



Sabhpathige, R., Deerasinghe, D. (2023). Sri Lankan Health System Response to the Covid-19 Pandemic: A Post Evaluation to Assess the Strengths and Weaknesses by Using Health Systems Approach. *Journal of Health Systems and Policies (JHESP)*, V, 135-151, DOI: 10.52675/jhesp.1344195

Sri Lankan Health System Response to the Covid-19 Pandemic: A Post Evaluation to Assess the Strengths and Weaknesses by Using Health System Building Blocks

Ranga SABHAPATHIGE¹ 
Dilrukshi DEERASINGHE² 

ABSTRACT

The COVID-19 pandemic spread across the globe, threatening almost all health systems, from the strongest to the most vulnerable, and the Sri Lankan health system was no exception. Since the COVID 19 pandemic became a serious public health threat in China, India, and other parts of the world, Sri Lanka has been on high alert and ready to respond. The purpose of this research is to describe how Sri Lanka's health system dealt with the COVID-19 pandemic using the World Health Organization's health systems building blocks framework, to assist policymakers in better understanding the deficiencies and planning future crisis management. COVID-19-related documents about Sri Lanka were manually and electronically searched, including peer-reviewed articles in local and international journals, government publications such as circulars, guidelines, and reports, WHO and World Bank publications, local and international news websites, publications, and websites of non-governmental organizations. The Sri Lankan health system responded in a proactive and multi-sectoral manner. Before the pandemic hit the country, the hospital system and a

¹ Visiting Research Fellow, University of Kent, Canterbury, United Kingdom

² Base Hospital, Panadura, Sri Lanka

* Corresponding author: Ranga SABHAPATHIGE, rangasabhpathige@gmail.com

well-established preventive health sector were prepared. However, issues such as human resource shortages, drug shortages, and other medical equipment shortages, as well as financial constraints, were difficult to manage. Delays in decision-making during the third wave led to negative outcomes for the country. However, the country was protected during the fourth wave due to committed vaccination and other timely preventive measures.

Keywords: Building Blocks Approach, COVID-19, Health System, Response, Sri Lanka

INTRODUCTION

COVID-19 is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and is a global public health issue with the ability to transmit from person to person across geographical boundaries in a short period. COVID-19 was initially identified in December 2019 after an epidemic in China's Hubei province. It has spread to various countries around the world by the beginning of March 2020, and the world health organization (WHO) designated it a pandemic on March 11, 2020 (WHO, 2020a). As a result, since the COVID 19 pandemic became a serious public health threat in China, India, and other parts of the world, Sri Lanka has been on high alert and ready to respond (Liyanapathirana et al., 2020), as being prepared for any type of emergency health threat is a key feature of a resilient health system (Legido-Quigley et al., 2020).

Sri Lanka's citizens have access to free health care through a well-defined preventive and curative sector (Ministry of Health, 2018). A network of tertiary and secondary care facilities, divisional hospitals (outpatient and inpatient treatment) and primary medical care units (outpatient care) provide curative services. The medical officer of health (MOH) and his colleagues provide preventive services to the entire island through health units. The public sector provides approximately 95% of inpatient care, and 50% of outpatient care (Ministry of Health, 2021).

In an international context, Sri Lanka's health system has been identified as a high-impact, low-cost model (Perera et al., 2019). This achievement was primarily due to the following factors: free care at the point of delivery since 1951; the adoption of preventive and primary care systems since 1926; and

the establishment of a large network of accessible primary health care services. The Ministry of Health oversees the overall stewardship and monitoring of government health services throughout the country. A minister and a secretary lead the Ministry. The technical head of the Ministry is the Director-General of Health Services (DGHS). Provincial health services are overseen by a Provincial Ministry of Health led by a Provincial Minister of Health. The work of the provincial health ministry is guided by the Ministry of Health and vertical programs (Ministry of Health, 2021).

The main objective of this paper is to describe how Sri Lanka's health system dealt with the COVID-19 pandemic using the WHO health systems building blocks framework, to help policymakers better understand the strengths and weaknesses, and to plan future crisis management.

