The Proceedings Ekonbiz 2024
ISBN: 978-99955-45-44-4
UDK: 615.451.3:341.231.14 ...

Submitted: 12.04.2024.
Accepted: 02.05.2024.
Review Article

ANALYSIS OF MANAGEMENT STRATEGIES FOR VIRAL RESPIRATORY INFECTIOUS DISEASES BASED ON ECONOMIC AND SOCIAL BENEFITS

Mao Renjie
Ural Federal University, Yekaterinburg, Russia
immunology214@qq.com
ORCID: 0009-0007-1009-7239

Astratova Galina Vladimirovna
Ural Federal University, Yekaterinburg, Russia
galina_28@mail.ru
ORCID: 0000-0002-3579-4440

Wang Juan
Ural Federal University, Yekaterinburg, Russia
yyoungpro@gmail.com
ORCID: 0009-0008-6862-3198

***Abstract**: **Background** Over the past few years, the COVID-19 epidemic has affected over 700 million people worldwide and resulted in a death toll of more than 6 million. The direct medical costs, as well as the indirect costs in terms of lost lives and productivity, have placed significant economic burdens on patients, the general public, and governments. Despite the conclusion of the pandemic, it is crucial to reflect upon the public health management and strategies employed by various countries during the COVID-19 crisis, identify any shortcomings, and enhance our public health management strategies to effectively tackle potential future epidemics. **Method** This study was based on public health data and related research papers from various countries during the COVID-19 epidemic. It conducted a retrospective evaluation of the main measures and factors for epidemic prevention and control in terms of economic benefits and social benefits. **Result** Restrictive measures had a negative impact on a country's economy and create social problems. The social benefits of vaccination largely depend on its scientific management. The placebo effect can have a positive impact on the economy and society. **Conclusion** Our research showed that mass vaccinations were not a reasonable solution to the epidemic. The placebo effect can produce economic and social benefits during the epidemic, but we need to try to find more economical methods.*

***Key words**: Covid-19, vaccines, placebo effect, management*

JEL classification: I18

1. INTRODUCTION

On March 11, 2020, Milan made an official declaration that the coronavirus (COVID-19) had reached global pandemic status. It wasn't until May 5, 2023, three years later, that the global pandemic caused by COVID-19 finally came to an end (Wise J, 2023). Over the past few years, the COVID-19 epidemic has affected over 700 million people worldwide and resulted in a death toll of more than 6 million (Cheng K, et al, 2023). The direct medical costs, as well as the indirect costs in terms of lost lives and productivity, have placed significant economic burdens on patients, the general public, and governments (Richards F, et al, 2022). Despite the conclusion of the pandemic, it is crucial to reflect upon the public health management and strategies employed by various countries during the COVID-19 crisis, identify any shortcomings, and enhance our public health management strategies to effectively tackle potential future epidemics.

2. SUBJECT

This study aimed to analyze public health management strategies for viral respiratory infectious diseases.

3. METHOD

This study was based on public health data and related research papers from various countries during the COVID-19 epidemic. It conducted a retrospective evaluation of the main measures and factors for epidemic prevention and control in terms of economic benefits and social benefits.

4. ANALYSIS

This study analyzed the management strategies of the COVID-19 epidemic from three aspects: restrictive measures, vaccines, and treatments.

4.1. RESTRICTIVE MEASURES AND HERD IMMUNITY

The global outbreak of COVID-19 has led to a wide array of government actions in response. These actions encompass various measures such as shutting down schools, imposing travel limitations, prohibiting large public gatherings, allocating emergency funds for healthcare infrastructure, introducing new social welfare programs, implementing contact tracing efforts, and other interventions aimed at curtailing the virus's spread, bolstering healthcare systems, and mitigating the economic effects of these measures (Hale T, et al, 2021). Throughout the course of the COVID-19 pandemic, several developed countries like Germany, Sweden, and Switzerland had witnessed various changes in their prevention and control strategies („POLICY RESPONSES TO COVID-19“, 2024). Notably, Sweden had openly suggested pursuing both active and passive herd immunity as a means to manage the spread of the virus („POLICY RESPONSES TO COVID-19“, 2024).

