

# IMPLEMENTATION RESULTS AND IMPACT OF THE ZERO-COVID STRATEGY IN THE COVID-19 PANDEMIC: A SCOPING REVIEW

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## ABSTRACT

**Objectives:** Describe the advantages and impacts of the Zero-COVID strategy.

**Method:** The search strategy includes terms related to (1) Zero-COVID and (2) COVID-19 in PubMed/MEDLINE, and Science Direct. Original research papers on the advantages and impacts of the Zero-COVID strategy in English were selected for the study. Data from selected studies were extracted and classified into themes and topics. The PRISMA principles were used to perform a scoping evaluation of several medical databases.

**Results:** In total, this research includes nine studies. The Zero-Covid strategy has brought some positive impacts, including significantly reducing morbidity, mortality, and environmental pollution. However, the Zero-Covid strategy also brought certain restrictions, which had negative effects on mental health, job loss, and reduced income.

**Conclusion:** While the strategy achieved its healthcare and national security objectives to a certain extent, it also led to substantial and unpredictable social and economic repercussions. The long-term effects on GDP and education remain uncertain. This scoping review can help governments consider preventative measures should the COVID-19 pandemic return.

**Keywords:** Zero-COVID strategy, benefits, unwanted, COVID-19.

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## 1. INTRODUCTION

The COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus is a major health problem and significantly affects people’s lives worldwide. According to World Health Organization (WHO) data, as of October 5<sup>th</sup>, 2023, the total number of confirmed COVID-19 cases globally has reached approximately 771 million, and the total number of deaths has reached 6.96 million [1]. Therefore, some countries have adopted the Zero-COVID strategy to eliminate the virus as soon as a new case is detected. In contrast, many countries have chosen mitigation strategies to reduce the number of cases.

The Zero-COVID strategy, initially developed in China and implemented by countries like New Zealand, Australia, and Taiwan, aims to eliminate the transmission of the SARS-CoV-2 virus within a defined geographic area. The Zero-COVID strategy includes contact tracing, mass testing, border quarantine, lockdown, and social distancing measures. In addition, a report from the Institut Esconomique Molinari showed that the number of deaths when applying the Zero-COVID strategy was 44 times lower than that of other tough control strategies. Economic performance has also been better, as evidenced by GDP growth in countries applying the exclusion strategy has returned to pre-pandemic levels in 2021. Moreover, strategy Zero-COVID has also succeeded in reducing the burden

of disease and reducing pressure on the health sector. Although the Zero-COVID strategy can effectively control the spread of the virus by up to 96% [2], the implementation of this strategy significantly affects the socio-economic development of countries [3]. Furthermore, strict prevention and control measures during the pandemic have also affected the quality of life, caused by reduced social connections, lockdowns, and social distancing.

A question is raised about whether the Zero-COVID strategy should be widely implemented. Therefore, based on the available literature, we conducted this study to describe the advantages and impacts of the Zero-COVID strategy. The results from our research can provide synthesized evidence for policymakers to develop an appropriate healthcare emergency response in the future.

## 2. SUBJECTS AND RESEARCH METHODOLOGY

### 2.1. Study design

The scoping review methods is applied for this study.

### 2.2. Selection of studies

The main focus of this study was to describe the advantages and impacts of the Zero-COVID strategy in countries that have adopted it. The included studies in this scoping review adhered to the following selection criteria and exclusion criteria:

*Table 2.1. Inclusion and exclusion criteria*

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>• Written in English</li> <li>• Conducted and published from 2019 to 2023</li> <li>• Reported the Zero-COVID strategy</li> <li>• Open-access articles</li> </ul>	<ul style="list-style-type: none"> <li>• Reviews, conference abstracts, editorials, books/book chapters, etc.</li> <li>• No results about the the Zero-COVID strategy and its advantages/disadvantages</li> </ul>

### 2.3. Search strategy and data retrieval

The search strategy consisted of terms about “Zero-COVID” and “COVID-19”. Search terms for each component are presented in Table 2.1. The terms were combined using Boolean operators (AND, OR, and

NOT) to form a complete search strategy. The search strategy was performed on PubMed/Medline and Science Direct. Studies published before June 2023 were downloaded and included in the dataset.



Table 2.2. Search terms

Component	Search terms
Zero-COVID	zero-COVID, zero COVID, zero COVID-19, zero COVID-19, elimination policy, elimination strategy, eradication strategy, eradication policy
COVID-19	COVID-19, SARS-CoV-2, covid-19 pandemic, coronavirus disease, coronavirus, 2019-nCoV

Search results were downloaded from databases and imported to Zotero. All titles and abstracts retrieved from the literature search were screened to determine whether the studies met the eligibility criteria.