METHODOLOGY

This non-systematic document review was conducted from January 1, 2020, to January 1, 2022, to review COVID-19-related documents about Sri Lanka. Peer-reviewed articles in local and international journals, government publications such as circulars, guidelines, and reports, WHO and World Bank publications, local and international news websites, publications, and websites of non-governmental organizations were manually and electronically searched. Articles were chosen for inclusion in the study by two authors based on the eligibility criteria and subjected to a rigorous verification process. Both members were given access to the relevant documents. Each member read through all the documents and highlighted the sections that were relevant to them. The data that was highlighted was entered into an Excel sheet under components of health system building blocks.

Health Service Delivery

During an infectious disease pandemic, both preventive and curative services must be well organized to provide effective service delivery to the public, which would not be possible in the face of a shortage and misdistribution of qualified staff, inadequate drugs, and medical supplies, and a lack of equipment and infrastructure (Hanson et al., 2003).

Curative Sector Response

Sri Lanka's curative sector response during the first and second waves was somewhat different from that of other countries, admitting all COVID-19 positive individuals to COVID-19 treatment hospitals without considering disease severity and admitting COVID-19 suspected patients only to designated hospitals. Although it appeared to be effective in preventing community spread, it had to be changed during the third wave due to rising caseloads, with only symptomatic patients being hospitalized (Epidemiology Unit, 2020).

Expansion and Improvement of Patient Management Facilities in Hospitals

At the beginning of the pandemic, there was only one hospital in the country equipped to manage highly infectious diseases: the National Institute of Infectious Diseases, with a 100-bed capacity.

By the end of 2020, hospitals had been strengthened by increasing the number of beds available to treat COVID-19 patients and increasing the number of ICU beds and high dependency units (HDU) available to treat critically ill patients. In addition to these measures, the Ministry of Health established a home-based care system to manage asymptomatic and mildly symptomatic patients at home with telemedicine facilities. Later, it was increased to up to 98 hospitals subsequently with the increase of suspected and confirmed cases, with a separate four hospitals to manage COVID-19 suspected pregnant mothers in May 2021 (Ministry of Health, 2021).

Many circulars and guidelines related to clinical management and outbreak control were prepared and issued by the Ministry of Health with the participation of relevant specialists, including provisional clinical practice guidelines, guidelines on the preparation of healthcare institutions to face pandemics, guidelines on the rational use of personal protective equipment (PPE), and infection control guidelines (Ministry of Health, 2020).

Expansion of Hospital Diagnostic Facilities

In order to increase COVID-19 RT-PCR testing capacity, the Ministry of Health facilitated the establishment of PCR testing laboratories in several hospitals. A focal point was established at the Ministry of Health to monitor the performance

of the country's PCR laboratories (Athapattu et al., 2021). These prompt measures enabled the expansion of testing capacity in 37 PCR laboratories from 600 to 22,000 tests per day by April 30, 2021 (Ministry of Health, 2021).

To Improve The Safety Measures to Prevent The Spreading of Infection from Patient to Patient as well as Patient to Health Care Workers

Providing efficient, high-quality care while guaranteeing the safety of workers and limiting the exposure of other patients during the epidemic was a challenge. However, the ministry of health recognized this as a sensitive and critical issue and collaborated with WHO and the Sri Lankan College of microbiologists to develop a set of training modules for frontline healthcare workers [HCW] on COVID-19 infection prevention and control [IPC] guidelines in Sri Lanka (WHO, 2020b).

Aside from that, the Ministry of Health has established a 1,390 emergency hotline where the public can get free medical consultation on COVID-19 symptoms. Patients with COVID-19 symptoms could contact this number instead of going to the hospital for help. A devoted doctor verifies the symptoms over the phone and, if necessary, assists in the patient's admittance to a hospital, as well as assisting with the dispatch of a free ambulance through the "1990 Suwasariya" service. By knowing the information about the patients coming to hospitals beforehand, healthcare workers could be able to take the necessary protective measures (Economynest, 2020).

Maintain Essential Routine Services, Emergency, and Potential Emergency Management Services During The Outbreak Period

During the pandemic, healthcare utilization fell by nearly a third, with the decreases being greater among those with less severe illnesses (Moynihan et al., 2021). In a modeling study, it was estimated that a reduction in essential maternal and child health services may result in more than a million additional child deaths worldwide (Timothy and Carter, 2020).