In the field of immunology, the term "herd immunity" refers to the resistance of a population or group to the spread of a contagious disease. This idea was first introduced in a publication called "The spread of bacterial infection: The problem of 'herd immunity'" by Topley and Wilson (Topley WW and Wilson GS, 1923). Herd immunity is only achieved when a significant portion of the population develops immunity to the specific pathogen, which in turn reduces the chances of transmission between infected and susceptible individuals (Smith DR, 2019). In simpler terms, if herd immunity is present, it becomes harder for the contagious disease to spread as the transmission chain is interrupted and susceptible individuals are safeguarded from infection. Herd immunity is derived from individual immunity, which is a process where the body's immune system detects and removes foreign substances, such as viruses and bacteria, to maintain good health. This immunity can be acquired by encountering and recovering from a disease or infection. Additionally, vaccination can also stimulate immunity. Herd immunity is typically achieved through widespread vaccination, like the smallpox vaccine, or when a large number of individuals become infected with a contagious illness, such as influenza (Xia Y, et al, 2020).

If we are to stop the spread of infection in the population through herd immunity, two-thirds of the population needs to be infected or vaccinated (Kwok KO, Lai F, Wei WI, Wong SYS, Tang JWT, 2020). This had led to serious debate about passive herd immunity (Kwok KO, et al, 2020). Active herd immunity through vaccines was generally considered a feasible solution and had been adopted by many countries. But the biggest challenge it faced was viruses that constantly mutate to produce antigenic escape (Suryawanshi YN and Biswas DA, 2023). It was for this reason that some researchers had once believed that classical herd immunity might not be applicable to COVID-19 (David MM, Gregory KF, Anthony SF, 2022). In fact, countries lifting prevention and control measures („POLICY RESPONSES TO COVID-19“, 2024) and being forced to adopt passive herd immunity were the most obvious reasons for the end of the COVID-19 pandemic („WHO COVID-19 dashboard“, 2024).

4.2. VACCINES AND NOCEBO EFFECT

We implemented active herd immunity through vaccines to combat COVID-19. Some COVID-19 vaccines had shown high efficacy against the coronavirus (Feikin DR, et al, 2022), and their effectiveness was enhanced with more vaccinations (McMenamin ME, et al, 2022). However, this effect would significantly decrease with time and virus mutation, which deserved vigilance (Link-Gelles R, et al, 2023, Lau JJ, et al, 2023). Studies had shown that COVID-19 vaccines did more than just prevent infection, but also reduced patients' risk of hospitalization and death (Lin DY, et al, 2022). It suggested that the vaccine was still valuable even if it lost its function of preventing the virus from infecting the human body. This was particularly important for potentially critically ill patients.

Researchers conducted a recent meta-analysis on COVID-19 vaccine trials, specifically focusing on the rates of adverse events. By comparing the adverse events reported by participants who received the vaccine to those who received a placebo injection, the study found that approximately one-third of participants who did not receive the vaccine experienced systemic adverse events such as headache and fatigue (Haas JW, et al, 2022). The "nocebo effect" is observed when an individual undergoes negative symptoms as a result of receiving a treatment that

lacks any pharmacological impact. This study showed that reports of adverse reactions to vaccines had a significant psychological impact on the public, and this will also bring more uncertainty to the effectiveness of active herd immunity. We should not ignore this. Considering the costs, effectiveness, and side effects of active herd immunity, it was worth considering whether COVID-19 vaccines should be widely administered during the coronavirus pandemic.

