

Review Article

COVID-19 Pandemic in Brunei Darussalam

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Article History

Received: 16 January 2023;

Received in Revised Form:

30 January 2023;

Accepted: 02 February 2023;

Available Online: 03 February 2023

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Abstract: Within ASEAN, Brunei is one of the low population density nations successfully combating the first wave of the COVID-19 pandemic in 2020. As of 4th January 2023, over 2.6 hundred thousand confirmed cases of COVID-19, with 225 deaths, had been reported in Brunei. This paper outlines the COVID-19 trends in Brunei and strategies taken by the health authorities to contain the pandemic. Three waves of COVID-19 have hit Brunei, with the first case of COVID-19 reported on 9th March 2020. The adoption of the “whole of nation approach” has proven to be effective in managing the outbreak. Early and decisive interventions taken by authorities and the public’s cooperation have been a remarkable

success story. The key success factors are effective pandemic containment measures, public communication strategy, and enhanced surveillance mechanisms supported by the mass testing program and contact tracing. A national vaccination strategy ensuring adequate vaccine distribution and effective administration has been rolled out to render lasting protection against the infection. National COVID-19 Recovery Plan Framework and a gradual COVID-19 de-escalation plan were implemented to ensure a smoother transition to the new normal. This review provides valuable insights into the development of a robust pandemic leadership model and highlights the lessons and strategies that other countries can adopt for any future uncertainties.

Keywords: COVID-19; Brunei; SARS-CoV-2; epidemiology; coronavirus; BruHealth

1. Introduction

Three years have passed since the novel Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome-associated coronavirus 2 (SARS-CoV-2) was first reported in Wuhan, China, in late December 2019 ^[1]. According to research studies, SARS-CoV-2 can be spread symptomatically or asymptotically, spreading from person to person through respiratory droplets or touching contaminated surfaces ^[2]. This rapid spread of the highly contagious respiratory virus has caused severe illness and fatality ^[3], leading to the declaration of COVID-19 as a global pandemic by World Health Organization (WHO) in March 2020 ^[4]. Throughout the years, the whole world has been hit by three waves of COVID-19 evolution as the viruses acquire many mutations generating multiple new variant strains, namely Alpha, Beta, Gamma, Delta (B.1.617.2) ^[5], Omicron (B.1.1.529) ^[6] and their sub-variants ^[7-10]. This has taken a significant toll on social communities, the economy and healthcare systems globally ^[11-17].

Taking a view at the ASEAN countries, Brunei was not spared from this novel coronavirus. Brunei Darussalam is a small and well-connected country located on the Island of Borneo in Southeast Asia, surrounded by the Malaysian state of Sarawak. It is a Sultanate with a current population of 447,945 as of 3rd January 2023. It is also a high-income country with a GDP of USD 14.01 billion in 2021 ^[18, 19]. It has a well-developed healthcare system ensuring adequate access to healthcare services among its citizens and residents, contributing to infant mortality of 6.9/1000 live births and a life expectancy at birth of 76.4 years in 2022 ^[18, 20]. The Government offers universal health coverage, including the provision of 15 comprehensive health centres, four hospitals, two air medical services, and two mobile health clinics. Brunei has amassed 266,819 confirmed COVID cases at the time of writing, with 225 deaths reported as of 4th January 2023 in the country ^[21, 22].

2. COVID-19 trend in Brunei

The first case of COVID-19 in Brunei was reported on 9th March 2020, involving a 53-year-old citizen returning from a Tablighi Jammah in Kuala Lumpur, Malaysia, with three friends without any symptoms on 3rd March 2020 [23-25]. This 4-day Tablighi Jamaat mass gathering was attended by 16,000 members of the Tablighi, an apolitical Islamic group and has driven the global spread of corona internationally to other countries, including Indonesia, Singapore, Thailand, Brunei and many others in the region [26, 27]. The patient developed symptoms of fever, cough, runny nose, and body ache on the fourth day of arrival and was transferred to Raja Isteri Pengiran Anak Saleha Hospital for treatment. In the following weeks, 100 cases were reported, all acquired in Malaysia, similar to the first case [28, 29].

