Proceedings of the 2nd International Conference on Environmental Geoscience and Earth Ecology
DOI: 10.54254/2753-8818/47/2024PJ0103

Global public health policy analysis: During the COVID-19 pandemic

Jiahao Ye

University of California Los Angeles, BS, 90095, USA

frankieye2003@g.ucla.edu

Abstract. The emergence of Covid 19 at the start of 2020 set the alarm for a new pandemic around the world following the turning century. Global efforts to fight against infectious diseases focus on protecting citizens from the virus, preventing the spread of the virus within and through a country, and promoting the idea of the dangers of the virus and ways of self-preservation. On a neurophysiological scale, ideal and effective strategies such as initiating quarantine around the world, in which a limit to the outside world is set, gradually stagnate the spread of the virus and maintain the optimum environment for the sick to recover. The mandatory policy and consensus around the world of wearing a mask and maintaining a six-foot distance substantially curbed the spread of the virus in public. On a microbiological scale, the technological advancement the world experienced in recent years resulted in the rapid development of public preventative treatment, such as vaccines, marking the turning point regarding the gradual decrease in the spread and, subsequently, the rate of death throughout the world. The methods of preventing the spread of disease, as well as protecting the citizens from further damage, have led to an exponential decay of cases regarding the coronavirus.

Keywords: COVID19, global health, quarantine, vaccine, social distancing, virus.

1. Introduction

The emergence of Covid 19 marks the fifth pandemic following the turn of the twenty-first century. The coronavirus stands alone in terms of the contagious nature of the virus compared to other pandemics, such as the Zika pandemic and the Ebola Virus. Rather than spreading from a vector, such as mosquitos, or through the exchange of bodily fluid, the coronavirus is spreading through the exchange of droplets and small particles that contain the virus [1]. As such, the coronavirus spread substantially faster than any pandemic virus that spread through a third vector. In comparison, the coronavirus streaks are similar to the first pandemic following the twenty-first century, the SARS pandemic, in terms of its methods of spreading and the presence of respiratory diseases and symptoms that follow both viruses. In response to the rapid spread of the new pandemic, global efforts seek ways to restrain the spread of the virus and suppress its symptoms. Leading countries in the spread of medicine and public health prevention, in the United States, China, France, and The United Kingdom, adopted the strategies of prevention, Promotion, and Protection in order to inform the public regarding information about the new virus as well as minimizing the damage done by the virus on the society. The act of prevention initiates methods of preventing the spread of the virus from reaching more people and more countries. The established policies of quarantine and the public mandates to wear masks while in public mark the world's first

DOI: 10.54254/2753-8818/47/2024PJ0103

success in limiting the spread of the virus and the virus's access to other countries. Quarantine is the act of secluding oneself from the outside world; this limits outside interactions and, as such, limits the scope of the virus in person-to-person infection. Due to the contagious nature through respiratory tracts, the public mandate of wearing a mask while standing six feet apart also limited the virus's access to other hosts. In addition to prevention efforts, it informs the public of the knowledge regarding the virus as well as methods to keep one safe and further act to curb the virus's contagion. Leading countries' efforts in supporting the public regarding basic knowledge regarding the virus allow the public to take early precautions and prepare for the virus. Protecting the public from the virus was done to prevent the spread of symptoms among the public and minimize the virus's damage to the human body. The recent technological development has led to rapid development and implementation of vaccines at a historically fast rate [2]. The rapid development and ramification of RNA and DNA vaccine for Covid 19 spearheads the turning point for the spread of the virus and the number of lethal cases. The vaccine introduces a dead or severely weakened virus inside the body in order to pre-arm the body for the virus in case the deadly virus does enter the body [3]. The development of preventive, protective, and promotional methods such as vaccine and quarantine policies established by leading countries in the world has led to the stagnating growth of Covid 19 following over four years of conflict with the deadly pandemic.