**2.4. Study selection**

The studies were extracted in a two-stage process. In the first stage, titles and abstracts of all search results were screened. Studies that did not focus on the research topic (Zero-COVID strategy) were excluded. The studies that met the selection criteria in the first stage were then downloaded in full text and moved forward to the second stage. In the second stage, full-text articles were assessed, and data from selected studies were extracted into an Excel form.

**2.5. Data extraction and analysis**

Each article was assigned a unique ID number for

further analysis by four independent research team members. Extracted data included (1) Title and authors, (2) Year of publication, (3) Study design, (4) Study period, (5) Countries, (6) Sample size, and (7) Results/ Impact of the Zero-COVID strategy. Findings were then summarized into themes, namely the benefits and unwanted impacts of Zero-COVID.

**2.6. Ethics in research**

This study has been accepted by the scientific council of the School of Preventive Medicine and Public Health, Hanoi Medical University.

**3. RESULTS**

**3.1. General characteristics**

**3.1.1. Results of the research**

Figure 3.1. The selection process for paper

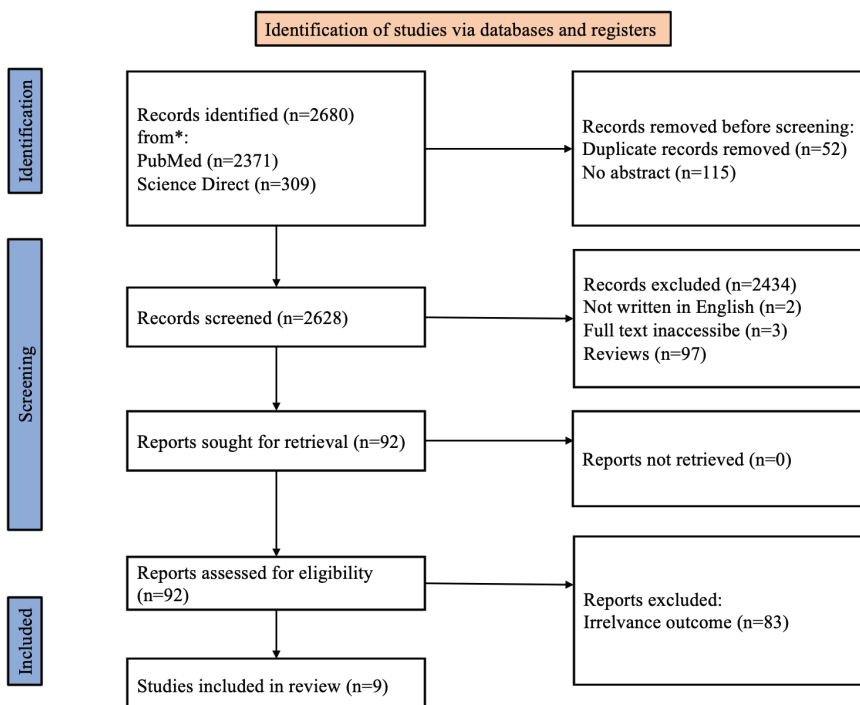


Figure 1 illustrates the process of selecting papers as well as the number of studies included and excluded in each step. The primary search on two databases identified 2628 papers. A total of 52 duplicates were removed by manually screening titles and abstracts, and 2434 publications were excluded. The remaining

92 papers underwent full-text screening, and 83 were excluded due to irrelevance outcomes. 9 articles that met the inclusion criteria and were selected for further analysis.

**3.1.2. Study characteristics**

*Table 3.1. General characteristics of the included studies*

Study	Study design	Year of study	Countries	Sample size
Brian J Hall et al	Cross-sectional study	2022	China	3230
Lara B Aknin et al	Longitudinal analysis	2021	15 countries	432.642
Wei Wang et al	Cross-sectional study	2020	China	-
Blair Mason et al	Cross-sectional study	2020	New Zealand	3560
Huan Wang et al	Cross-sectional study	2020	China	726
Wen-Jun Tu et al	Cross-sectional study	2022	China	9.640.788
Xu Liu et al	Cross-sectional study	2022	China	2493
Lan Wang et al	Cross-sectional study	2022	China	480.747
Michael König et al	Cross-sectional study	2020	Countries	44

Of the 9 selected articles, only one was a longitudinal analysis, the others were cross-sectional studies. Many of the studies have been undertaken since 2020. Studies on the Zero-COVID strategy are conducted in Asia including China, as well as Oceania including New

Zealand, and Australia. Samples were taken from the group of participants in each study.