In the late-March 2020, Bruneian Home Affairs Ministry imposed the outbound and inbound travel ban on all citizens and foreign residents with the exemptions of special circumstances to ensure the safety and well-being of the citizens and residents of Brunei Darussalam. The first COVID-19 fatality of a 64-year-old man was reported on 28th March 2020. The number of new infections continued to increase at a slower rate, with the last local case on 6th May 2020 [30]. This was marked as the first wave of COVID-19 in Brunei. A de-escalation plan through a gradual reduction of social distancing measures was put into action by the Brunei government on 16th May 2020 to control the outbreak while maintaining its border control [31]. According to the guidelines, the four-stage de-escalation plan was implemented based on the capacity of the health system, the socio-economic, current situation of COVID-19 in the country and at regional and global levels (Table 1). The new guidelines stipulate four operational readiness levels with specific restrictions: Level 0: Very high restriction (Closure); Level 1: High restriction; Level 2: Medium restriction; Level 3: low restriction; Level 4: normal operation (Pre-normal). Progression from one stage to another and implementation of guidelines varies depending on the type of activities or premise along with the timelines [32].

Table 1. Illustration of De-escalation Plan Implementation in Brunei [31].

	LEVEL 0 (CLOSURE)	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4 (PRE-NORMAL)
Mosques	From March 2020	29.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 02.08.2020	From 03.08.2020
Other places of worship		05.06.2020 – 17.06.2020	18.06.2020 – 05.07.2020	06.07.2020 – 02.08.2020	From 03.08.2020
Schools, other educational institutions		02.06.2020 – 17.06.2020	18.06.2020 – 03.07.2020	04.07.2020 – 26.07.2020	From 27.07.2020
Technical, vocational and higher education		02.06.2020 – 17.06.2020	18.06.2020 – 03.07.2020	04.07.2020 – 26.07.2020	From 27.07.2020
Tuition schools, music schools		05.06.2020 – 17.06.2020	18.06.2020 – 03.07.2020	04.07.2020 – 26.07.2020	From 27.07.2020
Special needs classes		08.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020
Driving schools		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Child care centres		08.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020
Activity centres for the elderly		15.06.2020 – 26.07.2020	27.07.2020 – 16.08.2020	17.08.2020 – 06.09.2020	From 07.09.2020
Museums, galleries and libraries		15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020
Gyms & fitness centres		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Indoor sports facilities		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Outdoor sports facilities, including outdoor playground		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Golf courses		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Swimming pools		06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020	
Restaurants, cafés and food courts		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Cinemas		06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020	
Arcade, indoor playground		27.07.2020 – 16.08.2020	From 17.08.2020		
Internet cafés		15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020	
Gerai & pasar		16.05.2020 – 14.06.2020	15.06.2020 – 05.07.2020	06.07.2020 – 26.07.2020	From 27.07.2020
Mass gatherings	06.07.2020 – 26.07.2020	27.07.2020 – 16.08.2020	From 17.08.2020		
Travel restrictions		From 05.06.2020			

Compared to other ASEAN countries, Brunei seems to have controlled the initial pandemic relatively rapidly, and the outbreak has been controlled for most of 2020 [33, 34]. An effective pandemic control could be shown when zero local transmission was reported over 15 months [35, 36]. Subsequently, new cases reported were limited to imported infections, bringing the total number of confirmed cases to 338 as of 1st August 2021 [21]. The Government was still at ease until the first local COVID-19 transmission of the Delta variant on 7th August 2021, marking the second wave of infection in Brunei[37]. An exponential growth of COVID-19 cases was triggered in the second wave due to the highly contagious Delta variant, bringing the cumulative number of new cases surged to 1873 on 23rd August 2021 [38]. The devastating wave of infections due to the Delta strain of rapid transmission, the severe acute respiratory syndrome and deaths led to overwhelming healthcare systems in Brunei[39].

Amid signs of a vaccine shortage and rising Covid-19 cases, this situation set the whole nation on high alert and forced Brunei into a two-month partial lockdown starting from 9th August 2021 in order to minimize the risk [40]. A strict curb was imposed, including curfews of 8.00 pm till 4.00 am called “Operasi Pulih”, closure of several public facilities or non-essential business, restrictions on gatherings and suspension of on-site activities at educational institutions [41]. Food establishment was only limited to take away and delivery services [42-44]. The work-from-home policy was implemented in most companies, whereas

only workers in the essential fields were allowed to work in the office [38]. The number of cases decreased with the containment measures in place, and the curve flattened in November 2021. However, various challenges associated with economy lose, ineffective e-learning, psychological and emotional stress have been raised due to stricter control measures during the second wave [45, 46]. Thereby, a National COVID-19 Recovery Plan Framework was announced on 25th October 2021 to ensure a safe transition and stable situation with minimal disruption to the daily activities of the community [41] (Figure 1). Despite the containment phase, this framework also includes the preparation phase, transition phase and endemic phase, whereby the commencement of each stage was based on vaccination coverage status and critical cases. Government is ready to shift the zero-COVID strategy to COVID-19 protection, a new phase of safely living with this deadly virus [41].



