespread use of social media. Social media has not only enabled isolated people to remain connected with their friends and families but also to communicate with medical experts. At the same time, myths about COVID-19, its treatment, and its effects have circulated on the same platforms leading governments to issue guidelines in several nations including India. While social media has enabled a regular flow of information, it has also led to unverified content circulating on platforms such as Twitter and Facebook, fueling panic in people about the virus and the vaccines.

This chapter explores the role social media platforms (Facebook, Twitter, Instagram, and others) have played in enhancing and delivering evidence, connecting communities, and also in circulating myths and unverified content during the COVID-19 pandemic. Through quantitative analysis, it encapsulates trends being witnessed in different geographies. It will conclude with learnings that we have gathered on leveraging this medium which can be used going forward in instances of future health crises.

Communications Strategies for Reaching Vulnerable Populations in the US for Building Trust, Vaccine Confidence, and Digital Connections

J. Carlos Velázquez and Amelia Burke-Garcia address the communication challenges of the disparate impact of COVID-19 on vulnerable populations in the USA including Latinos, African Americans, American Indians, and older adults. They examine the barriers that mitigate vaccine confidence and testing efforts. They also highlight the successful communications strategies that engaged vulnerable populations at the grassroots level to own and organize vaccine promotion efforts in local communities and to shift the narratives about vaccine hesitancy. Three case studies are presented to provide tools and resources that can be implemented for ongoing communication interventions to promote COVID-19 vaccine uptake.

Exploring a Vaccine for the Misinformation Virus in a Global Pandemic: Media Literacy, COVID, and Science Communication

Sundeep R. Muppidi explores the questions raised at the end of his recent book on “COVID-19, Racism and Politicization: Media in the midst of a pandemic”. For this chapter, he extends on that book to explore the socio-cultural, politico-economic, and digital context of media audiences’ consumption of information, misinformation, and disinformation and their innate ability (or lack thereof) to distinguish factual information and/or fall prey to false and misleading information (or not). The impact of such media consumption, how it breeds irrational fears of the unknown and opposing views, and its impact on participation in civil society are explored. He concludes by suggesting possible strategies to counter this trend.

Vulnerable Populations

The authors discuss the unprecedented rise in suicides and study asylum seekers and adolescents as well as increasing stigma and discrimination during the pandemic.

Preventable Losses: Threatening Rise in Suicides During the Pandemic

Komal Mittal and co-authors argue that COVID-19 is becoming one of the worst humanitarian crises of the twenty-first century. It has unraveled the very fabric of human lifestyles with mental health at the core of its concerns. Now more than ever, suicide has become a serious public health problem worldwide. Studies published after the pandemic was declared in March 2020 estimate that suicide rates will rise globally as a result of the COVID-19 pandemic. The WHO estimates that for each adult suicide, more than 20 others attempt suicide, and suicide risk is much higher in individuals who previously attempted suicide. Hence, suicide prevention in the times of the COVID-19 pandemic has become a global priority not only due to the increased rate of mortality, but also because of exacerbation of risk factors including economic instability, poor access to healthcare facilities, basic amenities, social disconnect, and many more. The aim of this chapter is to examine the relationship between the COVID-19 pandemic and the rise in suicide rates and mental health concerns. The authors undertake an analysis of existing systems and programs put in place by the government and civil society groups to critically examine suicide prevention strategies and approaches and comment on the way forward.

We Are Not all in the Same Boat: Refugees and Asylum Seekers in the Context of COVID-19

Philo Magdalene and co-authors show that the COVID-19 pandemic exacerbated the existential risks and uncertainties experienced by refugees and asylum seekers on a day-to-day basis. Although the pandemic presents some level of risk to everyone, the world's refugees and asylum seekers bear a very heavy burden of risk in the context of COVID-19. Overcrowding in camps, lack of access to medical services, changes to the asylum-seeking process, movement restrictions, and other factors converge to disproportionately impact refugees and asylum seekers. The chapter presents a case study that looks at the experiences of asylum seekers at the US-Mexico border through the lens of a non-governmental organization (NGO) volunteer who has been working in the region throughout the pandemic. By using this case study and secondary-level research, the authors seek to provide an understanding of the ways the pandemic has aggravated the challenges refugees and asylum seekers are facing globally, with an emphasis on the US-Mexico region.

Stigma Mechanisms in a Globalized Pandemic in India: A Theoretical Framework for Stigma

The GRID COVID-19 Study Group states that stigma has been documented to act as a significant barrier to healthcare access and healthcare-seeking behavior. Traditional frameworks of stigma and discrimination have been used in the past to explain the stigma associated with diseases such as tuberculosis, leprosy, and HIV. However, increasing globalization and the unprecedented access to information via social media and the Internet have altered infectious disease dynamics and have forced a rethink on mechanisms which propagate stigma. SARS, MERS, Ebola, and more recently COVID-19 have been associated with fear in communities across the globe due to the inherent uncertainties associated with emerging infectious diseases and a concurrent spread of misinformation—an infodemic. The authors present a theoretical framework to explain the evolution of COVID-19-associated stigma by exploring the complex interplay of various international, national, and intra-national mechanisms. It is anticipated that a conceptual framework which explains the evolution of stigma in fast-spreading global pandemics such as COVID-19 may also prove to be useful as a starting point for furthering the discussion on the progenitors, pathways, and manifestations of COVID-19-related stigma. This framework should be of practical use to researchers who are interested in exploring, validating, and identifying interventions to inform other frameworks for similar diseases.

