

Post-COVID pandemic: The new normal and aftermath

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ABSTRACT

Background: The COVID-19 pandemic has brought about unparalleled worldwide transformations, impacting all facets of human existence, including health systems, economies, societal norms, and individual behaviors. **Aim:** The goal is to comprehend the enduring alterations in public health strategies, economic recuperation processes, changes in work and education paradigms, and the psychological consequences for populations globally. **Methods and Materials:** This analysis uses a multidisciplinary approach by incorporating data from healthcare studies, economic reports, educational research, and psychological assessments. It aims to offer a comprehensive perspective on the world after the pandemic. **Results:** The findings suggest that the “New Normal” encompasses a wide range of changes, such as a greater dependence on digital technology, a transition toward remote work and learning, substantial modifications in global supply chains, and a revised outlook on health and wellness. The potential long-term consequences of these changes indicate that some may provide opportunities for innovation and expansion, whereas others present challenges that necessitate strategic planning and policy interventions. **Conclusion:** The aftermath of the COVID-19 pandemic presents a critical moment for global leaders, policymakers, and individuals to navigate the complexities of a transformed world, emphasizing the need for resilience, adaptability, and a renewed commitment to collective well-being.

Keywords: COVID-19, global crisis, impacts on health, pandemic, social and economic impacts

Introduction

COVID-19, caused by the novel coronavirus SARS-CoV-2, was first identified in Wuhan, China, in December 2019. It rapidly evolved into a global pandemic, affecting millions worldwide. As of 17 December 2023, more than 772 million confirmed cases and nearly seven million deaths have been reported globally.^[1] The rapid and unrelenting spread of COVID-19 can be ascribed to its elevated transmission rate, rendering it as one of the most contagious respiratory viruses in recent memory. The high mortality rate, especially among susceptible populations and the elderly, intensified the sense of urgency and fear that affected nations worldwide. The pandemic has significantly impacted individuals' lifestyles, occupations, education, and healthcare access, causing

socioeconomic consequences and psychological distress. It has also led to severe economic and political crises in affected countries. COVID-19 is a global threat, causing inequality and inadequacy in social advancement, and has not only impacted individual well-being but also exacerbated social inequalities.^[2]

The purpose of this review is to delve deep into the multifaceted impacts of the COVID-19 pandemic and provide a comprehensive understanding of the aftermath that has resulted in the emergence of a “new normal”. This review explores beyond the immediate health impacts of the virus to encompass the profound and far-reaching effects on economic systems, societal structures, and technological capacities. This review examines the diverse impacts that the COVID-19 pandemic has led to profound global changes, prompting a re-evaluation of health systems, economies, societal structures, and technological capacities, thereby shaping a distinctly different post-pandemic world.

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Immediate Health Impact

The COVID-19, a respiratory disease caused by the SARS-CoV-2 virus, has significant health consequences. It can range from mild symptoms to severe respiratory distress, requiring hospitalization, and possibly death. In severe cases, it can progress to pneumonia and acute respiratory distress syndrome (ARDS), necessitating intensive medical intervention. COVID-19 can also affect organ systems, leading to various immediate health complications. There have been reports of cardiovascular complications, including myocarditis, arrhythmias, and thromboembolism, which have led to higher rates of illness and death among those affected. Neurologic symptoms such as anosmia (loss of taste and smell), cephalalgia (headache), vertigo (dizziness), and cerebrovascular accidents (strokes) have also been reported, underscoring the capacity of virus to affect the central nervous system.^[3] Moreover, COVID-19 can give rise to gastrointestinal symptoms such as nausea, vomiting, and diarrhea, thereby adding complexity to the clinical presentation.^[4,5] Furthermore, the virus has been associated with widespread inflammation throughout the body and an excessive release of cytokines, leading to dysfunction and failure of multiple organs.^[6,7] These immediate health impacts disproportionately affect vulnerable populations, such as the elderly, individuals with underlying health conditions, and frontline healthcare workers. The swift dissemination of COVID-19 has inundated healthcare systems globally, resulting in scarcities of medical resources, hospital accommodations, and healthcare staff.^[8] This is essential for public health initiatives that aim to control the virus transmission and alleviate its impact on individuals and communities.