During the outbreak period, however, the Sri Lankan ministry of health issued guidelines on managing essential routine services, emergency, and potential emergency management services. Although some aspects of reproduc-

tive, maternal, and child health services were disrupted, most essential health services, such as antenatal care, postpartum care, and newborn care, were available throughout the pandemic. Institutional deliveries and skilled birth attendance remained unaffected (Silva and Jayakody, 2020). During this time, the ministry of health made the necessary arrangements to ensure the continuous supply of drugs to non-communicable diseases and other chronic patients by delivering monthly drug requirements from hospitals to patients' homes via Sri Lanka post, approving the delivery of two months' drug requirements to patients, and allowing them to open private pharmacies even during strict curfew periods (Wanigasinghe et al., 2021).

Preventive Sector Response

Intensify Case Finding, Contact Tracing, Monitoring, Quarantine of Contacts, and Isolation of Cases

To reduce the spread of disease from foreign travelers, the Sri Lankan government strengthened quarantine measures under the Quarantine and Prevention of Diseases Ordinance No.03 of 1897; all of them were quarantined after March 27, 2020 (GoSL, 1897). Cases were transferred to the specialized COVID-19 treatment hospitals once they were detected in hospitals and in the community, regardless of symptoms, to reduce the caseload in the community. PHIs tracked down all the contacts of the positive cases. The Epidemiology unit coordinated Covid-19 contact tracing in Sri Lanka, with assistance from MOH field staff, military forces, and police (Liyanapathirana et al., 2020). Initially, all primary and secondary contacts were quarantined at Sri Lanka army quarantine facilities. To prevent the spread of the disease, the entire village was locked down in some places. Furthermore, home quarantine guidelines were developed and implemented in some areas where contact history was not strong (Epidemiology, 2020). Later, the process of contact tracing was changed based on a circular issued by the director general of health services (DGHS) on November 16, 2020. Individuals who had contact with the index case are quarantined at home rather than in quarantine centers, and PCR testing is performed based on the date of exposure and the level of exposure (Ministry of Health, 2020a).

Strengthen Disease Surveillance

The disease surveillance system is bolstered further by COVID-19 surveillance, which utilizes existing respiratory disease surveillance systems as well as hospital-based surveillance. The surveillance network is being expanded to allow for contact tracing and community-based monitoring of people in-home quarantine. Other sectors have indeed been mobilized to strengthen surveillance even further, including at ports of entry (Health, 2020).

Vaccination

The primary goal of the global COVID-19 vaccination program is to reduce severe disease and, as a result, deaths caused by COVID-19 (Immunization and Advisory, 2021). In pursuit of this objective, the ministry of health introduced the safe and effective COVID-19 vaccine at the earliest possible time. The healthcare staff and other support frontline employees (from defense, police/STF, and services at ports of entry) are offered the initial 3 vaccination stocks received by the government in January 2021, with the priority of safeguarding essential healthcare facilities in the country (Epidemiology Unit, 2021).

In the second phase, the government began vaccination of people aged 30–60 in selected Western province communities in late February 2021. However, due to a lack of vaccines in the country, there was a significant lag period before beginning the country-wide community vaccination program in Sri Lanka. In Sri Lanka, however, with an available MOH network, country-wide community vaccination began in early June 2021 with the Sinopharm vaccine. With the rise in cases of the third wave, demand for vaccination has risen, and the existing preventive sector MOH system is unable to meet the demand, forcing the ministry of health to open vaccination centers in hospitals across the country. The Sri Lanka army and the government medical officers' union supported the ministry of health in its efforts to expand the country's immunization program (Ministry of Health, 2021b). By January 17, 2022, 94.8 percent of the target population had received two vaccine doses and 32.5 percent had received the booster dose, indicating a greater vaccination rate than comparable countries in the region (Epidemiology Unit, 2022).

Health Workforce

The COVID-19 outbreak boosted demand for the health workforce since the Ministry of Health had to establish new isolation units, ICUs, HDUs, intermediate care facilities, and hospitals around the country to accommodate the increasing patient population. It was extremely difficult to find workers for those units because most hospitals were already operating with a limited staff. The ministry of health, on the other hand, might address this issue by temporarily relocating doctors, nurses, and health care assistants from hospitals with a sufficient staffing level in big cities to underserved areas and boosting overtime hours for health care employees. Healthcare professionals were unprepared to deal with the new COVID-19 pandemic because they had never seen such a large epidemic before, but the Ministry of health overcame these obstacles by training staff with the help of professional colleges and the World Health Organization (WHO, 2020b).