The Social, Education, Health, and Economic Effects of the COVID-19 Pandemic on Kenya's Adolescents

Julie Mwabe and Karen Austrian state that the first case of COVID-19 was detected in Kenya in March 2020. Initial government responses included several containment measures such as school closures, movement limitations, and bans on public gatherings. These measures had many follow-on effects, in particular for the country's vulnerable adolescents. Between June 2020 and February 2021, two rounds of quantitative data were collected in four counties in Kenya (Kilifi, Kisumu, Nairobi, and Wajir) via phone surveys ($n = 3,921$). In addition, qualitative in-depth interviews were conducted in person in November 2020 with adolescents, parents, and other key stakeholders ($n = 234$). Results showed that the pandemic's effects on adolescents were far reaching and often differed by gender. While 85% of students reported doing some form of remote learning during school closures, 98% of them reported considerable challenges with less than one-third using technology (i.e., computers, phones, television, or radio) to support their learning. Over half of the adolescents reported depressive symptoms and over three quarters reported skipping meals in the past week due to COVID-19. Twelve percent of girls and 9% of boys reported skipping healthcare services in the past one month, with the most common reason being lack of money to access the needed service. Once schools fully re-opened, 16% of girls and 8% of boys who were enrolled at the start of the pandemic had not re-enrolled. Given the wide, multi-sectoral nature of the impacts of the pandemic, a coordinated response involving education, health, and gender actors, as well as government and non-government partners, is needed to mitigate the long-term negative impacts for Kenya's adolescents, in particular girls and other marginalized groups.

Country Experiences

Experiences of countries including the United Kingdom, Ethiopia, Mexico, Taiwan, Brazil, and Iran are discussed by the authors.

The Public Health Response to COVID-19 in the UK: A View from the Frontline

Tania Mishra charts the experience of working on the frontline public health response during the pandemic. The UK's initial public health response to the pandemic comprised a delayed lockdown, shortages of personal protective equipment (PPE), insufficient testing capacity, and ambivalence about wearing masks.

The pandemic's first wave ravaged the healthcare sectors. Subsequently, with experience and tight testing regimes, the management of COVID-19 in the care

sector improved enormously. Hospitals reduced workload to a bare minimum initially, followed by separate pathways to facilitate elective work, underpinned by testing and infection control. In addition to the elderly and frail, those on the fringes of society—for example, homeless, refugees, asylum seekers, and prison populations—experienced high rates of infection and mortality.

Nation-wide restrictions on movement were propped by an economic support program. The new school year in 2020 began amid rising cases, as people struggled to interpret confusing policies. Workplaces did not emerge from remote working till mid-2021 and remain a hub of infection transmission.

The tussle between maintaining economic activity and education versus preventing the spread of cases continues, while the focus of the public health response moves to high vaccination coverage, rapid testing, and responding robustly to emerging variants of concern.

Social and Behavior Change Preparedness for COVID-19 Prevention: Evidence and Experience from Ethiopia

Nandita Kapadia and co-authors discuss the experience of Ethiopia which is Africa's second-largest country and had 368,106 COVID-19 infections and 6,583 deaths as of November, 2021. Social behavior change (SBC) approaches which include mass media, health worker home visits, and community engagement are the cornerstone of an effective COVID-19 prevention strategy, in addition to vaccination. The authors assess Ethiopia's SBC preparedness to prevent the increase and spread of COVID-19 cases. They make recommendations on "SBC preparedness" in the context of another wave of COVID-19 in Ethiopia. The Johns Hopkins Center for Communication Programs collaborated with the Ethiopian Ministry of Health from March 2020 onwards to implement a rapid COVID-19 prevention intervention that includes supporting national- and regional-level risk communication systems, developing mass media and other public communication materials, promoting community engagement, and managing misinformation.

A computer-assisted phone survey was conducted in three regions (Amhara, Oromia, and Tigray) in October 2020 to estimate the prevalence of COVID-19 preventive behaviors, risk perceptions, and COVID-19 knowledge levels in about 1,000 respondents. The survey showed that only a third of the respondents practiced all three major COVID-19 preventive behaviors—wearing a mask, keeping two meters physical distance, and hand washing with soap. Policy implications for COVID-19 prevention within the Ethiopian context are discussed.

COVID-19 in Mexico: How the Systems Approach Can Improve Our Response?