Long-Term Health Effects

In addition to the current crisis, the COVID-19 pandemic has revealed unsettling long-term health consequences. The term “Long-term COVID” refers to a perplexing condition where individuals experience persistent symptoms that continue for an extended period even after the acute phase of the illness has resolved. The symptoms encompassed fatigue, cognitive impairment, and respiratory issues, among others.

Affirmatively, the occurrence of acute kidney injury (AKI) significantly amplifies the likelihood of adverse kidney outcomes following the acute phase of COVID-19.^[9] An analysis of 1612 patients during the initial year of the pandemic revealed that individuals who developed AKI due to causes unrelated to COVID-19 had a decrease in their estimated glomerular filtration rate (eGFR) at an average rate of $-2.7 \text{ ml/min/1.73 m}^2/\text{year}$. However, those who developed COVID-19-associated AKI had much steeper declines, with an average eGFR slope of $-16.7 \text{ ml/min/1.73 m}^2/\text{year}$ (a difference in slope of $-14.0 \text{ ml/min/1.73 m}^2/\text{year}$).^[10] In addition to its impact on kidney disease, infection with SARS-CoV-2 also resulted in the subsequent development of significant abnormalities in cardiac cells and cardiovascular complications, such as dysrhythmias, ischemic heart disease, heart failure, pericarditis, myocarditis, and

thromboembolic disease. The examination of neuroimaging data obtained before and 4-5 months after SARS-CoV-2 infection indicates that the infection can cause significant alterations in the brain's structure. These changes include a decrease in the thickness of grey matter and a reduction in overall brain volume.^[11] This finding has raised significant concerns and underlines the need for long-term healthcare support and ongoing research to better understand and address these lingering effects on a substantial subset of patients.

Vaccination and Immunity

The swift innovation of vaccines emerges as one of the most notable accomplishments in combating against COVID-19 infection. The Pfizer-BioNTech vaccine, for example, was produced in an unprecedentedly short period, taking less than a year, and exhibited an outstanding efficacy of 95% in preventing COVID-19 infections.^[12] Global vaccination campaigns were initiated with unparalleled swiftness, offering optimism for managing the transmission of the virus and mitigating the intensity of illness. Nevertheless, the worldwide allocation of vaccines exposed significant inequalities. Wealthy nations obtained the majority of vaccine doses, resulting in significantly lower vaccination rates in low-income countries.^[13] The significant disparity in vaccine distribution has highlighted the pressing necessity for a fairer and well-coordinated strategy, particularly in the mid of a worldwide health emergency.

Healthcare Systems Evolution

The COVID-19 pandemic has accelerated the adoption of telemedicine and telehealth platforms to reduce face-to-face interactions and improve healthcare delivery. Healthcare systems have allocated resources to invest in surveillance, testing, contact tracing, and vaccine distribution to address future outbreaks.^[14] Hospitals and facilities have modified procedures to handle increased cases, such as increasing beds in intensive care units and redistributing resources. Collaboration among healthcare providers, government agencies, and community organizations is crucial for managing public health emergencies. Digital health technologies, such as electronic health records and remote monitoring devices, have been adopted to enhance patient care and efficiency.^[15] The pandemic has exposed healthcare access and outcomes disparities, leading to initiatives aimed at achieving health equity. The momentum to tackle these disparities has increased. Overall, the pandemic has accelerated innovation and adjustment in healthcare systems to ensure fairness in future public health crises.

Economic Consequences

Global economic downturn

The COVID-19 pandemic had a profound and destructive economic effect worldwide. The International Monetary Fund (IMF) has documented a significant decline of around

3.5% in the worldwide Gross Domestic Product (GDP) for the year 2020.^[16] The economic recession had a significant impact on several countries, resulting in a 4.3% contraction of the United States' GDP. Nevertheless, the consequences differed considerably among different regions, highlighting the unequal economic burden of the pandemic. India experienced a significant 8% economic contraction, whereas China, the country where the pandemic originated, achieved a modest 2.3% economic growth.^[17] These distinct figures emphasize the intricate interaction of various factors that dictate the degree of economic disturbance, such as governmental actions, healthcare infrastructures, and dependence on industries.

