Strengthening surveillance, coordination and preparedness in Hong Kong Special Administrative Region, China: responses to the COVID-19 pandemic

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Hong Kong Special Administrative Region (SAR), China, is an international city with a population of about 7.51 million people.[1] Following the outbreak of severe acute respiratory syndrome in 2003, the Government developed contingency plans for emerging infectious diseases and established the Centre for Health Protection (CHP) under the Department of Health in 2004 to achieve effective prevention and control of diseases in collaboration with local and international partners. The Prevention and Control of Disease Ordinance[2] was enacted in 2008 to provide a legal framework for infectious disease control in compliance with the International Health Regulations (2005)[3] of the World Health Organization (WHO). These measures put the Government in a better position to respond to the COVID-19 pandemic.

This report aims to summarize the epidemiology of COVID-19 cases, deaths and vaccination rates, and describe response measures implemented by the Government of Hong Kong SAR, China, in 2020–2023.

EPIDEMIOLOGY

Hong Kong SAR, China, experienced five waves of the COVID-19 pandemic, starting with two imported cases recorded on 23 January 2020. Over 3.1 million cases and over 10 600 related deaths were recorded up to 29 January 2023, when the containment phase ended (**Table 1**). Using a consensus approach, the first four waves of the COVID-19 pandemic (2020–2021) were characterized as distinct surges in case numbers, each separated by periods of low transmission. The onset of each wave was typically linked to imported cases or local outbreaks, often driven by different variants. The emergence of highly transmissible Omicron subvariants subsequently triggered a fifth wave, resulting in a substantially higher number of infections that far exceeded the cumulative scale of all previous waves. During the first to fourth waves from 23 January 2020 to 30 December 2021, a total of 12 631 cases (range: 1–144 cases per day) and 198 related deaths were recorded, representing a cumulative incidence of 170.6 per 100 000 population and a case fatality rate (CFR) of 1.57%. From May 2021 to late December 2021, "dynamic zero" infection status was achieved, with only imported cases recorded. The fifth wave, triggered by an imported case of Omicron variant BA.2, began on 31 December 2021. The number of cases increased exponentially from early February 2022 to a peak of more than 100 000 cases on 28 February 2022. Another upsurge of cases started in June 2022 and peaked in December 2022, which was associated with the emergence of Omicron variants BA.4/BA.5 and their descendant lineages. The fifth wave saw a total of nearly 3.1 million cases with over 10 400 related deaths, yielding a CFR of 0.34%. Since 2023, resurgences in COVID-19 activity were observed every 6–9 months, attributable to changes in predominant variants.

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Published: 09 September 2026
doi: 10.5365/wpsar.2026.17.5.1378

Table 1. **Cumulative COVID-19 cases, deaths[a] and vaccination rates[b] by month and year, Hong Kong Special Administrative Region, China, 2020–2023**

2020	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cases	13	95	715	1038	1085	1206	3272	4811	5088	5324	6315	8847
Deaths	0	2	4	4	4	7	27	87	101	101	103	138
2021	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Cases	10 453	11 006	11 465	11 770	11 837	11 919	11 980	12 108	12 218	12 347	12 437	12 650
Deaths	172	187	191	194	195	196	197	197	198	198	198	198
HCW vac. rate (%)	–	–	0.7	12.8	23.2	32.2	51.7	82.5	94.1	94.8	95.1	95.1
≥60 vac. rate (%)	–	–	1.4	8.6	11.8	14.9	23.0	32.8	41.9	45.5	47.7	50.1
Total vac. rate (%)	–	–	–	–	–	–	–	–	–	65.7	67.3	69.2
2022	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Cases	14 204	275 652	1 156 652	1 299 916	1 358 415	1 427 793	1 556 456	1 755 377	1 990 601	2 146 805	2 347 228	2 855 512
Deaths	198	1110	7523	8333	8404	8416	8487	8606	8782	8938	9134	9853
HCW vac. rate (%)	95.8	96.5	97.6	98.6	98.7	98.8	99.5	99.5	99.6	99.7	99.3	99.6
≥60 vac. rate (%)	52.8	61.2	72.7	74.1	76.9	79.4	80.6	81.6	82.8	83.2	83.4	83.6
Total vac. rate (%)	67.3	71.7	80.1	84.3	87.1	88.7	89.5	89.2	90.7	91.3	91.7	91.9
2023	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Cases	3 106 579	NA[c]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Deaths	10 670	10 797	10 838	10 931	11 350	11 671	11 824	11 890	11 985	12 045	12 071	12 080
HCW vac. rate (%)	99.3	99.2	98.9	99.0	98.4	98.4	98.1	97.7	97.4	97.7	96.8	96.2
≥60 vac. rate (%)	83.7	83.7	83.7	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9
Total vac. rate (%)	92.0	92.0	92.1	92.9	92.9	93.0	93.0	93.0	93.0	93.0	93.0	93.0