Oscar San Roman Orozco and co-authors cite Donella Meadows, who identifies a system as any set of interrelated things that produce their outcome. The elements in any system are highly interconnected as they continuously influence each other. Public health challenges do not exist in a vacuum but are influenced by several factors, including the social, economic, and political context. To understand any one factor, mapping out the surrounding elements and analyzing the relationships between them and other elements in the system is necessary. The authors apply the systems thinking approach within the Mexican context. A systems analysis of COVID-19 in Mexico through a systems map is undertaken to illustrate the complexity of systems and how to leverage the power of systems thinking to execute intersectoral, innovative, and highly impactful interventions for an improved response to the ongoing COVID-19 pandemic and the pandemics of the future.

Response to the COVID-19 Pandemic in Taiwan

Shikha Kukreti and co-authors state that the world has suffered a large number of infections and deaths due to the COVID-19 pandemic. Due to its proximity to China, it was initially feared that Taiwan would become the worst affected country. However, COVID-19 has been widely controlled in the region; a few local outbreaks occurred with limited cases since the pandemic began. Taiwan leveraged its experience in containing the SARS outbreak in 2003 to respond to the COVID-19 crisis with proactive measures, early deployment, prudent actions, and transparency. Most political debate in Taiwan has centered around vaccines. However, from challenges like vaccine availability to increasing people's willingness to take vaccines, the Taiwan government has succeeded well. Taiwan's National Health Insurance system is a vital component of its strategy to improve the efficiency of healthcare delivery throughout the country. And the database integrated with the Centers of Disease Control provides real-time alerts to healthcare providers about patients whenever they are identified. In response to the Delta variant spread after a community outbreak, health monitoring measures were tightened, leading the country to successfully control the spread of the infection. Other countries could draw lessons from Taiwan's response to COVID-19.

COVID-19 in Brazil: Overall impact and singularities

Antonio vaz de Macedo and co-authors discuss how the pandemic has spread at alarming rates across the globe with a case tally of over 270 million and a death toll of more than 5 million as of mid-December 2021. Ranking third among the world's

most affected SARS-Cov-2 hotspots, Brazil is by far the hardest hit among its Latin American neighbors, with over 22 million cases and a death toll in excess of 600,000. The actual death toll is likely higher. The official figure is lower because of limited testing and inconsistency in nationwide cause of death reports. Despite Brazil's continental dimensions and one of the largest developing free market economies in the world, it is tainted for harboring one of the highest socio-economic disparities of all, with roughly a fifth of its population under the poverty line. On the positive side, Brazil has the largest public funded healthcare program in the world. Despite having lagged behind vaccination roll-out initially, the country has taken a giant leap over the past six months, which has resulted in two-thirds of its population being vaccinated. There has been a tremendous drop in both SARS-Cov-2 cases and deaths. In this chapter, the authors discuss the overall impact of the COVID-19 pandemic in the country with a particular focus on underserved minorities.

Iran's Experience with the COVID-19 Pandemic: Focusing on Vulnerable Populations

Amir Mansourieh and co-authors share the COVID-19 experience in Iran. Iran was one of the first countries to be affected by the COVID-19 pandemic. The pandemic coincided with the economic problems that Iran is facing. Iranians have encountered serious problems in various aspects of their lives. According to official statistics, there were about six million infections and about 130,000 deaths due to COVID-19 in Iran. Quarantine, social distancing, and other health protocols led to a decline in the mental and social health indicators. Vulnerable groups including children, women heads of households, the homeless, drug addicts, and the disabled were at higher risk. Although initially, governmental and non-governmental organizations were not prepared to manage the pandemic, overtime they made efforts and implemented several innovative measures in the areas of education, mental health service provision, and addiction. However, the economic conditions in Iran impacted all these measures adversely. The authors discuss Iran's experiences with COVID-19 focusing on the health, social, psychological, and economic factors. They also unravel lessons learned through Iran's experience with COVID-19.

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She worked with the Ford Foundation's New Delhi Office (1983–1994) and supported child survival, women's health, sexual and reproductive health, and HIV and AIDS programs. Before that, she worked with the International Fertility Research Program (IFRP) which was later renamed Family Health International (1971–1975) and the India Fertility Research Programme (1975–1983). She designed and monitored multi-centric clinical trials globally to assess the safety and effectiveness of fertility control technologies. During 1962–1971, as faculty of the Departments of Preventive and Social Medicine at the Lady Hardinge Medical College, New Delhi and the Institute of Medicine Sciences, Varanasi, she helped to develop this new discipline.

She has published six books and contributed chapters to 20 books. She has over 100 publications in peer-reviewed journals and several articles in print media.

Dr. Ash Pachauri has a PhD in Decision Behavior and a Master's Degree in International Management. He worked with McKinsey and Company before pursuing a career in the social development arena, Dr. Pachauri's experience in the fields of public health and management emerges from a range of initiatives including those of The Bill and Melinda Gates Foundation, Program for Appropriate Technology in Health (PATH), United Nations Development Programme (UNDP), International Planned Parenthood Federation (IPPF), and Centers for Disease Control (CDC) in the US.

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