2. Introduction of COVID-19

COVID-19 is a viral infectious disease spread by exchanging droplets and small particles that may contain the virus. Like the SARS virus, COVID-19 was contagious through the respiratory tract with symptoms such as fever, coughing, loss of taste and smell, and breathing difficulty [4]. Coronavirus had its first confirmed case in late November of 2019. While its exact origin is still unknown, due to its similarities in structure and symptoms to the SARS virus, the coronavirus was speculated to have originated from an animal vector, specifically from bats. Regarding lethality, the global case fatality in January 2020 was 1.7%, with it falling off in March 2020 below 0.3% [5]. The Coronavirus was identified as an RNA virus; this describes that the genetic material within COVID-19 was coded through ribonucleic acid (RNA) rather than being from deoxynucleic acid (DNA). The Coronavirus life cycle was very similar to other infectious diseases. After entering the body through the host's nose or the mouth, the virus enters the target cell through either endosome or plasma fusion. Spike proteins on the coronavirus surface attach to the angiotensin-converting enzyme 2 (ACE2) of the receptors of the specific targeted cells. After the virus was taken up by the target host cell through the endosome, the spike proteins were activated by cathepsin L, and the viral genetic material was released onto the host cell. In order to produce the proteins necessary for producing new viral genomes, the virus hijacks the host cell's RNA polymerase. It translates the protein necessary for the processing and production of new genomes. After the new viral RNA was formed, the RNA was packed into protein coats, and a new virus generation was formed.

3. World Public Health Organization initiative regarding the virus

Due to the very contagious nature of the virus, the World Health Organization (WHO) demanded the leading countries in terms of population, health research, and technological advancement to spread awareness of the virus and contain the virus spread and bloom into a worldwide pandemic. Leading countries in viral research and public health prevention, such as the United States and China, Initiated the process of protection, prevention, and promotion to curb the spread of the virus and minimize the symptoms of the virus. The first step in preventing the spread of the virus was the promotion of health information regarding the virus to the public. The promotion of health information, including the variety and uniqueness of the symptoms of the coronavirus, as well as countermeasures being taken within society to restrain the spread of the virus, was necessary to prepare the public for the new health crisis. In addition, the Socio-Ecological Model of Health Promotion established various health promotion interventions of different scales of society, ranging from individuals to communities, to sustain the systematic approach and equity for future health preparedness strategies [6]. In response to the call of action from WHO regarding the promotion of public health information, The United States government

DOI: 10.54254/2753-8818/47/2024PJ0103

initiated the Office of Disease Prevention and Health Promotion (ODPHP) to improve public health relations among its citizens further and provide science-based health promotions to update its citizens regarding the process of health prevention efforts, such as the invention of coronavirus vaccine, and encourage the public of following the current health crisis guideline, such as following the order to quarantine. Similar to the United States government's effort in promoting health information through conveying knowledge to the people, the Chinese government set to increase the public knowledge of health information through progressing health literacy levels among its citizens. The Chinese National Health Literacy Promotion Action Plan aims to increase the Chinese citizen's health literacy by 30% through healthcare investment, scientific advancement, and digital connectivity to keep up to date with its citizens [7]. The collective effort to promote health information to the public gives its citizens the arrangement to prepare for public prevention policies and also convey useful information in combating and alleviating the symptoms of the infectious disease if contracted.

4. General outline in the spread and preventive measures for the virus

The lack of public experience in restraining a pandemic, paired with the absence of preventive measures such as the vaccine, resulted in millions of humans worldwide contracting symptoms from the Covid 19 virus. The virus's life cycle involves a period of time in which the virus incubates within the host to multiply its genome and prepare for infecting other cells [8]. For coronavirus, this incubation period lasts for over six days. For the first few days of being contracted with the virus, the host experienced little to no symptoms. This results in the host being unaware that they have been infected. It creates the possibility of the individual interacting with the public and spreading the virus further, as it was highly contagious during incubation [9]. The substantial spike in coronavirus resulted in symptoms resulting in global health organizations initiating guidelines and countermeasures worldwide to minimize the damage done by the virus. The assignment of Personal Protective Equipment (PPE) such as masks, gloves, and gowns allows health providers to maintain their health while preventing the disease from spreading to other patients [10]. Hospitals and health clinics also made specific protocols to protect themselves and other patients from potential virus cases. Hospitals and health centers established specialized rooms in which patients with potential symptoms of Covid 19 are isolated from the rest of the hospital to protect the patient potentially with Covid 19 from other infectious diseases while protecting other patients from having contact with and contracting Covid 19. For severe symptoms of COVID 19, Intensive Care Units (ICU) centers were more discerning in terms of the selection of the patients due to the surge in patients who require critical care as the amount of rooms and resources in ICU were greatly limited [11]. The abnormal surge in patients needing critical care from the ICU has resulted in other patients with potentially more significant life-threatening diseases not receiving the medical intervention in time. The limited room in ICU has resulted in the World Health Organization pronouncing policies for home care for coronavirus in issues that are less life-threatening and less in need of medical intervention [12]. Regarding medication, the coronavirus being identified as a viral infection led to treatment plan updates as antiviral medications were rapidly produced and prescribed. The practice of telemedicine emerged in the time of Covid 19. It paved the way for medical professionals to instruct patients with less severe cases of COVID-19 on how to heal from the disease digitally. The practice of telemedicine was effective as the practice was not as time-consuming as in-person medical practice. In addition, patients did not have to leave their homes to see medical professionals; this allowed for the safety of the patients and prevented them from being exposed to other diseases. Nevertheless, the telemedicine practice hampered the patient-to-practitioner relationship as the patient and the practitioner did not receive the time and opportunities to form trust, and subsequently, the patient's symptoms and their severity may not be adequately diagnosed by the professional over the phone or without performing in-person diagnostic exams. The rapid adjustments made by hospitals in terms of regulating the protection for practitioners and patients have substantially curbed the spread of the virus within hospitals and minimized the damage done by the virus within society.