4.3. TREATMENTS AND PLACEBO EFFECT

Viral respiratory infections are usually self-limiting conditions that can be effectively managed with analgesia and rest (Van Doorn HR and Yu H, 2020, Peters S, et al, 2011). The COVID-19 treatment guidelines from the USA National Institutes of Health (NIH) („COVID-19 Treatment Guidelines“, 2024) clearly stated that the treatment modality for non-hospitalized patients with mild to moderate COVID-19 was symptom management. Antiviral drugs were only used to treat patients who were at high risk of developing severe COVID-19. The treatment for hospitalized adult patients with COVID-19 was sign-supportive care. This suggested that the primary treatment modality for COVID-19 patients was symptom management. The negative psychological effects of the epidemic and lack of understanding of the nature of the disease may prompt people to look for methods that can help them prevent and treat diseases. In fact, throughout most of the pandemic, we had no specific treatment for COVID-19. This mentality of the people will prompt them to seek help from medical institutions, thus placing a great burden on a country's public health system. This will lead to unnecessary financial expenditures and social problems for the country. The use of placebos is an existing and yet to be improved solution to this problem.

The placebo effect refers to the positive effects that come from the overall experience of a clinical encounter, including the treatment process and the relationship between the clinician and patient. This is different from the specific benefits that come from the actual effects of medical interventions. While a placebo (such as a sugar pill) is often used in scientific studies to understand the placebo effect, it is not always necessary to use a placebo in order to see these effects. The placebo effect can also enhance the effectiveness of medical treatments that have been proven to work. Additionally, the communication between practitioners and patients, both through words and actions, can create placebo effects even without the use of specific treatments (Miller FG, Colloca L, Kaptchuk TJ, 2009). Studies showed that placebos were effective in relieving pain and nausea, and that physical placebos were significantly more effective than pill placebos (Miller FG, Colloca L, Kaptchuk TJ, 2009). This suggested that the placebo effect of COVID-19 patients seeking treatment at a medical facility might be more pronounced than if they receive a placebo pill.

5. RESULTS

The following table (Table 1) summarized the evaluation of economic and social benefits of restrictive measures, vaccines, and placebos during the COVID-19 epidemic.

Table 1. The Evaluation of Economic and Social Benefits of Restrictive Measures, Vaccines, and Placebos

	Economic benefits	Social benefits
Restrictive measures	Negative	Negative
Vaccines	Negative	Positive*
Placebos	Positive*	Positive

**** Require specific conditions***

Restrictive measures were once used by many countries as a method to combat COVID-19 during the epidemic. However, this measure proved to be ineffective and was abandoned („POLICY RESPONSES TO COVID-19“, 2024). Countries lifted restrictive measures and ended the epidemic through passive herd immunity. Restrictive measures had a negative impact on a country's economy and create social problems.

Vaccination, as a means of active herd immunity, was used by some countries and had high hopes. Mass vaccinations could produce herd immunity over a period of time, but it faced many challenges, including limitations on effective time, virus mutation, and the nocebo effect. In terms of its contribution to the end of the epidemic, its cost was also too high. We cannot ignore the positive and negative psychological effects of mass vaccination on society. Vaccination, as a means of active herd immunity, can enhance people's confidence in fighting the epidemic. Media informing the public about potential vaccine adverse events may cause or contribute to the nocebo effect (Amanzio M, Cipriani GE, Bartoli M, 2021), and education on the nocebo effect may be helpful (Pan Y, Kinitz T, Stapic M, Nestoriuc Y, 2019, Ballou S, et al, 2022). In fact, the problems faced by social management during the epidemic may become more complicated depending on whether vaccination is available or not. Riots erupt in Austria over lockdown of unvaccinated residents (Ott JS, Edwards FL, Boonyarak P, 2021).

Therefore, the social benefits of vaccination largely depend on its scientific management.

The placebo effect is prevalent in various social activities during the COVID-19 pandemic. If there is a huge difference between the standards of clinical treatment guidelines („COVID-19 Treatment Guidelines“, 2024) and public expectations, the social benefits brought by the placebo effect will be immeasurable. If we try to consider the economic benefits of placebos, we should not consider the activities of health care institutions as the preferred way to achieve the placebo effect, although it may have more pronounced effects (Miller FG, et al, 2009). During the epidemic, it is very valuable to try to find other low-cost alternatives to achieve the placebo effect.