**3.2. The benefits and unwanted impacts of the Zero-COVID strategy**

*Table 3.2. Benefits of the Zero-COVID strategy*

Impacted aspects	Study	Results
Morbidity and mortality	Lara B Aknin et al	The daily COVID-19 mortality rate is lower compared to countries implementing a mitigation strategy ( $\beta = -0.112$ [95% CI $-0.223$ to $-0.001$ ])
	Huan Wang et al	10 cases of COVID-19 infection, 0 deaths
	Lan Wang et al	The annual HIV infection rate decreases by 5.2450% (from 4.4143 to 4.1827 per 100,000 people, $p < 0.001$ )
	Wen-Jun Tu et al	A reduction of 12.6% in hospital admissions due to stroke fell
Fracture rate	Blair Mason et al	37% reduction in the number of children presenting with paediatric orthopaedic 40% reduction in total fractures 27% reduction in soft tissue injuries 55% reduction in infections 54% were treated at home without surgical intervention 17% of fractures manipulated using procedural sedation 14% of soft tissue injuries are managed in the procedure room 15% had procedures in the operating theatre



Impacted aspects	Study	Results
Environment	Wei Wang et al	Pollution levels decreased (the mean concentrations of PM <sub>2.5</sub> , PM <sub>10</sub> , NO <sub>2</sub> , SO <sub>2</sub> and CO have decreased by 28.57%, 35.85%, 45.39%, 35.20%, 38.58% respectively, while that of O <sub>3</sub> increased by 52.49%) The mean molecular weight (MW) decreased slightly The changing rates for each subgroup vary from -7.09% to -31.95% A basic component of the oxygenated organic aerosol, CHO compounds have a mean decreasing rate of 24.73%

A total of 9 articles were found, of which 3 explored the rate of morbidity and mortality, 1 on fracture rates, and 1 on the environment.

The Zero-COVID strategy has yielded positive outcomes for countries implementing it. Evidence indicate that such countries experience fewer daily

deaths. Additionally, there have been significant reductions in morbidity and mortality rates, as well as a decrease in pediatric trauma-related hospital admissions. Furthermore, the strategy has led to a reduction in environmental pollution, with decreased concentrations of various pollutants.

*Table 3.3. The unwanted impact of the Zero-COVID strategy*

Impacted aspects	Study	Results
Mental health	Brian J Hall et al	20.1 % for anxiety based on GAD-7 3.8 % for suicidal ideation based on ASQ
	Xu Liu et al	16.5% had problems with psychosocial functioning
Income, employment	Brian J Hall et al	1 in 5 individuals report job loss, with 6.8% experiencing permanent unemployment. 69.2% suffer income loss 30.7% experience over 50% income loss
	Huan Wang et al	74% cease employment. 92% experience income reduction in the second month, 82% in the third month, and 91% in the fourth month after implementing the lockdown
Healthcare	Huan Wang et al	62% are impacted by healthcare activities in the second month, 45% in the third month, and 44% in the fourth month
	Wen-Jun Tu et al	A rise of 18% in the mortality rate attributed to cerebrovascular disease
	Lan Wang et al	An increase of 14.1076% in the mortality rate due to HIV
Economy	Michael König et al	The quarterly GDP decreases by 0.08%
Education	Huan Wang et al	In the fourth month after the lockdown, 60% of students and teachers engage in fewer discussions 58% lack any supervision of students' academic progress 48% of students do not actively listen in class 54% lack guidance for their homework assignments

The Zero-COVID strategy, despite its benefits, also carries drawbacks. It negatively affects people's mental health, causing anxiety disorders and even contemplation of suicide. Job loss and reduced income rates have risen significantly, impacting a

substantial portion of the population. The lockdown measures have disrupted healthcare access, leading to increased mortality in certain health conditions like cerebrovascular diseases and HIV-related deaths.

Moreover, the strategy's long-term effects are hard to predict, as it has led to a reduction in GDP and disruptions in education due to school closures. Overall, although the strategy may attain its objectives related to healthcare and national security, it brings about substantial and unpredictable social and economic repercussions.

## **4. DISCUSSION**

### **4.1. The benefits of the Zero-COVID strategy**

The Zero-COVID strategy has demonstrated several positive outcomes for countries that have adopted this approach. These results have highlighted the effectiveness of the Zero-COVID strategy in combating the COVID-19 pandemic. The daily mortality rate is lower compared to countries employing a mitigation strategy, reflecting the success in controlling virus transmission and reducing the impact of COVID-19-related deaths in the community. Since March 26, 2020, New Zealand has implemented an elimination strategy involving the closure of all non-essential businesses, restrictions on public transportation, social distancing, and hand hygiene measures. This has contributed to a reduction in hospital admissions related to injuries in children [5].

