The COVID-19 measures in China:

Understanding of the Dynamic Zero-COVID strategy to protect normal life

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The COVID-19 pandemic has brought so many deaths and kept having a tremendous impact on work, children's education, and the daily life of people. All countries around the world have faced COVID-19 and have taken measures on their own. Although the geographical conditions and political backgrounds vary from country to country, modern lifestyles are not significantly different. However, the number of deaths and economic losses due to this pandemic differ considerably from country to country. Especially in China, since the government suppressed the initial spreading in Wuhan, the domestic daily life and economic activities have been maintained with almost no deaths. Due to a fundamentally different political system from Japan and Western countries, many people tend to shun China as a country with different values. Indeed, it will not be easy to copy what China has done as they are in Japan. But, for this endless COVID-19 pandemic, China shows a direction which we cannot neglect. Lives, economy, education, and everyday life are all important in any country. We hope to share our understanding of the measures we have seen while living in China for the future of Japan.

The first suppression In January 2020, many infected people were found in Wuhan, Hubei Province, and on January 20, before the start of the Spring Festival (January 24 to February 2), the Chinese government announced its decision to make the maximum effort to suppress it. As a result, Hubei Province, where Wuhan City is, took strict measures of lockdown and going-out restrictions. They continued the strong measures for about three months until April 8. 3,869 people, about 83% of the cumulative death toll in China so far, died in Wuhan City in the early stages of the epidemic. In cities outside Hubei Province, though the number of newly infected people did not exceed 100, some local governments implemented lockdowns from the beginning of February 2020. They continued until no infected person was found, which took about three weeks.

The highest response level The Chinese government's decision on January 20 is "to manage it as the Class 1 infectious disease."[1] Although the Chinese government classifies COVID-19 as an infectious disease of Class 2, they decided to take the highest response of the most severe infectious diseases, such as plague and Ebola. COVID-19 is an infectious disease that is unknown to humankind. Therefore, no one can estimate its risk from the information obtained in such a short time. Furthermore, the schedule for developing vaccines was also not unknown at that time. Therefore, we can understand the decision to make all efforts to ensure suppression as reasonable.

The law stipulates measures for the Class 1 infectious diseases in advance; thus, the government can take strong and enforceable actions. Instructions for hospitalization and quarantine of positives and their contacts are enforceable, and there are penalties for non-compliance[2]. The other pre-determined rule is obligatory to register to the system of the Chinese CDC within 2 hours when a PCR positive case is found.

Daily life without infected people The cumulative number of infected people throughout China is 98,427 as of November 17, 2021, and the cumulative number of deaths is reported to be 4,636[3].

In addition, the cumulative number of infected people is extremely low in areas where infection explosions have been prevented, even in large cities. For example, in Shanghai (a population of 26 million), the cumulative number of infected people in the city, excluding overseas inflows, has remained less than 400, and the cumulative number of deaths is just 7.

Our feeling is that we are living without infected people nearby except for the time and place when and where a local spreading happens. At this moment, we cannot know whether the number of infected people is really 0 or not unless all citizens are tested, but it can be seen from the current situation that the number of infected people in the city would have kept being 0 in the past. If the area is designated as a *low-risk area* (as described below), local governments have taken few measures to limit people's everyday lives and economic activities. The restaurant is busy, and many people surround the round tables and have a drink together. If there is even one infected person, the number of infected people increases exponentially according to a high value of the basic reproduction number of COVID-19. Then sooner or later, infected persons will surely be found. No infected person has been found for months in many areas because there is no starting point of the infection chain reaction. China does not keep the number of infected people low due to behavioral restrictions, etc., but maintains the state with no starting points.

[1] https://www.rcaid.jp/news/monthly2020.html "On January 20, 2020, the National Health and Health Committee announced to add the new coronavirus pneumonia as the Class 2 infectious disease but to manage it as a Class 1 infectious disease" (China's infectious diseases are classified into three levels (Jia/Yi/Bing).

[2] As a recent example, a 64-year-old woman who hid her itinerary to leave Nanjing was detained. Generally, when a rule violation does not bring serious consequences, warnings and administrative penalties (administrative detention less than 15 days) will be imposed instead of criminal penalties (up to 7 years in prison).https://www.chinadaily.com.cn/a/202108/04/WS6109ded9a310efa1bd6666f0.html

[3] Our World in Data https://ourworldindata.org

The low-risk area only when 0 cases for two consecutive weeks In China, each area is set as a low-, medium-, or high-risk area according to the infection status.

Areas in which new cases are kept 0 for two consecutive weeks are set as *low-risk areas* and have almost no behavioral restrictions. You can live a normal daily life. You are also free to move to other areas if you have been in low-risk areas for the past two weeks.

