

Determinants of Taiwan's Early Containment of COVID-19 Incidence



See also Morabia, p. 923, Tarantola et al., p. 925, and the *AJPH* COVID-19 section, pp. 939–977.

The 2003 SARS (severe acute respiratory syndrome) outbreak hit Taiwan hard, with 346 confirmed cases and 73 deaths, respectively accounting for 4.3% and 10.0% of global cases and deaths. By contrast, Taiwan has been rather successful in countering the current COVID-19 outbreak at this stage, with only 329 confirmed cases (1.38 per 100 000) and 5 deaths (0.02 per 100 000), respectively accounting for 0.039% and 0.012% of the global total as of April 1, 2020. Other countries neighboring China have not fared as well. At the time of writing, South Korea has 9887 confirmed cases (19.2 per 100 000) and Japan has 2178 (1.7 per 100 000). This comes despite close economic integration between Taiwan and China, with air passenger routes between the two being among the world's busiest. The sharp contrast between these outcomes can be explained by multiple factors. We share field observations from Taiwan that may provide insight into Taiwan's unique experience with COVID-19.

SARS EXPERIENCE AND EMERGING RESPONSE SYSTEM

The SARS outbreak in 2003 was a wakeup call for Taiwan

and, in the outbreak's aftermath, most of Taiwan's hospitals and health care facilities established fever-screening stations and triage systems, along with 1100 negative pressure wards under the guidance of the Taiwan Centers for Disease Control and Prevention (CDC). Subsequent experiences with outbreaks of H1N1, H5N1, H7N9, rabies, and dengue fever helped the Taiwan CDC establish a robust response mechanism for emerging epidemics.¹ Hence, as the COVID-19 outbreak unfolded, the Taiwan CDC and its health care facilities, for both acute and chronic care, were able to respond early, quickly, and efficiently.

VERY EARLY PROACTIVE MEASURES

Beginning December 31, 2019, even before the extent of the COVID-19 outbreak was fully understood, Taiwan had already commenced onboard quarantine measures for all direct flights arriving from Wuhan, China. In early January, Taiwan activated airport quarantine measures, requiring all arriving passengers who had transited through China, Hong Kong, or Macau to undergo home quarantine for 14 days—a full four

to eight weeks before other countries, including South Korea and Japan, initiated such requirements. Taiwan's hospitals activated infection-control mechanisms and negative pressure isolation wards as early as the end of January. Schools, restaurants, offices, and most other public places were required to provide body temperature monitoring and hand sanitizer. On March 21, the Taiwan government activated its strictest level of international travel restrictions. Other strategies implemented include wearing surgical masks, staying at home, restricting social gatherings, maintaining social distance of more than 1 meter outdoors and 1.5 meters indoors, and delaying the start of the school semester. In addition, the government requisitioned 16 hotels to serve as quarantine facilities.² These measures not only directly protect Taiwan from the threat of community transmission of the

virus but also helped quell the spread of fear.

NATIONAL HEALTH INSURANCE SMART CARD

Taiwan's National Health Insurance (NHI) covers nearly 99.8% of the total population.³ The Taiwan CDC used the NHI smart card system to trace real-time travel and arrival history from the National Immigration Agency. As a result, when a patient develops influenza-like symptoms, the Taiwan CDC can proactively determine whether the patient belongs to a high-risk group for COVID-19. NHI smart cards can also be used to screen patients entering hospitals to prevent further infection spread.