In addition, the ministry of health's medical services unit trained health-care workers on ICU care, infection control, COVID patient management, and a variety of other related topics, as well as developing a user-friendly online platform for sharing training materials, videos, circulars, and guidelines to improve workforce knowledge. According to a government decision, the ministry of health encourages flexible working conditions, such as flexible duty hours, shift rescheduling, and working from home when possible (Lanka, 2020).

Medicines and Other Logistic Supply

The delivery of medications and other medical supplies has been short and late during the COVID-19 pandemic, which could be owing to logistics and production problems for a variety of causes. There were certain limits on international trade because several countries shuttered their ports of entry (Ying et al., 2020).

Due to Sri Lanka's reliance on medical supplies from other countries, there was a shortage of personal protective equipment (PPE) in both health-care institutions and the local market. To address this issue, the Ministry of health encourages healthcare institutions to prepare PPE locally, and many institutions have begun to prepare PPE with the available suitable material using their sewing rooms as well as the help of local garment industries and

donors. It was a bonus that Sri Lanka had a textile garment factory network, allowing standard PPE kits to be produced throughout the country. In parallel with those activities, the ministry of health formed an emergency procurement committee, comprised of the highest-ranking officials, to expedite the procurement process in order to ensure the supply of drugs, medical equipment, and consumables to hospitals (Ministry of Health, 2020b).

Health Information

Robust and dependable information management systems serve as the foundation for evidence-based decision-making across all health system building blocks. It is essential for the development and implementation of health policies, governance and regulation, health research, human resource development, health education, and training, service delivery, and financing (Sirintrapun and Artz, 2015).

During the COVID-19 pandemic period in the country, the ministry of health's epidemiology unit served as the focal point of disease surveillance, reporting data relevant to the virus situation (Liyanapathirana et al., 2020). The disease surveillance system of Sri Lanka allows for a bottom-up flow of information to the epidemiological unit from hospitals, medical officers of health (MOH), and regional directors of health services (RDHS). The country's well-established disease notification system aided in the surveillance of the COVID-19 epidemic (Epidemiology Unit, 2005).

COVID-19: live situational analysis dashboard providing information related to the disease was established at the website of the health promotion bureau (HPB, 2020), and Covid daily status report has been displayed on the epidemiology unit website to provide the correct information to necessary parties and public (Epidemiology Unit, 2021).

A holistic web-based "Hospital Information Upgrading system [HIUS]" was successfully launched to collect aily data on the number of available beds for COVID-19 patients, including HDUs and ICUs, medical equipment availability and requirements, and oxygen requirements of 130 COVID-19 treatment hospitals of the country (Fernando et al., 2021).

The Covid-19 immunization tracker (CIT), smart vaccination certificate (SVC), and national Covid-19 health information system (NCHIS) were the

key digital health innovations that aided COVID-19 information management in Sri Lanka. Furthermore, Sri Lanka has created a COVID-19 immunization tracker, a global good for health information that captures and analyses individual level, disaggregated COVID-19 vaccination data (WHO, 2021).

Leadership and Governance

Governance, according to the world health organization, is a cross-cutting health system function that influences the function of all building blocks. Despite this, its importance is sometimes overlooked during times of crisis (Gostin and Mundaca, 2016).

The national public health emergency mechanisms were activated under the DGHS to respond to the COVID-19 pandemic in Sri Lanka, and the ministry of health's disaster preparedness and response division (DPRD) served as the overall country-level coordinator for the health sector (Ministry of Health, 2020b). Furthermore, the government of Sri Lanka established the 'national operation center for COVID-19 outbreak prevention' as the country's command center for managing the outbreak. The commander of the army was appointed as the head of this committee (NOCPCO, 2020). Although the government's leadership and governance were praised during the first and second waves, it was stated that during the third wave, the government failed to impose travel restrictions, considering the economic situation, resulting in many cases and deaths despite health authorities' instructions (Kumarasinghe, 2021).

Health Care Financing

A good health financing mechanism should raise funds to achieve universal coverage in the health system, ensuring that people can access needed services without financial hardship (WHO, 2007). Adequately funded health systems are better able to withstand the pressures of disasters, whether man-made or natural, whereas funding gaps exacerbate the negative impact (Karanikolos et al., 2016).