Recovery efforts

Various government globally implemented a diverse range of stimulus measures to counteract the economic harm caused by the pandemic. Japan demonstrated a courageous move by implementing a stimulus package equivalent to approximately 40% of its GDP, making it one of the most significant proportional responses recorded.^[18] These endeavors were directed toward alleviating the immediate economic harm and promoting the process of recuperation. Nevertheless, the efficacy of these measures exhibited significant disparities among diverse economies. The outcomes were influenced by factors such as the timing of implementation, the magnitude of the stimulus, and the economic structure. The pandemic highlighted the significance of prompt and synchronized fiscal measures to enhance economic resilience during the times of crisis.

Shift in work culture

The COVID-19 pandemic expedited the acceptance of remote work, leading to a notable transformation in work culture. In 2020, Stanford University conducted a study that found a significant 42% of the labor force in the United States was engaged in full-time remote work during the pandemic.^[19] This shift had both immediate and enduring consequences across various dimensions. Initially, it prompted a reassessment of commercial real estate as companies reevaluated the necessity of expansive office spaces. Furthermore, urban planning started to adjust to evolving commuting patterns and decreased demand for urban office spaces. Finally, the transition to remote work had significant effect on the work and personal life balance, as individuals dealt with the blurred lines between their professional and personal spheres. Companies have also begun to investigate hybrid work models, which involved a combination of in-office and remote work.^[20]

Impact on Specific Sectors: Mmaximizes

The COVID-19 pandemic had a dramatic and asymmetric impact on specific sectors of the economy. Among the hardest-hit industries were travel and hospitality. The United Nations World Tourism Organization reported a staggering decline of 73% in international tourist arrivals in 2020.^[21] Lockdowns, travel restrictions, and safety concerns brought the global tourism industry to a near standstill, with severe consequences affecting businesses and employment in this sector.

Conversely, the e-commerce sector experienced an unprecedented surge in demand. With people staying home and relying on online shopping for their essential needs, e-commerce giants such as Amazon reported a remarkable sale of 37% increase in 2020.^[22] The pandemic accelerated the shift toward online shopping and digital commerce, further reshaping the retail landscape. It also highlighted the importance of logistics and supply chain resilience in ensuring the efficient delivery of goods.

Societal Changes

Shift in social interactions

The COVID-19 pandemic brought about a seismic shift in social interactions, reshaping the way people connect with one another. Social distancing measures and lockdowns drastically altered the fabric of society. This decline in physical and social interactions disrupted established social norms that led to profound implications on mental health. The human need for social connection was starkly highlighted, and the absence of it took a toll on individual well-being.^[23]

These changes in social interactions may have long-lasting effects on society. The pandemic forced individuals to adapt to new ways of connecting, including virtual gatherings and video calls. As restrictions eased, some people embraced these changes as convenient alternatives to traditional socializing. However, others yearned for the return of in-person interactions, suggesting that the balance between virtual and physical connections will continue to evolve in the post-pandemic world.

Mental health and well-being

The COVID-19 pandemic has significantly affected mental health and well-being worldwide, leading to increased stress, anxiety, and uncertainty. Factors such as fear of contracting the virus, social isolation, financial difficulties, and disruptions in daily routines have contributed to increased feelings of solitude and seclusion.^[24] Insufficient social interaction and support networks can intensify depression and anxiety, affecting mental well-being. Economic ramifications such as unemployment and limited resources have exacerbated feelings of hopelessness and desolation. The pandemic has disrupted mental health services, making it difficult for individuals seeking in-person therapy or counseling.^[25] Although transition to remote mental health services has proven to be beneficial, it has limitations to universal accessibility. Therefore, prioritizing mental health support, enhancing accessibility, and fostering resilience are crucial in overcoming these challenges.

Education and learning

The COVID-19 pandemic triggered a transformation in the field of education and learning. Many students, particularly those from disadvantaged backgrounds, faced obstacles in accessing online education, exacerbating educational disparities. The educational community needs a more comprehensive understanding of the diverse effects of the COVID-19 pandemic through online

learning, including its impact on students, teachers, pedagogy, information and communication technology (ICT) technology, online learning methods, and implications for different academic disciplines.^[26] The geographical distribution of scientific output on online learning during the COVID-19 pandemic was uneven. In addition, the COVID-19 pandemic prompted the investigation of emergency remote learning methods, such as e-learning, distance learning, and virtual learning, to minimize direct interaction between educators and students.^[27] These approaches were primarily supported by various ICT tools, such as social media, gamification/simulation, virtual reality, videoconferencing platforms, and telehealth. Although computer-based learning, blended learning, and m-learning are not exclusively limited to online learning environments, they can be particularly applicable to specific fields of study, particularly in the aftermath of the COVID-19 pandemic.