DOI: 10.54254/2753-8818/47/2024PJ0103

5. The policies of quarantine and social distancing

In order to further protect the public from the virus and prevent the spread of the virus nationally and globally, the World Health Organization calls for countries worldwide to initiate policies of quarantine and social distancing to limit the spread of the virus through person-to-person contact. The coronavirus, a respiratory virus, can only spread to other hosts through air particles that reach another person if they stand too close. The risk of contracting the coronavirus substantially decreases the more significant the distance another person is away from the source of the source. As such, the implementation of social distancing, in which the distance one person stands from another person is maintained at over six feet of length, significantly reduces the exposure of air particles to another human. Additionally, wearing a mask builds upon the effectiveness of social distancing. Wearing a mask helps to reduce the spread of the virus by physically blocking the air particles from reaching the other host. The three layers of textile fabric masks, being composed of one water-attracting layer or hydrophilic layer and two water-repelling layers or hydrophobic layers, remove any virus particles smaller than a pore within a fluid through inertia, impact, diffusion, and electrostatic attraction [13]. The innovative production of masks paired with social distancing policies has shown to be remarkably effective in preventing another host from being infected by the virus. When the COVID-19 carrier and another potential host are wearing a mask and standing more than six feet apart, the transmission rate between the carrier and the next host is shallow, with less than a one percent chance of transmission. In addition to social distancing, the World Health Organization also calls for the initiation of quarantine policies for all countries with active virus infections to further reduce the spread of the virus. Quarantine is the state of remaining isolated from the public by limiting the movement and interactions among people. The World Health Organization calls for countries around the world to limit the amount of outside contact people receive in order to forbid the potential of further infection. Different countries have different policies regarding quarantine and have yielded drastically different results.

6. US policies regarding social distancing

The United States implemented various levels of quarantine rules that range from individual to state levels of regulation. The US government implemented stay-at-home orders in which citizens of the United States were discouraged from outside activities, except for life-depending activities such as grocery shopping and critical hospital visits. The stay-at-home policies were effective in terms of limiting the spread of coronavirus domestically. By mitigating public exposure to the virus, the Stay-at-home policy successfully curbs the number of new coronavirus cases over time. The United States government further implemented domestic and international travel restrictions. In addition, some foreigners, depending on the location being departed from, were required to practice self-isolation in order to immediately isolate any confirmed cases as well as prevent the spread of foreign variants of COVID-19 into the United States. Lastly, the United States Centers for Disease Control and Prevention practiced contact tracking to identify individuals who have contracted the virus and inform other citizens who were in close proximity with the contracted individual to be aware of symptoms and prevent further spread of the virus [14]. Although contact tracing was effective in tracing travelers coming into the country, the process is done through volunteering. As such, contact tracing was only effective when the infected individual was identified, and this allows for infected individuals to remain anonymous in fear of the consequences following contact tracing.

