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Analysis of Prevention Factor in the Context of Health Security during Covid-19 Pandemic in India

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ABSTRACT: As the most populous country in the world, India faces challenges in various sectors, especially the health security sector during the COVID-19 pandemic. One important factor in minimizing the spread of COVID-19 is implementing Prevention. Prevention is very necessary to protect the community from potential infection by disease and other negative health impacts. This study aimed to determine and analyze prevention factors in the context of health security during the COVID-19 pandemic in India. This study used a descriptive method and applied a qualitative approach. The data sources are secondary data (journals, archives, books, documents). The data collection technique is a literature review, and the data analysis is bibliographic. The result is that India ranks 66th out of 195 countries in the 2021 Global Health Security Index (GHSI) report, with a total index score of 48.8. The category with the highest index score in health security is risk management, which is 60.2, and the category with the lowest index score of 29.7 is Prevention. There are two indicators in the prevention category that India does not have: the Biosafety indicator and Dual-use research and culture of responsible science. The government can improve prevention capabilities in the context of health security against the potential for future outbreaks by creating a system for these two indicators. The Indian government has implemented several prevention strategies in dealing with COVID-19, such as health awareness campaigns, issuing various health guidelines and protocols, and launching mobile applications (mHealth). Even so, the government has several challenges in implementing Prevention, such as limited health infrastructure and community compliance with applicable health regulations.

KEYWORDS: COVID-19, Health Security, Prevention

I. INTRODUCTION

COVID-19 is not the first pandemic experienced by humanity. The globe is developing capacities for the early identification of outbreaks, such as the National Public Health Institute, Global Outbreak Alert and Response Network, and Medical Intelligence. Even while the international system has issued warnings, this is still insufficient for countries to cope. According to the Global Health Security Index (2019), no country was adequately equipped to deal with an epidemic or pandemic. One country with a big challenge in dealing with the COVID-19 pandemic is India. As the country with the largest population in the world (UN, 2023), India faces challenges in various sectors, especially the health security sector and the availability of public health infrastructure. The cumulative total number of positive COVID-19 cases in India as of February 2025 was 45,044,607 cases and ranks third as the country with the most cases in the world and fourth with the highest number of deaths due to COVID-19 with a total of 533,622 deaths (WHO, 2025).

The Global Health Security Index (GHSI) can be used to determine a country's health security capabilities. It analyzes a country's health security holistically, considering the broader environment, such as biological threats in each country, geopolitical concerns, the robustness of the health system, and the government's preparedness to manage an epidemic. This report's framework consists of six categories, 37 indicators, 96 sub-indicators, and 171 questions. Prevention, detection and reporting, rapid response, health system, commitments to enhance national capability and financing, global norms, and risk environment are the categories or pillars of health security (GHSI, 2021). One of the important factors influencing the handling of COVID-19 is Prevention in the context of health security. Prevention is essential to protect the public from potential infection with disease and other negative health impacts (CDC, 2024).



This study aims to determine and analyze prevention factors in the context of health security during the COVID-19 pandemic in India. This study is expected to be a reference and recommendation for related parties to determine policies to increase preventive factors in anticipating potential outbreaks in the future.

II. RESEARCH METHODOLOGY

This study used a descriptive method and applied a qualitative approach. The data sources are secondary data (journals, archives, books, documents). The data collection technique is a literature review, and the data analysis is bibliographic.

III. RESULT

India ranks 66th out of 195 countries in the 2021 GHSI report, with a total index score of 48.8, down -0.8 from 2019. The category with the highest index score in the health security context is risk management, which is 60.2, followed by policies made and implemented in health service centers. Prevention has the lowest index score of 29.7 and is ranked 85th by category. Here is Figure 1. Which shows each category's index score and ranking in India's health security context.

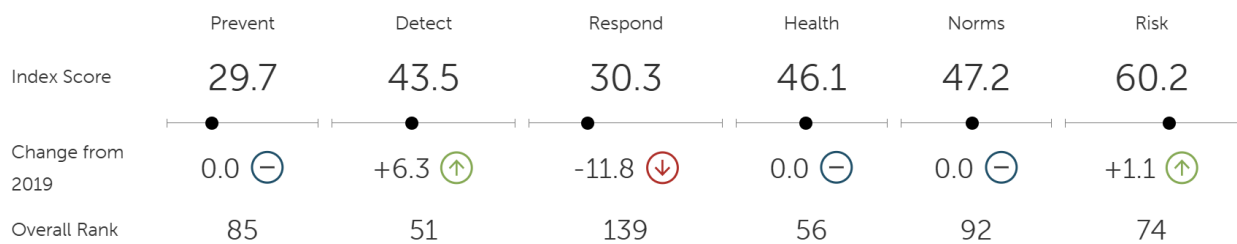


Figure1. India Health Security Index (Source: GHSI, 2021)

The prevention factor is the focus of this study because the index score is the lowest. Several indicators are related to the prevention category: antimicrobial resistance (AMR), zoonotic disease, biosecurity, biosafety, dual-use research, culture of responsible science, and immunization. The following is Figure 2—score values in the prevention category.