In 2019, the government of Sri Lanka spent only 1.8 percent of GNP on health, as it does in many other low- and middle-income countries. A large portion of this was recurring in nature, with less emphasis on capital development. As a result, it was difficult to cope with this massive global pandemic

of COVID-19 in 2020 (Ministry of Health, 2019). However, the government of Sri Lanka released additional funds to strengthen the ministry of health's outbreak response, and development partners such as the world bank, Asian development bank (ADB), WHO, and United States agency for international development (USAID) gave a helping hand by providing monetary and equipment support (Ministry of Health, 2020).

DISCUSSION

During the first two waves of the COVID-19 pandemic, Sri Lanka's overall COVID-19 response was highly ranked internationally in terms of effectiveness, efficiency, and leadership, as well as case fatality rate and cases per 100,000 population, owing to the ministry of health's proactive response with a good disaster readiness plan (CMA, 2020).

However, in the 3rd wave due to the delay in enforcing the travel restriction and community vaccination, the number of confirmed cases increased exponentially, and by May 27, 2021, there were 172,277 cases, with an unprecedented case fatality rate of 2.6, and cases per 100,000 population remained relatively low (69.6). This increase in mortality could be attributed to overburdened hospitals with fewer resources, a low case detection rate, and a demographically aging Sri Lankan population with a high mortality rate, which is common with aging (JHCRC, 2021).

At the policy level, the decision to prepare the hospital system in advance to accept the cases and the participation of experts for the preparation of clinical management and outbreak control guidelines were the key strengths of the initial response.

On an operational level, Sri Lanka's response to COVID-19 was bolstered by the tireless work of trained MOH staff in a well-established preventive health network, the availability of a network of easily accessible primary care institutions, the availability of a well-functioning communicable disease surveillance system, strict contact tracing and quarantine of exposed individuals, institutionalized treatment of asymptomatic positive cases, and high vaccination coverage. The mission has been strengthened further by the dedicated healthcare management team in key positions of the ministry of health, the availability of skilled medical personnel, the construction of innovative information systems,

strong political leadership, and inter-sectorial collaboration (Hettiarachchi et al., 2020).

In terms of weaknesses, inadequate ICU beds, inadequately trained ICU staff, and staff distribution anomalies all harmed service delivery. The health ministry should find a way to expand ICU facilities and train additional ICU staff to be used in disasters. Furthermore, health staff mal-distribution should be addressed at the national level through policy decisions and implementation. Another issue was a lack of medicine, other equipment, and personal protective equipment (PPE), which was primarily due to a lack of production in the country. To effectively combat future outbreaks, authorities must prioritize the start of production of those items within the country (Hettiarachchi et al., 2020). During the third wave, some issues with information reliability were reported, and the epidemiology unit should strengthen the information system by adding relevant checks at the necessary points to prevent such errors in the future (The Island, 2021).

Delays in imposing restrictions during the third wave, while India was severely impacted by the delta variant, were heavily criticized, and decision-makers should be more concerned with evidence than political judgments in such situations in the future. Aside from that, the delay in beginning community immunization was a problem due to evidence-based decision-making, and policy-makers must be aware of these issues in the future. Although the involvement of tri-forces in COVID control activities was commended, the undue involvement of military personnel in health decision-making was strongly criticized by the country's professionals (Amaratunga et al., 2020).

Inadequate financial allocation from the national budget hampered the Sri Lankan health sector's ability to grow capital development, limiting infrastructure development in the health sector during the last few years and negatively impacting the epidemic response. Therefore, the government of Sri Lanka (GoSL) should enhance the financial allocation to the ministry of health in the future to better equip the Sri Lankan health system to deal with future health catastrophes. Even though the country's economy had been severely harmed by the pandemic, with a 71% drop in tourist arrivals, a 74% drop in industrial exports, a 32% drop in agriculture exports, and a 32% drop in remittances from foreign workers, the government was still committed to finding ways to

immunize the country's nearly entire target population (Sltda, 2020; Ranga et al., 2021; Seneviwickrama et al., 2020).

Overall, Sri Lanka employed the same containment strategies to control COVID-19 as China, South Korea, and Singapore, applying a proactive approach by identifying and managing cases, as well as tracking and isolating close contacts, as compared with the mitigation strategies used by the United States, the United Kingdom, and France, which focused on treating severe cases and those with underlying conditions (Chen et al., 2021).