The pandemic accelerated discussion about the future of education, including the assimilation of technology into conventional learning environments and the need for inventive methodologies to engage students in remote contexts. Furthermore, it highlighted the significance of fair and impartial access to education and the need to narrow the gap in digital resources to guarantee that every student has equitable chances to acquire knowledge and flourish.

Inequality and disparities

The COVID-19 pandemic highlighted and exacerbated existing inequalities and disparities in societies globally. The World Bank's report in 2021 noted that the crisis disproportionately impacted women, the poor, and marginalized groups, deepening global socioeconomic disparities.^[17] These disparities were evident in various aspects, from access to healthcare and economic opportunities to educational attainment.

The pandemic has highlighted social and economic disparities, leading to discussion about the need for fairer and more comprehensive policies. It emphasized the weaknesses of individuals with restricted access to resources and emphasized the significance of social safety nets in safeguarding the most susceptible individuals during periods of emergency. The insights gained from the pandemic have prompted demands for structural reforms to tackle inequality and establish more robust and inclusive societies in the aftermath of the pandemic.

Impact on marginalized communities

The pandemic had a profound and detrimental effect on marginalized communities, children, and individuals with disabilities. It has worsened socioeconomic inequalities for marginalized communities, as many are employed in low-paying, non-remote jobs, increasing their susceptibility to the virus. In addition, access to healthcare and COVID-19 testing is often restricted, posing additional health risks. Economic disruptions have led to increased unemployment and poverty, particularly for vulnerable communities.^[28]

Children have been severely affected by the pandemic, particularly in the education sector. School closures have impacted knowledge acquisition, social skills development, and mental well-being. The transition to online education has highlighted digital disparities, as economically disadvantaged children often lack access to essential technology and internet connectivity. Vulnerable children also faced additional difficulties due to the lack of school-based services, such as free-meal programs and mental health support.^[29]

People with disabilities have also faced increased difficulties during the pandemic, with interruptions in vital services and transition to digital platforms. Insufficient information about the pandemic and public health protocols has exacerbated their marginalization. The increased concern about COVID-19 health hazards has led to increased seclusion and anxiety, negatively impacting their psychological well-being and overall state of being.^[30]

Technological Advancements

Digital transformation

The COVID-19 pandemic expedited the implementation of digital technologies in diverse industries. In the retail sector, prominent corporations such as Walmart and Target witnessed a rapid expansion of their online operations, resulting in a significant increase in digital sales.^[31] Customers turned to e-commerce platforms to meet their needs while adhering to social distancing measures. This shift not only allowed retailers to continue serving their customers during lockdowns but also reshaped consumer behavior, with many individuals exploring the convenience of online shopping, which is likely to persist in the post-pandemic world.^[32] The pandemic accelerated the transition to digital financial services, including online banking, mobile payments, and contactless transactions. This trend not only enhanced convenience but also highlighted the importance of digital financial infrastructure in ensuring access to financial services during challenging times.^[33]

Innovation in healthcare

The healthcare industry witnessed remarkable technological advancements in response to the pandemic. Telemedicine, once a niche service, became a necessity for providing healthcare by minimizing physical contact.^[34] This expansion in telehealth services not only allowed patients to receive medical care from the safety of their homes but also provided a solution to healthcare access challenges in underserved areas.^[35]

In pharmaceutical industries, the development of mRNA vaccines by Pfizer-BioNTech and Moderna represented a breakthrough innovation. These vaccines demonstrated high efficacy in preventing COVID-19 and offered a promising approach to the development of vaccine for other diseases.^[36] The rapid development of these vaccines showcased the potential for innovative technologies to revolutionize

vaccine development and infectious disease control in the future.

Privacy and surveillance

The COVID-19 infection spreads through social interaction, necessitating contact-tracing software. Mobile devices offer ease of use, widespread ownership, and personalized usage, leading to the development of various smartphone applications by governments and international organizations.^[37] The use of digital tools for contact tracing and surveillance during the pandemic ignited debates about privacy and civil liberties. Many individuals are using COVID-19 status and tracing applications, but they have concerns about data collection and privacy. These findings are crucial for designing and implementing pandemic-related applications, as meeting user expectations leads to increased adoption. It is essential to not disregard these expectations during health crises.^[36] However, these measures also raised concerns about the erosion of privacy rights and the potential for government overreach.