Furthermore, to curb the transmission of COVID-19, the Chinese government swiftly implemented nationwide lockdown measures starting from January 25, 2022. These measures include compulsory isolation, closing nonessential public facilities, restricting transportation and contacts. As a result, anthropogenic activities like industrial production and vehicle emission were highly reduced, and the level of air pollutants was observed to plummet correspondingly. Specifically, key air pollutants, including PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, and CO, decreased by 28.57-45.39%, while O<sub>3</sub> levels increased by 52.49% [6].

### **4.2. The unwanted impacts of the Zero-COVID strategy**

However, it is important to acknowledge that while the Zero-COVID strategy has yielded positive results, it has also posed significant challenges and limitations in various aspects of social life. Research conducted in Shanghai during the peak of the lockdown period revealed a high burden of mental

health issues, with 26.1% of the total population meeting depression screening criteria, 20.1% for anxiety, and 3.8% reporting suicidal ideation [7]. In addition, the Zero-COVID strategy has had an impact on healthcare needs, especially for urgent and chronic cases. The mortality rate has shown a significant increase in cases of cerebrovascular diseases (18%) and an increase in deaths related to HIV (14.1076%) [8]. Hospitalized patients also faced a higher financial burden, potentially due to the government's quarantine policies. Despite potential benefits in healthcare and national security, the long-term adverse effects of the Zero-COVID strategy remain uncertain.

Furthermore, the implementation of the Zero-Covid strategy has resulted in many people experiencing temporary or permanent unemployment and facing economic difficulties. Even those who managed to retain their jobs have often received reduced salaries or were not paid as usual, further exacerbating economic hardships. A study by Huan Wang et al showed that 74% of the population stopped working, and 91% experienced income reductions [8].

Additionally, to maintain a high employment rate, the government has also been making efforts to minimize the impact of these regulations on students' education by leveraging online learning and parental support. China is one of the few countries with internet connectivity in remote and rural areas, making distance learning feasible during quarantine periods. However, internet connectivity issues remain a significant barrier for many. Numerous households lack suitable electronic devices for online learning. A study by Huan Wang et al found that 58% of students reported having no supervision or tutoring during their online learning sessions, significantly affecting the quality of their online education [8].

### **4.3. Strengthens and limitations**

Although this study met its objective by describing the advantages and impacts of the Zero-COVID strategy, some limitations should be acknowledged. Due to the short period of data collection, there is a possibility of missing studies relevant to the Zero-COVID strategy. Only English papers were included in this review, hence, some valuable information might be left out. Moreover, as this review did not assess the quality of each study, there might be some evaluation bias.





Despite the limitations, this review provides an overview of the advantages and impacts of the Zero-COVID strategy. Compared to the previous scoping and narrative review [9] countries across the globe have adopted either a mitigation or an elimination policy, such as the zero-COVID-19 strategy. However, further research is needed to systematically investigate the advantages of the zero-COVID-19 strategy in the literature. To bridge the research gap, this study examines the zero-COVID-19 strategy in terms of its advantages as a global anti-pandemic framework. Methods: A literature review was conducted in PubMed, PsycINFO, and Scopus to locate academic articles that discussed the advantages of the zero-COVID-19 strategy. Braun and Clarke's thematic analysis approach was adopted to guide the data analysis process. Results: The findings of our study show that the advantages of the zero-COVID-19 strategy range from short-term (e.g., limited virus infections, hospitalizations, and deaths. Moreover, our review extracted data from various databases, including PubMed/MEDLINE, and ScienceDirect so it can cover the majority of available literature. The included studies in our review are original research in internationally indexed journals so the research results are highly reliable.

## 5. CONCLUSION

This scoping review summarizes the existing evidence on the advantages and impacts of the Zero-COVID strategy. The Zero-COVID strategy has had favorable outcomes, such as reduced daily deaths, lower morbidity and mortality rates from COVID-19, and a drop in pediatric trauma-related hospital admissions. It has also led to decreased environmental pollution. Nevertheless, it has drawbacks, including negative impacts on mental health, increased job loss and income reduction for many, disruptions in healthcare access, and higher mortality in specific health conditions such as cerebrovascular disease. The long-term effects on GDP and education remain uncertain. Especially, this scoping review can help governments consider preventative measures should the Covid-19 pandemic return in the future.

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## CONFLICTS OF INTEREST

There are no conflicts of interest declared by the author(s).

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