RECOMMENDATIONS

Although Sri Lanka increased hospital bed capacity to meet demand, the number of ICU beds remained woefully inadequate. Since the healthcare system should invest more in increasing ICU bed capacity. Due to the country's economic insecurity during the third wave, there is a delay in enforcing travel restrictions, resulting in an increased caseload. As a result, in future pandemics, decisions on pandemic control should be made as soon as possible. Due to a shortage of vaccines, community immunization in Sri Lanka was delayed. In the future, the Ministry of Health should work with key industries to determine how to procure vaccines in time for future epidemics. Financial resources for health should be raised in order to enhance the health system and better respond to outbreaks. To effectively respond to outbreaks, the government should begin manufacturing medications and other therapeutic products.

CONCLUSION

This article examines the Sri Lankan health system's COVID-19 response concerning WHO's health system building blocks framework. The key strengths of their response were being proactive in response to the pandemic by preparing hospital networks, involving experts in the development of guidelines, and utilizing a robust preventive sector network. Human resource and financial constraints, drug, and other equipment availability issues, and gaps in evidence-based policy decisions should all be addressed to build a more resilient health system for future disasters.

Finally, it is reasonable to commend the ministry of health Sri Lanka's pandemic response strategies, as evidenced by the reduction in transmission, rel-

actively low caseload, and high vaccination coverage during the fourth wave.

Ethical Approval: Administrative clearance for the study was obtained from Ministry of Health, Sri Lanka. Ethical approval was not required for the study.

Authors' Contributions: This study's conception and implementation were aided by both researchers. The first author was in charge of overseeing the entire study and coordinating the operations. The final manuscript was read and approved by both writers.

Funding and Acknowledgement: The authors would like to thank the officials from the Ministry of Health, and postgraduate trainees in health care management for helping this study.

Conflict of Interest Statement: Both authors declared that they had no conflict of interest for this study.

REFERENCES

- Amaratunga, D., Fernando, N., Haigh, R., Jayasinghe, N. (2020). The COVID-19 outbreak in Sri Lanka: A synoptic analysis focusing on trends, impacts, risks and science-policy interaction processes. *Progress in Disaster Science*, 8, 100133.
- Athapattu, P., Wijenayake, P. H., Weediawatta, P. K. G. P. (2021). Establishment of a national focal point to monitor the Performance of PCR Centres in Sri Lanka. *Sri Lankan Journal of Medical Administration*, 1, 49-55.
- Chen, H., Shi, L., Zhang, Y., Wang, X., Jiao, J., Yang, M., Sun, G. (2021). Response to the COVID-19 Pandemic: Comparison of strategies in six countries. *Frontiers in Public Health*, 9, 1-11.
- CMA. (2020). GRID Index: Tracking the global leadership response in the COVID-19 crisis. CMA Australia On Target. (Access Address: <https://cmaustralia.edu.au/ontarget/grid-index-tracking-the-global-leadership-response-in-the-covid-19-crisis>) (Access Date: April 24, 2022)
- De Silva, C., Jayakody, H. (2020). Essential service delivery in reproductive, maternal and child health services during the pandemic. *Journal of the College of Community Physicians of Sri Lanka*, 26, 190.
- Dr. Fernando GHS, Dr. Gunasena BAHM, Dr. Yapa Bandara AS, D. L. P. (2021). Establishment of a Hospital Information Updating System to Augment Hospital Readiness for the Third Wave of COVID-19 in Sri Lanka. 28th Scientific Sessions, Sri Lanka College of Medical Administration, 23.
- Economynest. (2020). Sri Lanka starts 1390 Coronavirus hotline to call for Covid-19 symptoms – EconomyNext. (Access Address: <https://economynext.com/sri-lanka-starts-1390-coronavirus-hotline-to-call-for-covid19-symptoms-63916/>) (Access Date: July 22, 2021)
- Epidemiology. (2020). Guideline for the Home quarantine / Quarantine in non-health care settings. Epidemiology Unit Ministry of Health-Sri Lanka.
- Epidemiology Unit. (2020). Provisional Clinical Practice Guidelines on COVID-19 Suspected and Confirmed Patients – In collaboration with Ceylon College of Physicians Coordinated by Epidemiology Unit Ministry of Health-Sri Lanka.