TOTAL TRANSPARENCY AND PUBLIC EDUCATION

Taiwan identified its first person with COVID-19 on January 22, 2020, a Taiwanese businessperson returning from Wuhan. Since then, Health and Welfare Minister Chen Shih-Chung has hosted a daily

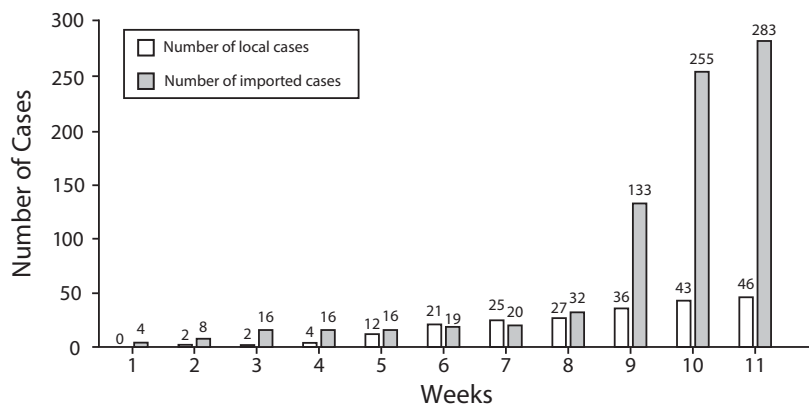
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Week	1	2	3	4	5	6	7	8	9	10	11
Local cases	0.00	0.01	0.01	0.02	0.05	0.09	0.11	0.11	0.15	0.18	0.19
Imported cases	0.02	0.03	0.07	0.07	0.07	0.08	0.08	0.13	0.56	1.07	1.19
Total cases	0.02	0.04	0.08	0.09	0.12	0.17	0.19	0.24	0.71	1.25	1.38

Note. Total confirmed cases = 329.

FIGURE 1—Weekly Accumulated Number of Cases and Incidence Rates per 100 000 Population of COVID-19: Taiwan, January 22–April 1, 2020

90-minute televised press conference to provide the public with a case-by-case update on the current status of the outbreak in Taiwan, seeking to maximize transparency and awareness and thereby minimize public anxiety. Social media has also played an important role in promoting public education.

MASK-RATIONING PLAN

From SARS and other previous epidemics, people in Taiwan had already internalized the importance of both wearing masks and handwashing to prevent infection. To ensure adequate domestic supplies, on January 24, 2020, Taiwan banned the export of surgical masks and personal protective equipment. Then, beginning on January 28, the government began releasing six million masks per day. Each week, every resident could purchase three masks at a strictly enforced set price of

US \$0.13 from their local pharmacy using their NHI smart card. Taiwan recently upgraded this rationing system to allow pre-ordering. Furthermore, the government also encouraged the rapid ramping up of mask production. By February 20, 66 factories were producing nearly 6 million per day and quickly scaled up to 10 million per day.⁴ Recently, output has increased to 13 million per day, and Taiwan has begun to export and donate masks and thermal scanners to the United States, the European Union, and other countries.

SOCIAL COHESION AND SENSE OF URGENCY

Taiwan is currently not a World Health Organization (WHO) member and does not have WHO observer status. During the 2003 SARS outbreak, this exclusion from international health organizations and information left Taiwan to fight

the virus alone.⁵ This experience critically raised the public’s awareness of the need for an early, quick, and effective response to emerging epidemics.⁶

In summary, a range of measures helped Taiwan respond early and effectively to the still emerging COVID-19 crisis, including maximizing response system efficiency, activating early proactive measures, tracing with the NHI smart card, promoting transparency and public education, enforcing social cohesion, and fostering a public sense of urgency. However, Taiwan is currently facing more imported cases as Taiwanese citizens who were abroad at the initial outbreak gradually return home, thus increasing the risk of community transmission. From Figure 1, we can see that the imported cases account for 86% of total accumulated cases and significantly increased in mid-March. However, the number of local cases has only increased very slightly, without a sign of wide community spread. Thus the initial preventive measures are

still effective, but there is still widespread recognition in Taiwan that continued vigilance is imperative to prevent further spread of the virus. **AJPH**

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W-T. Chiu collected the data and wrote the editorial. R. P. LaPorte gave epidemiological suggestions and comments. R. P. LaPorte and J. Wu revised the editorial. J. Wu designed the study.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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