CONCLUSION

Our research showed that restrictive measures were not ideal for managing the COVID-19 outbreak because of their huge negative economic and social impacts. Mass vaccinations were not a reasonable solution to the epidemic and requires scientific management to be helpful. The placebo effect can produce economic and social benefits during the epidemic, but we need to try to find more economical methods. The experience in the prevention and control of the COVID-19 global pandemic provides valuable reference for improving public health management strategies for viral respiratory infectious diseases.

REFERENCES

[1] Wise J. (2023). Covid-19: WHO declares end of global health emergency. *BMJ*, 381, 1041.

[2] Cheng K, Wu C, Gu S, Lu Y, Wu H, Li C. (2023). WHO declares the end of the COVID-19 global health emergency: lessons and recommendations from the perspective of ChatGPT/GPT-4. *Int J Surg*, 109(9), 2859-2862.

[3] Richards F, Kodjamanova P, Chen X, Li N, Atanasov P, Bennetts L, Patterson BJ, Yektashenas B, Mesa-Frias M, Tronczynski K, Buyukkaramikli N, El Khoury AC. (2022). Economic Burden of COVID-19: A Systematic Review. *Clinicoecon Outcomes Res*, 14, 293-307.

[4] Hale T, Angrist N, Goldszmidt R, Kira B, Petherick A, Phillips T, Webster S, Cameron-Blake E, Hallas L, Majumdar S, Tatlow H. (2021). A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nat Hum Behav*, 5, 529-538.

[5] POLICY RESPONSES TO COVID-19. (2024). Retrieved 30.01.2024 from the website https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S

[6] Topley WW, Wilson GS. (1923). The spread of bacterial infection. the problem of herd-immunity. *J Hyg*, 21(3), 243-249.

[7] Smith DR. (2019). Herd Immunity. *The veterinary clinics of North America. Food Anim. Pract*, 35(3), 593–604.

[8] Xia Y, Zhong L, Tan J, Zhang Z, Lyu J, Chen Y, Zhao A, Huang L, Long Z, Liu NN, Wang H, Li S. (2020). How to Understand “Herd Immunity” in COVID-19 Pandemic. *Front. Cell Dev. Biol*, 8, 1-7.

[9] Kwok KO, Lai F, Wei WI, Wong SYS, Tang JWT. (2020). Herd immunity - estimating the level required to halt the COVID-19 epidemics in affected countries. *J Infect*, 80(6), 32-33.

[10] Suryawanshi YN, Biswas DA. (2023). Herd Immunity to Fight Against COVID-19: A Narrative Review. *Cureus*, 15(1), 1-7.

[11] David MM, Gregory KF, Anthony SF. (2022). The Concept of Classical Herd Immunity May Not Apply to COVID-19. *The Journal of Infectious Diseases*, 226(2), 195-198.

[12] WHO COVID-19 dashboard. (2024). Retrieved 30.01.2024 from the website https://data.who.int/dashboards/covid19/cases?n=c

[13] Feikin DR, Higdon MM, Abu-Raddad LJ, Andrews N, Araos R, Goldberg Y, Groome MJ, Huppert A, O'Brien KL, Smith PG, Wilder-Smith A, Zeger S, Deloria Knoll M, Patel MK. (2022). Duration of effectiveness of vaccines against SARS-CoV-2 infection and COVID-19 disease: results of a systematic review and meta-regression. *Lancet*, 399 (10328), 924-944.

[14] McMenamin ME, Nealon J, Lin Y, Wong JY, Cheung JK, Lau Eric HY, Wu P, Leung GM, Cowling BJ. (2022). Vaccine effectiveness of one, two, and three doses of BNT162b2 and CoronaVac against COVID-19 in Hong Kong: a population-based observational study. *The Lancet Infectious Diseases*,22(10), 1435-1443.