Figure 1. Illustration of National COVID-19 Recovery Framework in Brunei [41].

Meanwhile, the COVID-19 Steering Committee has announced the Early Endemic Phase started on December 2021. Loose movement restrictions were imposed, including a shortened night curfew of 12 am to 4 am, but remained the restriction on leisure travel ban [47]. On late December 2021, Brunei’s first imported case of Omicron was detected when a traveller arrived from the United Kingdom [48]. Emerging of the new variant strains of Omicron, with new cases increasing nearly six-fold than the peak of the Delta wave in Brunei, has introduced the third wave of infections as Omicron replaced Delta as the dominant strain [49]. The peak of the third wave was hit at the beginning of March 2022, with the reported number of cases around 4885 and a death tally of 135 [21]. Amid high-vaccination rates, fatality rates had been dropping steadily since the beginning of the pandemic to 0.14 % by the end of June 2022 [30]. Brunei commences its transition to the endemic phase starting on 1st June 2022. During the endemic phase, individuals had more freedom on inbound and outbound international travel, resuming of in-person learning, reopening of all public facilities, non-essential business, government premises, counter services, and private business offices, manufacturing and processing companies as well as no limitation on the

capacity of mass gatherings. [50]. Starting from 22nd June 2022, the Brunei government has halted the daily update of COVID case numbers [51]. Currently, Brunei enters the fifth or “new normal” phase of its de-escalation plan (Figure 2).

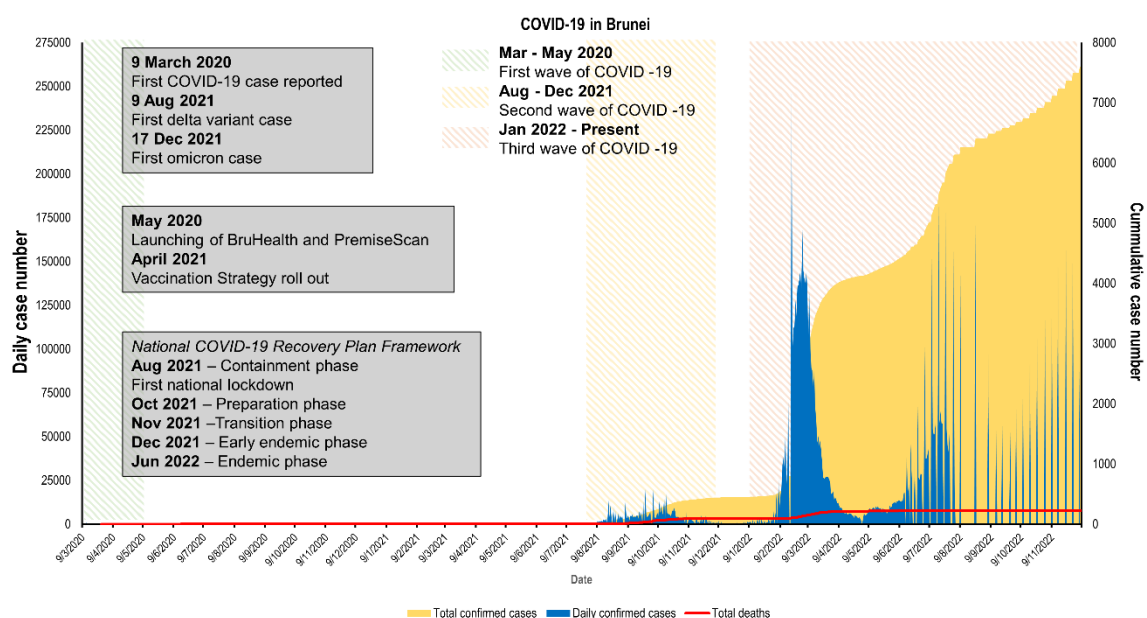


Figure 2. Illustration of daily confirmed COVID-19 cases, cumulative COVID-19 cases, cumulative deaths due to COVID-19, and a brief timeline of the events in Brunei since the first case reported in the country.