- Epidemiology Unit. (2021). Covid 19 Situation Report. Ministry of Health-Sri Lanka.
- Epidemiology Unit. (2021). Guidelines for COVISHIELD Covid-19 Vaccination Campaign January-February 2021. Ministry of Health-Sri Lanka.
- Epidemiology Unit. (2022). Epidemiology unit Covid-19 vaccination coverage. (Access Address: <https://www.epid.gov.lk/web/>) (Access Date: February 19, 2022)
- GoSL. (1897). Quarantine and Prevention of Diseases Ordinance. In Legislative Enactments of the Democratic Socialist Republic of Sri Lanka. Chapter 222.
- Gostin, LO., Mundaca-Shah, CC., Kelley, PW. (2016). Neglected dimensions of global security: The global health risk framework commission. *JAMA*, 315, 1451-1452.
- Hanson, K., Ranson, M. K., Oliveira-Cruz, V., Mills, A. (2003). Expanding access to priority health interventions: A framework for understanding the constraints to scaling-up. *Journal of International Development*, 15, 1-14.
- Hettiarachchi, D., Noordeen, N., Gamakaranage, C., Somarathne, E. A. R. B. D., Jayasinghe, S. (2020). Ethical responses to the covid-19 pandemic—lessons from Sri Lanka. *Asian Bioethics Review*, 225-233.
- HPB. (2020). COVID-19 dashboard. (Access Address: <https://hpb.health.gov.lk/en>) (Access Date: September 14, 2021)
- Immunization, N., Advisory, T. (2021). Press Release Implementation of the scientifically recommended vaccine priority list. *Journal of the College of Community Physicians of Sri Lanka*, 27, 1-2.
- JHCRC. (2021). Mortality analyses – Johns Hopkins Coronavirus Resource Center. *Journal of the College of Community Physicians of Sri Lanka*. (Access Address: <https://coronavirus.jhu.edu/data/mortality>). (Access Date: April 16, 2023)
- Karanikolos, M., Heino, P., McKee, M., Stuckler, D., Legido-Quigley, H. (2016). Effects of the global financial crisis on health in high-income OECD countries: A narrative review. *International Journal of Health Services*, 46, 208-240.
- Kumarasinghe, K. (2021). Sri Lanka teaches the world how not to respond to COVID-19. *The Diplomat*. (Access Address: <https://thediplomat.com/2021/05/sri-lanka-teaches-the-world-how-not-to-respond-to-covid-19/>) (Access Date: June 27, 2021)
- Lanka, P. S. S. (2020). Remote work arrangements during the global Corona virus pandemic pandemic. (Access Address: <https://cmb.ac.lk/remote-work-arrangements>) (Access Date: July 1, 2021)
- Legido-Quigley, H., Asgari, N., Teo, Y. Y., Leung, G. M., Oshitani, H., Fukuda, K., Cook, A. R., Hsu, L. Y., Shibuya, K., Heymann, D. (2020). Are high-performing health systems resilient against the COVID-19 epidemic? *The Lancet*, 39, 848-850.
- Liyanapathirana, A., Ferdinando, R., Palihawadana, P. (2020). COVID-19 outbreak in Sri Lanka: An epidemiological response. *Journal of the College of Community Physicians of Sri Lanka*, 26.
- Ministry of Health. (2018). Essential (Health) Services Package (Esp) for Sri Lanka. Sri Lanka Essential Service Package. Draft 2.2
- Ministry of Health. (2019). Annual Health Bulletin 2019, Sri Lanka.
- Ministry of Health. (2020). Annual Health Report 2020. Ministry of Health-Sri Lanka.
- Ministry of Health. (2020). Provisional Clinical Practice Guidelines on COVID-19 suspected and confirmed patients In collaboration with Ceylon College of Physicians Coordinated by Epidemiology Unit (Issue March).

Ministry of Health. (2020a). Quarantine Process to be Followed by All Immediate Contacts of a COVID-19 Patient and Any Person Entering into The Country through Ports of Entry during the COVID-19 Pandemic Situation, Sri Lanka.