HCW: health-care worker; NA: not applicable; vac.: vaccination.

Numbers are cumulative totals.

Dashes indicate that no data were available at the time of data release. In Hong Kong Special Administrative Region, China, the COVID-19 Vaccination Programme was officially launched on 26 February 2021.

[a] Deaths are registered deaths, counted by month of death rather than month of registration.

[b] Vaccination rates are shown as the percentages of: HCWs (including staff of the Department of Health and staff of public hospitals under the Hospital Authority) having completed a primary series, cumulatively; older adults (≥60 years) having completed a primary series, cumulatively; and total individuals having completed a primary series, cumulatively. There was fluctuation in figures in 2022 and 2023 with respect to HCW vaccination rates due to changes in the HCW population within the public health-care sector.

[c] Starting on 30 January 2023, Hong Kong Special Administrative Region, China transitioned its COVID-19 surveillance mechanism from tracking individual COVID-19 cases to focusing on broader pandemic trends and severity. As a result, data on the number of COVID-19 cases are no longer available thereafter and are marked as NA in the table.

RESPONSES

The first 2 years (2020–2021)

In response to a report of a cluster of pneumonia cases of unknown etiology (subsequently known as COVID-19) on 31 December 2019, the Government immediately formulated the Preparedness and Response Plan for Novel Infectious Diseases of Public Health Significance, launched on 4 January 2020, with simultaneous activation of the "Serious" response level under the Plan. The then-Secretary for Food and Health coordinated the required responses from relevant government bureaux and departments. COVID-19 was included as a statutorily notifiable infectious disease on 8 January. In parallel, the Government swiftly ramped up laboratory capacity for diagnosis and launched an enhanced laboratory surveillance programme on 13 January. Upon confirmation of the first two imported cases on 23 January, the Government activated the "Emergency" response level on 25 January, and the Chief Executive of Hong Kong SAR, China, chaired a steering committee to formulate relevant strategies and measures covering disease prevention and control, public engagement and risk communications. In addition, an expert advisory group comprising local experts on public health, microbiology and clinical medicine was established to provide advice for formulation of control strategies. The Government established a dedicated website as a centralized information portal for the public, and hosted daily media briefings to keep the public informed of the latest situation and actions needed.

From January 2020 to January 2023, Hong Kong SAR, China, adopted a rigorous containment approach to curb the spread of COVID-19. When WHO declared COVID-19 a pandemic on 11 March 2020, the Government imposed compulsory quarantine on all inbound travellers and temporarily prohibited entry of non-residents who travelled by air from overseas in the same month. The Government also implemented a series of physical distancing measures, including prohibiting group gatherings in public places, restricting the operating hours of catering businesses, and temporary school closure. Mandatory mask-wearing in public places was introduced in July 2020. A territory-wide sewage surveillance programme for COVID-19, covering around 80% of the population, began later that year. Samples were collected from manholes – each representing roughly 40 000 population on average – and were tested for SARS-CoV-2 to detect hidden community transmission. This allowed the Government to pinpoint affected areas and implement targeted measures, such as lockdown and compulsory testing.[4] To enhance case detection, compulsory testing of specified groups of persons was introduced in November 2020. Hong Kong SAR, China, launched the territory-wide COVID-19 vaccination programme on 26 February 2021. From April to December 2021, Hong Kong SAR, China, primarily recorded only imported cases, with no sustained local transmission in the community.