3. Measures taken by the Government in addressing the impact of COVID-19 in Brunei

The extreme quarantine implemented in Wuhan and the entire Hubei region of China mandated all residents to shelter in place without exception. Singapore and Vietnam’s strategy of comprehensive surveillance to detect and contain as many cases as possible has been highly successful in controlling or eliminating SARS-CoV-2 [52]. In Brunei, the Government has taken a ‘whole of nation’ approach in coping COVID-19 pandemic effectively, whereby all the ministers and private sectors worked together as a team under the leadership of His Majesty the Sultan [53-55]. Ministry of Education (MOE) implemented home-based learning and announced school closure [56, 57]. Youth Volunteer Ad-Hoc Committee was established by the Ministry of Culture, Youth and Sports (MCYS) to assist the Ministry of Health in handling the outbreak. Ministry of Home Affairs (MOHA) implement strict monitoring measures such as proper sanitization, temperature screening and capacity limit permit to certain premises [58].

Through the Whole-of-Government Approach, Brunei succeeded in suppressing the first wave of the COVID-19 pandemic in 2020 by taking early and stringent containment measures without imposing lockdown rules [59]. Since late- January 2020, prior to the confirmation of the first COVID-19 cases in Brunei, earlier travel bans on foreign visitors from Italy, Iran, China’s Hubei, Jiangsu and Zhejiang provinces were imposed, and the returning citizens were required to undergo RT-PCR testing on arrival and a mandatory

quarantine at designated facilities for 14 days ^[58]. One of the factors that contributed to Brunei's success was adopting PT-PCR testing in the absence of clinical symptoms early in the outbreak and only trails Singapore in the number of tests administered per 1,000 people within ASEAN. Under the Infectious Disease Act, COVID-19 testing is mandatory for anyone with influenza or pneumonia disease and travel or close-contact history, regardless of symptomatic or asymptomatic ^[60]. This enhanced surveillance mechanism, supported by a mass testing program and rigorous contact tracing, has been implemented across the country, resulting in a significant reduction in the effective reproduction number ^[61-63].

In responding specifically to the pandemic, the Government swiftly dedicated a budget allocation of BND15 million (US\$10.5 million) for the viral outbreaks and emergencies. COVID-19 Relief Fund has been set up to ease the financial burden of the public ^[60]. A BND11 million (US\$8.3 million) has been allocated to accelerate equitable access to new COVID-19 tools. Within weeks, the allocation contributed to a comprehensive health care system when key ministries collaborated effectively with sundry construction and engineering firms to pool resources supporting the conversion of the sports complex into a 24-hour testing facility and the construction of more monitoring centres for foreigners, citizens and residents of Brunei Darussalam from abroad to undergo self-isolation ^[64, 65]. New National Isolation Centre Building in Tutong District was also constructed, thereby increasing the hospital bed capacity by 7-folds. Meanwhile, a new auxiliary virology laboratory has been constructed in Bandar Seri Begawan, which is capable of increasing the COVID-19 testing capacity in the country. Starting in March 2020, the Government of His Majesty the Sultan and Yang Di-Pertuan of Brunei Darussalam has allocated a special monthly allowance of \$400, specifically for medical staffs, volunteers, common workers in hospitals, isolation centre and quarantine centres as well as all staff under the Ministry of Health. This monthly allowance will be extended until the eradication of COVID-19 in Brunei Darussalam ^[66].

On the other hand, Brunei implemented a transparent public communication strategy through daily live press conferences on national television to provide the latest updates on COVID-19 situation. The official launch of the GOV.BN Telegram channel also provides residents with official Government information and announcements, including official press releases and latest COVID-19 information. Health Advice Line 148 has been set up and can be contacted for further information on COVID-19 updates ^[67]. The Ministry of Health has collaborated with China's Yidu Cloud Technology, a medical technology company, to set up an artificial intelligence system to forecast infection trends and create medical resource mapping ^[66].