Indicator	Index Score & Change from 2019	Rank
1.1) Antimicrobial resistance (AMR)	50.0 0.0 ⊖	84 / 195
1.2) Zoonotic disease	29.3 -0.2 ⊖	55
1.3) Biosecurity	24.0 0.0 ⊖	58
1.4) Biosafety	0.0 0.0 ⊖	70
1.5) Dual-use research and culture of responsible science	0.0 0.0 ⊖	13



Indicator	Index Score & Change from 2019	Rank
1.6) Immunisation	75.0 0.0 ⊖ —●—	43

Figure2. India’s Index score Prevention Category by indicators. (Source: GHSI, 2021)

There are two indicators in the prevention category that India does not have: the Biosafety indicator and Dual-use research and culture of responsible science.

IV. DISCUSSION

Based on GHSI data (2021), India ranks above 40 in several indicators in the prevention category, such as immunization, zoonotic disease, Biosecurity, and Antimicrobial resistance (AMR). Despite not having a biosafety indicator, India still ranks 70th out of 195 countries, and even the absence of dual-use research and a culture of responsible science indicators still places India in 13th place globally. Many countries do not have these two indicators, especially low-middle-income countries. The reason is limited resources and technical capabilities, so the biosafety management system is difficult to apply (Relle et al., 2021). In addition, Biosafety is also regulated by various international instruments such as the WHO International Health Regulations and the Biological Weapons Convention (BWC) (Safdar et al., 2023). Biosafety is an important component of the global health security system, helping to prevent biological disasters that can have wide-ranging impacts (Gao, 2019). Biosafety includes safely handling and controlling infectious microorganisms and hazardous biological materials to prevent the spread of disease and protect public health (De Souza et al., 2023). Stronger international cooperation is needed to prevent health insecurity and ensure effective biosafety measures (Zavriev, 2022). In other indicators, Dual-use research and a culture of responsible science are also not widely owned by countries worldwide. This indicator has advantages and disadvantages, and these two sides are difficult to assess. Dual-use research in the life sciences can advance public health but poses risks if misused, such as in bioterrorism or accidental release of pathogens (Evan, 2020).

In the context of prevention during the COVID-19 pandemic, the government has implemented various strategies and initiatives to control the spread of the virus and protect the public. Among them, the launch of a public awareness campaign promoting the use of masks, social distancing, good hand-washing movements, and education related to effective sanitation, as well as education on how to increase immunity and mental health through traditional systems such as Ayurveda, Yoga, and Homeopathy by the Ministry of Health and Family Welfare (Kotecha, 2021). The launch of this campaign coincided with the issuance of health guidelines and protocols related to the prevention and management of COVID-19 based on standardization from WHO and the Indian Council of Medical Research recommendations (George et al., 2021). The government also complements the strategy with technology empowerment in various aspects. One of the existing mobile application-based technologies is mobile health or mHealth. This mobile application focuses on disseminating prevention strategies, monitoring individuals, especially those confirmed positive for COVID-19 and who must be quarantined, and tracing close contact with people around them (Bassi et al., 2020). In its implementation, the Indian government faces challenges and obstacles in the prevention process to minimize the spread of COVID-19 so that it does not spread further. Factors influencing it include many people who do not use masks or personal protective equipment for health workers who work directly with COVID-19 patients. This situation happened because, at the beginning of the pandemic, the availability of Medical Devices was still very limited. In addition, health infrastructure and health services are not yet optimal, thus hampering patient safety, and infection control measures can be carried out (Garg et al., 2020).



V. CONCLUSION

There are two indicators in the prevention category that India does not have: the Biosafety indicator and Dual-use research and culture of responsible science. The government can improve prevention capabilities in the context of health security against the potential for future outbreaks by creating a system for both indicators. During COVID-19, the Indian government has implemented several prevention strategies such as health awareness campaigns, issuing various health guidelines and protocols, and launching mobile applications (mHealth). The government has several challenges in implementing prevention, such as limited health infrastructure and community compliance with applicable health regulations

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