[15] Link-Gelles R, Levy ME, Natarajan K, Reese SE, Naleway AL, Grannis SJ, Klein NP, DeSilva MB, Ong TC,

Gaglani M, Hartmann E, Dickerson M, Stenehjem E, Kharbanda AB, Han J, Spark TL, Irving SA, Dixon BE, Zerbo O, McEvoy CE, Rao S, Raiyani C, Sloan-Aagard C, Patel P, Dascomb K, Uhlemann AC, Dunne MM, Fadel WF, Lewis N, Barron MA, Murthy K, Nanez J, Griggs EP, Grisel N, Annavajhala MK, Akinseye A, Valvi NR, Goddard K, Mamawala M, Arndorfer J, Yang DH, Embí PJ, Fireman B, Ball SW, Tenforde MW. (2023). Estimation of COVID-19 mRNA Vaccine Effectiveness and COVID-19 Illness and Severity by Vaccination Status During Omicron BA.4 and BA.5 Sublineage Periods. *JAMA Netw Open*, 6(3), 1-18.

[16] Lau JJ, Cheng SMS, Leung K, Lee CK, Hachim A, Tsang LCH, Yam KWH, Chaothai S, Kwan KKH, Chai ZYH, Lo THK, Mori M, Wu C, Valkenburg SA, Amarasinghe GK, Lau EHY, Hui DSC, Leung GM, Peiris M, Wu JT. (2023). Real-world COVID-19 vaccine effectiveness against the Omicron BA.2 variant in a SARS-CoV-2 infection-naive population. *Nature Medicine*, 29, 348–357.

[17] Lin DY, Gu Y, Wheeler B, Young H, Holloway S, Sunny SK, Moore Z, Zeng D. (2022). Effectiveness of Covid-19 Vaccines over a 9-Month Period in North Carolina. *New England Journal of Medicine*, 386(10), 933-941.

[18] Haas JW, Bender FL, Ballou S, Kelley JM, Wilhelm M, Miller FG, Rief W, Kaptchuk TJ. (2022). Frequency of Adverse Events in the Placebo Arms of COVID-19 Vaccine Trials: A Systematic Review and Meta-analysis. *JAMA Netw Open*, 5(1), 1-15.

[19] Van Doorn HR, Yu H. (2020). Viral Respiratory Infections. *Hunter's Tropical Medicine and Emerging Infectious Diseases*, 284-288.

[20] Peters S, Rowbotham S, Chisholm A, Wearden A, Moschogianis S, Cordingley L, Baker D, Hyde C, Chew-Graham C. (2011). Managing self-limiting respiratory tract infections: a qualitative study of the usefulness of the delayed prescribing strategy. *British Journal of General Practice*, 61(590), 579-589.

[21] COVID-19 Treatment Guidelines. (2024). Retrieved 30.01.2024 from the website https://www.covid19treatmentguidelines.nih.gov/management/clinical-management-of-adults/clinical-management-of-adults-summary/?utm_source=site&utm_medium=home&utm_campaign=highlights

[22] Miller FG, Colloca L, Kaptchuk TJ. (2009). The placebo effect: illness and interpersonal healing. *Perspect Biol Med*, 52(4), 518-539.

[23] Amanzio M, Cipriani GE, Bartoli M. (2021). How do nocebo effects in placebo groups of randomized controlled trials provide a possible explicative framework for the COVID-19 pandemic? *Expert Rev Clin Pharmacol*, 14(4), 439-444.

[24] Pan Y, Kinitz T, Stapic M, Nestoriuc Y. (2019). Minimizing drug adverse events by informing about the nocebo effect—an experimental study. *Front Psychiatry*, 10, 504.

[25] Ballou S, Iturrino J, Rangan V, Cheng V, Kelley JM, Lembo A, Kaptchuk TJ, Nee J. (2022). Improving Medication Tolerance: A Pilot Study in Disorders of Gut-brain Interaction Treated with Tricyclic Antidepressants. J Clin Gastroenterol, 56 (5), 452-456.

[26] Ott JS, Edwards FL, Boonyarak P. (2021). Global Responses to the COVID-19 Pandemic. Public Organiz Rev, 21(4), 619–627.