The fifth wave and end of the containment phase (2022–2023)

The rapid surge in the number of cases during the fifth wave posed significant challenges to public health systems. The Government adjusted its strategy swiftly and permitted the use of rapid antigen tests alongside nucleic acid tests for confirming SARS-CoV-2 infection. The CHP launched online platforms that allowed individuals to directly report their test results and epidemiological information. Confirmed patients who were asymptomatic or had mild symptoms and did not require hospital care were allowed to isolate at home. A Vaccine Pass was launched in February 2022 to allow access to certain public premises, help with contact tracing and motivate the public to get vaccinated. The Central People's Government of China provided timely and invaluable support to help Hong Kong SAR, China, cope with the significant increase in the number of cases. Community stakeholders also supported various anti-epidemic measures.

From July 2022, the Government started to gradually adjust the anti-epidemic measures with a view to return to normality, taking into account the progressive establishment of a community immunity barrier through vaccination and natural infection. These included reopening of leisure and entertainment venues and relaxation of catering and gathering restrictions. The strategy was shifted towards precise prevention, focusing restrictions on high-risk groups rather than blanket measures, with an overall objective to achieve the greatest effects with the lowest costs through precise, data-driven measures. Most anti-epidemic measures were phased out by the end of 2022. Compulsory isolation ended on 30 January 2023, signifying the transition to the

mitigation phase. Surveillance was changed from tracking of individual cases to monitoring of the disease trends and severity, with case-based surveillance confined to severe and fatal cases only. Hong Kong SAR, China, resumed full normalcy on 1 March 2023 with the lifting of the mandatory mask-wearing requirements. By March 2023, 95% of the population possessed hybrid immunity equivalent to having received three doses of vaccine (via vaccination and/or natural infection). On 30 May 2023, the response level was lowered from "Emergency" to "Alert."

A comprehensive preparedness and response plan, backed by a robust legal framework, enabled Hong Kong SAR, China, to address public health challenges quickly, effectively and in a coordinated manner. The response framework facilitated the formulation of appropriate and timely anti-epidemic measures based on scientific evidence and the latest information. The Government also maintained transparency and timeliness in risk communications, thereby fostering public trust and effectively countering the infodemic. The extensive use of information technology also contributed to the effective planning and implementation of various anti-epidemic measures. Hong Kong SAR, China, adopted a whole-of-community approach to combat the pandemic, mobilizing stakeholders across society to participate in anti-epidemic efforts. These collective contributions were instrumental in the successful fight against COVID-19.

CONCLUSION

While Hong Kong SAR, China, successfully responded to the COVID-19 pandemic, the Government encountered several operational challenges. One of the challenges was the transition from mandatory laboratory testing to voluntary self-reporting during the fifth wave, which may have resulted in underascertainment of the true case count. In addition, the unprecedented scale of the Omicron surge temporarily overwhelmed contact tracing capacities, necessitating a strategic shift from individual case containment to broader community mitigation measures. Acknowledging these limitations, the Government remains vigilant and is committed to enhancing preparedness for future emerging and re-emerging infectious diseases. Looking ahead, the Government will continue to closely monitor the situation and risks of COVID-19 and other infectious diseases, with an emphasis on protecting high-risk groups and keeping a close watch on the latest WHO assessments. The Government will implement additional measures to enhance its capacity against infectious diseases, including strengthening surveillance and early warning systems, stepping up workforce training, broadening and deepening collaboration with Mainland authorities, and fostering international cooperation in scientific research.

Conflicts of interest

The authors have no conflicts of interest to declare.

Ethics statement

This brief report consists of a review and synthesis of openly available public health data. It does not involve human participants, identifiable personal data or interventions. Based on organizational ethical review policies, such activities do not require formal ethics approval.

Funding

None.

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