4. Contact Tracking mobile apps

In May 2020, following the steps of the neighbouring countries in developing contact tracing apps, namely MySejahtera by Malaysia and PeduliLindungi by Indonesia on April 2020 and March 2020, respectively ^[68], a national mobile health application known as BruHealth developed by EVYD Technology team was launched by the Ministry of Health,

Brunei Darussalam (MOH)^[69]. It was launched to effectively trace infected individuals and potential risk exposure and identify high-risk areas using Bluetooth and GPS tracking features. It serves as a virtual platform to control the transmission of COVID-19 in Brunei via digital contact tracing and a QR code premise check-in^[70]. The QR code comes with five colour codes, ranges of green, yellow, red, blue and purple, indicating individual health status, and each colour code denotes entry permissions to any premises^[71]. To further ensure better accessibility of the BruHealth application to all residents of Brunei Darussalam, the PremiseScan application was launched, enabling the business owner to scan customers' QR codes upon entry and exit of business premises^[72].

Under Chapter 204 of the Infectious Diseases Act, residents who failed to adhere to the regulation of entry premises based on colour health codes during the COVID-19 pandemic will commit an offence. Individuals will face a maximum compound fine of BND5,000 if found guilty; if convicted in court can be fined up to BND10,000 or sentenced to 6 months imprisonment or both^[73]. On 25th September 2021, the BruHealth mandate was enforced to better regulate residents' movement. The Government imposed \$100 on-the-spot fines on the individuals who failed to use the BruHealth app in public places^[74]. The app has drawn a total of 436,047 registrations since its launch on 14th May 2020^[69]. BruHealth app is different from other contact tracing apps adopted in other countries; it initially provided pandemic updates and FAQs on COVID-19 and accessibility of medical resources. The new version of BruHealth was rolled out and turned into a healthcare management app which offers additional features such as personal health records, personal health plans, online appointments and online consultation. It also integrates with the Brunei Health Information System (Bru-HIMS), which adopts the concept of One Patient One Record, which links primary and secondary healthcare data across the entire government health network^[75]. Therefore, all residents are required to register with Bru-HIMS before seeking medical services or treatment at any healthcare centre to ensure a smooth transition of medical records. A self-assessment tool was provided via healthinfo.gov.bn to self-assess risk factors for COVID-19 and concurrently assist Government's initiative to provide real-time Government dashboard.

5. Vaccination program

Before vaccines for COVID-19 were available, Brunei was one of the many countries in the Asia Pacific Region that had participated in the WHO-led Solidarity trial, recognizing the critical importance of global collaborative efforts on the prevention and treatment of COVID-19^[76]. The trial was a global effort to compare the safety and effectiveness of biotherapeutics using different combinations of remdesivir, Iopinavir/ritonavir, interferon beta, chloroquine and hydroxychloroquine, as early as April 2020^[77, 78]. A wide range of vaccine types were authorized by the Brunei Darussalam Medicines Control Authority (BDMCA) under Emergency Use Authorization to achieve herd immunity. The four vaccines approved for use are Comirnaty from Pfizer, SpikeVax from Moderna, Vaxzevria from AstraZeneca and Covilo from Sinopharm^[79-81]. Covilo consists of inactivated SARS-CoV-2 virus in which the genetic materials have been destroyed, rendering it unable to be replicated

or causing disease but still able to stimulate the body's immune response with the intact antigen protein on the virus surface. Vaxzevria is a non-replicating viral vector that delivers modified genetic material to the host cell and triggers an immune response once viral spike proteins are produced in the host cell. Comirnaty and SpikeVax utilise lipid-based nanoparticle encapsulated genetically engineered mRNA encoding for the spike protein of SARS-CoV-2 that directs cells to produce spike protein. Upon vaccination, the spike protein produced by the host cell induces the immune system to produce antibodies and other immune cells that protect host cells against the infectious virus. A COVID-19 Vaccine Technical Committee is established to study and evaluate the safety, efficacy and quality of COVID-19 vaccine candidates for local authorization ^[82, 83].

Vaccination Strategy was developed and implemented starting from 3rd April 2021, in which all Brunei residents, regardless of citizenship status, can receive the COVID-19 vaccination for free. The distribution of the vaccine was divided into three phases. The first phase mainly targeted frontliners against the epidemic, senior citizens aged 60 and above, and students bound for overseas study. In the second phase, the jabs were administered to childcare staff, teachers and adults with comorbidities. In phase three of the vaccination program, the vaccine was available to all residents aged 18 and above ^[79]. The vaccination centre was allocated for each district in Brunei, namely Brunei-Muara, Belait, Tutong and Temburong. Vaccination appointments assigned with a QR code were scheduled via BruHealth app^[82]. AstraZeneca and Sinopharm vaccines were deployed in the beginning phase of the vaccination program. Mass vaccination for all adult residents began on 5th July 2021, and the vaccination program was then set to roll out to the younger age group of 12 to 17 on 19th October 2021^[84]. Kids aged 5 to 11 were administered their first dose vaccine of the Pfizer-BioNTech on 3rd April 2022 as the incidence of child hospitalisation rates quadrupled during the Omicron-fuelled third wave, compared to the Delta-driven second wave last year ^[85]. Vaccines are not 100% effective at preventing COVID infections, but immunization greatly reduces the risk of severe diseases, hospitalization and death in individuals who are fully vaccinated ^[86, 87].