Ministry of Health. (2020b). Sri Lanka Preparedness Response Plan, COVID-19. (Access Address: http://www.health.gov.lk/moh_final/english/public/elfinder/files/publications/2020/SPRP.pdf). (Access Date: April 2020)

Ministry of Health, S. L. (2021). Sri Lanka Health System Review, 10. (Access Address: <https://doi.org/https://apo.who.int/publications/i/item/sri-lanka-health-system-review>.) (Access Date: April 2020)

Ministry of Health. (2021a). COVID-19 Sri Lanka Strategic Preparedness & Response Plan 2021. 58.

Ministry of Health. (2021b). Hospital vaccine program circular.pdf. (Access Address: http://www.epid.gov.lk/web/images/pdf/Circulars/Corona_virus/hospital_vaccine_program.pdf) (Access Date: November 22, 2021)

Moynihan, R., Sanders, S., Michaleff, Z. A., Scott, A. M., Clark, J., To, E. J., Jones, M., Kitchener, E., Fox, M., Johansson, M., Lang, E., Duggan, A., Scott, I., Albarqouni, L. (2021). Impact of COVID-19 pandemic on utilisation of healthcare services: A systematic review. *BMJ Open*, 11, 11-17.

NOCPCO. (2020). "Self-quarantining does not mean that they are positive cases" – Head, NOCPCO. *WHO South-East Asia Journal of Public Health*, 8, 21-25.

Perera, S., Nieveras, O., de Silva, P., Wijesundara, C., Pendse, R. (2019). Accelerating reforms of primary health care towards universal health coverage in Sri Lanka. *WHO South East Asia J Public Health*, 8, 21-25.

Ranga SDUM, Dilrukshi DARK, Abeysekara CM, O. S. (2021). Cost of managing COVID 19 patients in a tertiary care hospital in Sri Lanka. *Journal of Medical Administration*, 22, 42-48.

Seneviwickrama, M., Kantharuban, D., Rodrigo, C., Karunarathna, B., Talagala, I., Gunatilake, I., Jayawardana, P., Goonewardena, S. (2020). COVID-19: the first coronavirus pandemic. *Journal of the College of Community Physicians of Sri Lanka*, 26.

Sirintrapun, S. J., Artz, D. R. (2015). Health information systems. *Surgical Pathology Clinics*, 8, 255-268.

Sltda. (2020). Sri Lanka tourism development. In Sri Lanka tourism development authority. (Access Address: <https://www.sltda.gov.lk/en>) (Access Date: October 23, 2021)

The Island. (2021). Epidemiology Unit accused of manipulating pandemic data – The Island. (Access Address: <https://island.lk/epidemiology-unit-accused-of-manipulating-pandemic-data/>) (Access Date: June 7, 2021)

Timothy Robertson, Emily D Carter, N. W. (2020). Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: A modelling study. *Lancet Glob Health*, 8.

Unit, E. (2005). Surveillance case definitions for notifiable diseases in Sri Lanka. Ministry of Health, Sri Lanka, 19-20.

Wanigasinghe, J., Jayawickrama, A., Hewawitharana, G., Munasinghe, J., Weeraratne, C. T., Ratnayake, P., Wijesekara, D. S., Fernando, S., Rupasinghe, P. (2021). Experience during COVID-19 lockdown and self-managing strategies among caregivers of children with epilepsy: A study from low middle income country. *Seizure*, 84, 112-115.

WHO. (2007). Everybody business: strengthening health systems to improve health outcomes: WHO's framework for action. (Access Address: www.who.int/healthsystems/strategy/everybodys_business.pdf.) (Access Date: July 8, 2021)

WHO. (2020a). Coronavirus disease 2019 (COVID-19) Situation Report. World Health Organisation, 2019 (April), 1-13.

WHO. (2020b). Sri Lanka: Training on COVID-19 infection prevention and control for healthcare workers. WHO COVID Infection Prevention Control for Health Care Workers. (Access Address: <https://www.who.int/news-room/feature-stories/detail/sri-lanka-training-on-covid-19-infection-prevention-and-control-for-healthcare-workers>)

WHO. (2021). WHO Dialogues: Sri Lanka shares digital innovations made during pandemic. (Access Address: <https://www.who.int/southeastasia/news/feature-stories/detail/who-dialogues-sri-lanka-shares-digital-innovations-made-during-pandemic>) (Access Date: January 17, 2022)

Ying, W., Qian, Y., Kun, Z. (2020). Drugs supply and pharmaceutical care management practices at a designated hospital during the COVID-19 epidemic. *Res Social Adm Pharm*, 17, 1978-1983.