7. UK policies regarding social distancing

Similar to the United States quarantine policies, the United Kingdom implemented similar restriction bans and public isolation policies. The United Kingdom implemented the "traffic light system" to screen for possible infections being carried by foreigners entering the country. The traffic light system categorizes different countries based on COVID-19 risk; travelers from the "red-listed" countries were subjected to immediate testing and quarantine in designated hotels by the government. Travelers arriving from "amber-listed" countries were required to practice self-quarantine and take COVID-19 tests at different checkpoints of the symptom's development. Travelers from "green-listed" countries were not

DOI: 10.54254/2753-8818/47/2024PJ0103

required to quarantine but were still required to test for symptoms of coronavirus [15]. Similar to the United States, the United Kingdom also initiated local quarantine policies in which the citizens of the UK were restricted from public interaction and movement. Similar to the effect of mass quarantine on the United States, the public quarantine policies in the United Kingdom saw great success through maintaining social distancing and increased individual awareness of the virus and possible symptoms. Lastly, the United Kingdom, in contrast to other countries, actively seeks to trace and maintain domestic protection against variants of the coronavirus. In response to the insidious growth in variants of the coronavirus, the UK implemented additional Coronavirus screen tests, such as PCR testing for travelers from red-listed countries in which variants of the virus may be a serious concern.

8. China policies regarding social distancing

In juxtaposition to the Western countries, the Chinese government regulations were more absolute and less lenient regarding public policies against COVID-19. The Chinese government implied a mandatory public quarantine policy in which the citizens of China were required to practice absolute self-isolation [16]. The Chinese government discontinued the restricted public access to public self-service shops such as supermarkets in order to reduce the amount of person-to-person contact. Furthermore, with the exception of occupations that concern the health of the society and the development of preventative measures against coronavirus, such as doctors, nurses, and scientists, the Chinese government has limited the number of people within occupational jobs in order to regulate the number of people within a specific area and maintain the order for societal progress. the Chinese government also requires a mandatory quarantine period of two weeks for foreigners traveling into the countries. The Chinese government also implemented travel bans, such as closing the border for any non-essential travel to China through airlines and temporarily terming public transportation, such as buses and trains, to discourage any travel to China [17].

9. The invention and effect of vaccines

In order to further protect humans from the symptoms of the virus and to prevent further contagion of COVID-19 to more countries, the leading countries in healthcare research and public health prevention collaborated internationally in order to invent a COVID-19 vaccine that would prepare and protect the host's body from the symptoms of the virus and prevent the virus from transmuting from vector to vector. The Coronavirus vaccine works in tandem with the human immune system in order to prime the body for defense against the invasion of the virus. The vaccine introduces a dead or severely weakened virus replica into the body through injection. The body's immune system, specifically the macrophage, detects the foreign virus and engulfs the viral particles, after which the macrophage communicates with the rest of the immune system and relays the biological makeup of the virus and primes the B cells to produce specific antibodies against that unique type of virus in parallel with the vaccine [18]. When a harmful virus attacks the body, the host's body immediately recognizes the virus and begins the production of antibodies against the virus. The United States and German health company, in collaboration with other health facilities around the world, developed both the first RNA and DNA Coronavirus vaccine, which has proven to be clinically effective in preventing symptomatic COVID-19 cases. The invention of the coronavirus vaccine marks a landmark in the field of medicine as the speed of development and effectiveness of the vaccine surpasses any previous developments in vaccines [19]. The technological advancement seen in the twenty-first century allows for a greater understanding of the function and categorization of viruses. The emergence of mass media through technology allows for the global communication of leading health facilities, which allows scientists to understand the structure of the virus quickly and speeds up the ramifications of the vaccine [20]. In addition, the advancement in manufacturing technologies allowed for the multiplication of the vaccine and distribution worldwide when the vaccine was proven to be clinically viable in treatment patients.