Around November 2021, frontline workers started receiving their booster dose and followed by the senior group later. Following the emergence of the Omicron variant in late 2021, adults who were fully vaccinated can get mRNA vaccines as booster shots, and booster vaccination dosing interval varies depending on the type of vaccine in their second dose ^[88]. "Mix and Match" strategies were recommended as preliminary studies showed heterologous COVID-19 prime-boost vaccination induces robust immune responses, characterized by high levels of both antibodies and T cells, which kill infected cells and support other antiviral responses ^[89]. The Brunei government does not intend to make booster doses a mandatory condition; however, the administration of booster shots is encouraged to prolong protective immunity and provide maximum protection against COVID-19 variants, including Delta (B.1.617.2) and Omicron (B.1.1.529) ^[90]. The administration of the third dose is on a walk-in basis at all vaccination centres. Booster shots for adolescents ages 12-17 were rolled out at the beginning of April 2022 ^[91]. On June 2022, a second booster shot was offered to elderly

aged 80 and above, adults aged 60 and over with chronic diseases, immunocompromised persons aged 18 and above, as well as healthcare workers and frontliners with high risk of exposure. The fourth jab will be voluntary and only administered to eligible individuals five months after their third dose. ^[92] Two bivalent vaccines from Moderna and Pfizer were authorised by the Brunei Darussalam Medicines Control Authority and rolled out as a booster dose on late November 2022. These bivalent vaccines not only target the original COVID-19 virus strain and the Omicron BA.1 subvariant concurrently it is expected to provide better protection against Omicron subvariants, including against BA.4 and BA.5 than the original COVID-19 vaccines ^[93]. As of 11th December 2022, 78.9% of the total population has received a third COVID-19 vaccine dose under the National COVID-19 Vaccination Programme. As of 24th November 2022, the vaccination program had delivered 1,283,392 vaccine doses with a vaccination rate of 285.83%, which contributing an immunisation coverage of 97.8% ^[21].

6. Conclusion

As early as January 2020, Brunei had implemented stringent precautionary measures early, including massive testing, implementation of travel bans and mandatory quarantine to prevent and suppress COVID-19 before the first case was detected on 9th March 2020 ^[94]. Brunei was hit by three COVID-19 waves as follows: first wave occurred between March and May 2020; second was from the end of August 2021 to December 2021; third wave commenced in January 2022 until the present day. The key lessons of Brunei's success factors in managing the COVID-19 pandemic are the adoption of "whole of government approach" and the "whole of nation approach", which involves the engagement of all ministers, private sectors and residents in the country. Successful containment of the COVID-19 pandemic in Brunei was achieved through prompt actions from the Government, speedy implementation of national policies and mutual adherence to government guidelines by the public. Brunei Government has taken a combination of pandemic containment measures such as travel restriction, social distancing, strict quarantine measures, and test-isolate-trace approach complemented with contact tracing applications, namely BruHealth and PremiseScan. This has resulted in the successful flattening of the curve of the first wave and maintaining zero local transmission for 15 months. At the same time, Brunei deployed financial support to mitigate the economic fallout due to COVID-19 pandemic ^[95]. Adequate vaccine procurement, distribution, effective rollout and administration are also the key to securing a durable recovery. With the pandemic broadly under control, Brunei implemented National COVID-19 Recovery Plan Framework and a gradual COVID-19 de-escalation plan to bring the nation adapting to the new normal. The notable policies aforementioned can provide a framework for other nations to contain future pandemics.

Author Contributions: WSA performed the literature search, critical data analysis as well as manuscript writing. JW-FL, VL, YSO, YK and LCM performed editing and revision. JW-FL, VL, YSO, YK, LCM and LT-HT provided technical support and proofreading. LT-TH conceptualized this review writing project.

Conflicts of Interest: The authors declare no conflict of interest.

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