Balancing public health needs with individual privacy rights became a key challenge for governments worldwide. Striking the right balance between using technology for effective pandemic response and safeguarding personal data and privacy rights became a subject of intense scrutiny.^[38] These discussions have fueled ongoing debates about the use of surveillance technologies and data privacy in the context of public health emergencies, with implications for future policies and regulations in the post-pandemic world.

Looking Forward: Future Implications

Predictions for the post-pandemic world

The post-pandemic era is expected to see increased focus on public health infrastructure, increased adoption of remote work, and a shift toward hybrid or fully remote work models. Governments and organizations are expected to invest more in preparedness, including stockpiling medical supplies and enhancing surveillance systems.^[39] Consumer behavior will be reshaped by e-commerce, contactless payments, and outdoor activities, with people prioritizing convenience, safety, and sustainability. The pandemic has also highlighted social and economic inequalities, leading to increased awareness and calls for action to address systemic issues such as healthcare disparities, income inequality, and access to education.^[40] Greater efforts will be made to build more inclusive and resilient societies, focusing on equity, social justice, and community resilience.^[41]

Preparedness for future pandemics

The experience with COVID-19 has underscored the critical need for better preparedness to face future pandemics and global health crises. The World Health Organization (WHO) has emphasized the importance of building robust healthcare infrastructure, enhancing global surveillance systems, and ensuring equitable access to healthcare resources (WHO, UHC). Governments and

international organizations are expected to prioritize investments in public health infrastructure and research to better anticipate and respond to emerging health threats. Effective readiness for future pandemics necessitates a comprehensive approach, involving adaptable public health and social measures to address evolving epidemiological patterns and hospital capabilities, along with a dedicated effort to implement mitigation strategies. Achieving success will rely on proactive and coordinated efforts at both regional and global levels, along with ongoing efforts to maintain and enhance robust healthcare infrastructure. Nations should prioritize the establishment of comprehensive healthcare systems, allocate consistent funding toward research and innovation, and collaborate by exchanging information and pooling resources to achieve global health equality.

Role of international cooperation

The COVID-19 pandemic has highlighted the imperative need for international collaboration in tackling global challenges. The utilization of initiatives such as COVAX, which facilitated the advancement and dissemination of vaccines to economically disadvantaged countries, demonstrated the capacity of international cooperation during periods of emergency.^[42,43] The COVID-19 pandemic has highlighted gradual advancements in global health collaboration, and the formation of extensive networks of global health governance involving both governmental and non-governmental entities. From this standpoint, despite the unforeseen external impact of COVID-19, there was a sustained and even increased level of global health collaboration among different sectors and groups of individuals. This implies that despite facing various difficulties, global health governance has been establishing a sophisticated mechanism that functions across different levels (government institutions, regional bodies, profit-driven entities, civil society, and public-private collaboration).

Conclusion

This analysis provides a thorough examination of the adverse effects of the COVID-19 pandemic on various aspects, such as health, economy, society, technology, and global cooperation. The pandemic has accelerated substantial transformation, revealing both obstacles and prospects for inventive solutions and adaptability. The impact of COVID-19 will be permanently recorded in history due to its worldwide magnitude and the unparalleled collective reaction it provoked. It revealed weaknesses in our worldwide systems, emphasizing the necessity for improved readiness and a more robust healthcare infrastructure. Nevertheless, it also demonstrated the capacity of humans to adjust, and endure, and the extraordinary potential of scientific advancement, as demonstrated by the swift innovation of vaccines. The COVID-19 pandemic, despite its unprecedented challenges, has showcased humanity's remarkable ability to adjust and endure amid hardship. This presents a distinctive chance to reconsider and reformulate our future, highlighting the significance of readiness, flexibility, and global cooperation. As we progress, the knowledge gained from this global crisis will

persistently influence our endeavors to construct a more robust, fair, and interconnected world, better equipped to confront the forthcoming challenges.

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Conflicts of interest

There are no conflicts of interest.

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