DOI: 10.54254/2753-8818/47/2024PJ0103

10. Conclusion

This article further analyzes the causes of the COVID-19 outbreak through its development process from the initial viral outbreak to a global pandemic. In terms of public health strategies, in the face of this health crisis, health organizations have adopted health initiatives for protection, prevention and promotion. In terms of promotion initiatives, health organizations such as WHO have released health information about the virus and its prevention methods, providing the public with correct guidance and systematic action plans. The conservation initiative includes major renovations to hospitals and medical centers to handle the surge in COVID-19 patients while also serving patients with other chronic conditions. In terms of preventive measures, different countries have implemented quarantine and social distancing policies to curb infection rates at home and abroad. The findings suggest that public quarantine policies in the United States and the United Kingdom were particularly effective in suppressing the spread of the virus. By promoting health regulations and enforcing social distancing through self-isolation, these policies have significantly reduced contagion rates. The Chinese government's previous quarantine policy has further significantly reduced the number of new coronavirus cases and protected people from virus-related symptoms. Additionally, the paper found that the development of vaccines played a key role in protecting patients from viral symptoms and preventing further outbreaks, marking an important step towards ending the outbreak. Although COVID-19 has greatly reduced the threat it poses to human health globally, the process of overcoming this problem is worth pondering. Future research also needs to further study the long-term effects and best practices of different prevention and control measures to provide reference for future public health crises.

References

[1] Centers for Disease Control and Prevention 2021 About COVID-19 Centers for Disease Control and Prevention https://www.cdc.gov/coronavirus/2019-ncov/your-health/about-covid-19.html#:~:text=COVID%2D19%20spreads%20when%20anmay%20contaminate%20surfaces%20they%20touch

[2] Cohen S. 2020 December 10. The fastest vaccine in history. UCLA Health. https://www.uclahealth.org/news/article/the-fastest-vaccine-in-history

[3] Centers for Disease Control and Prevention 2022 Explaining how vaccines work Centers for Disease Control and Prevention https://www.cdc.gov/vaccines/hcp/conversations/understanding-vacc-work.html

[4] Caldaria A Conforti C Di Meo N Dianzani C Jafferany M Lotti T Zalaudek I & Giuffrida R 2020 COVID-19 and SARS: Differences and similarities Dermatologic Therapy

[5] Horita N & Fukumoto T 2023 Global case fatality rate from COVID-19 has decreased by 968% during 25 years of the pandemic Journal of Medical Virology

[6] Levin-Zamir D Sorensen K Su T T et al 2021 Health promotion preparedness for health crises - a “must” or “nice to have”? Case studies and global lessons learned from the COVID-19 pandemic Global Health Promotion

[7] WebMD 2020 COVID-19 incubation period WebMD https://www.webmd.com/covid/coronavirus-incubation-period

[8] Burrell C J Howard C R & Murphy F A 2017 Virus Replication Fenner and White's Medical Virology 39–55

[9] Zaki N & Mohamed E A 2021 The estimations of the COVID-19 incubation period: A scoping reviews of the literature Journal of infection and public health 145 638-646

[10] Personal Protective Equipment - Overview Occupational Safety and Health Administration https://www.osha.gov/personal-protective-equipment

[11] Arabi Y M Myatra S N & Lobo S M 2022 Surging ICU during COVID-19 pandemic: An overview Current Opinion in Critical Care

[12] World Health Organization nd-a Coronavirus disease COVID-19: Home care for families and caregivers World Health Organization https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-covid-19-home-care-for-families-and-caregivers

DOI: 10.54254/2753-8818/47/2024PJ0103

[13] Rawal A 2020 Multi-layered masks to combat COVID-19 The Indian Journal of Medical Research
[14] CDC. 2022. Contact tracing. https://www.cdc.gov/museum/pdf/cdcm-pha-stem-lesson-contact-tracing-lesson.pdf
[15] Department for Transport 2021 Traffic light system: Safe return to international travel GOVUK https://www.gov.uk/government/speeches/traffic-light-system-safe-return-to-international-travel
[16] Huld A 2022 China travel restrictions 2021/22 - latest travel and entry requirements China Briefing News https://www.china-briefing.com/news/china-travel-restrictions-2021-2022-an-explainer-updated/
[17] Office of Infectious Disease and HIV/AIDS Policy OIDP 2024 April 4 Vaccines protect you. HHS.gov.
[18] Kashte S. Gulbake A. El-Amin III S. F. & Gupta A. 2021. COVID-19 vaccines: Rapid development implications challenges and future prospects. Human Cell.
[19] Wang Q Su M Zhang M & Li R 2021 Integrating digital technologies and public health to fight Covid-19 pandemic: key technologies applications challenges and outlook of digital healthcare International Journal of Environmental Research and Public Health 1811 6053
[20] Quon C M Walker M & Graves L 2023 The influence of mass media on the COVID-19 vaccination decision-making process: Prospective survey-based study Journal of Medical Internet Research