If infected persons are found, even just one person, the local government first carries out a thorough epidemiological investigation. They will take the low-risk area away if they find some probability of spread of infection. Areas where the cumulative number of infected people is less than 50 for the last two weeks or more than 50 but without cluster infection confirmed are designated as *medium-risk areas*. When moving from a middle-risk area, a negative proof of the PCR test is required once before and after the move, and temporary isolation is required depending on the workplace. The local government decides the specific measures when designated as a medium-risk area, but generally, going out is restricted until the results of the PCR tests of all people are known. In that case, one family member can go out to buy food and necessities once a day.

Areas where the cumulative number of infected people in the past two weeks has been 50 or more and cluster infections have occurred are designated as *high risk areas*. In a high-risk area, you cannot go out of that area in principle. Penalties for violating quarantine rules include a minimum of two days and a maximum of seven years in custody, depending on the content.

Since the unit of this risk area is judged by an expert based on the situation, it may be divided by blocks or streets instead of the entire city. In addition, recent measures have set more detailed classification and cancellation criteria than the above three levels[4]. You will be required to show your smartphone's "health QR code" or/and "journey card" when using transportation or commercial facilities. Security guards are stationed at the entrances of universities and large commercial facilities to check these codes. The health QR code reflects information managed by the government such as self-reports and test results, while the journey card reflects which risk area the person has stayed based on the location information of the mobile phone. The itinerary card displayed in green is proof that it is okay, which indicates that you have been in a low-risk area for the past two weeks.

Border control measures For maintaining domestic cities with no starting points of new spreading, it is necessary to prevent the influx of infected people from foreign countries as much as possible. Local governments have implemented a quarantine measure from March 2020. Arrivals must be quarantined in designated hotels for two weeks.

The cost of hotel isolation is basically paid by the arrivals (depending on the location, it is 7,700 RMB ($\approx$ 1,206 USD) including meals in Shanghai). Since there were multiple cases of new spreading from those who completed the quarantine, local governments are recently imposing additional one-week hotel isolation or home isolation (health observation).

In terms of tests at the border, you must first undergo both a PCR test and a serum IgM antibody test within 48 hours of entering China. After arrival, PCR tests will be

[4] https://m.thepaper.cn/baijiahao_13790040

performed on two samples, nasopharyngeal swab and saliva, at the airport. Currently, the arrivals will have more than 6 PCR tests during the two-week hotel isolation and the one-week home isolation.

Regarding foreigners entering the country, a visa will be issued if you receive a letter of invitation (approved by the local government), and you can enter the country. Recently, the issuance of invitation letters has been resumed in many cities. However, there are exceptions at the discretion of the local government; some foreigners who are already employed in China but are abroad still cannot receive invitation letters. Regarding the entry of families of foreign workers, new visas have been suspended for nearly a year, are but have recently resumed. Besides, the issuance of student visas required for international students to enter the country has not been resumed yet. The actual number of arrivals, including Chinese people, was about 90,000/month on average in 2020 (including arrivals from Hong Kong and Macau). This is close to the average number of arrivals in Japan during the same period, about 70,000/month, which is remarkably small for the country with more than ten times of population than Japan.

Mass testing Nevertheless, COVID-19 infected people sometimes slip through it and appear in the city despite such thorough border measures. Once an infected person is found, some areas of the city will be designated as medium-risk or high-risk areas, and citizens' lives will be affected. Therefore, the goal is to achieve 0 infected people in the shortest time and return to the low-risk area for two consecutive weeks. As in other countries, contact reduction is the basis of infection control, but it takes some time to achieve zero infection by itself. Thus, a mass PCR test are carried out on the inhabitants of the infected area to suppress it in as short a time as possible. Speed is also important to enhance the effectiveness of this mass test, and the authority requests to complete the inspection within two days in cities with 5 million or fewer people and within three days in cities with 5 million or more people[5].

The cost of the mass test is not high compared to the economic loss due to prolonged periods of remaining medium- and high-risk areas. Currently, the cost of a single-tube PCR test including labor costs is 60 RMB($\approx$ 10 USD), and one of 10-people pool type is 20 RMB($\approx$ 3 USD). The cost of the mass test for 1 million citizens is about as 20 million RMB ($\approx$ 3 million USD). By the way, the price of the PCR test kit is currently around 10 RMB ($\approx$ 1.7 USD) [6].

The PCR test also plays an important role in low-risk areas. If the detection of new spreading is delayed, the infection will spread to other areas. Then, the suppression measures must be applied in broader areas and for a longer time; thus, an enormous economic loss may occur. Therefore, the testing strategy is in place even in low-risk areas as follows. Local authorities encourage PCR tests on people with any symptoms and conduct regular PCR tests on high-risk people, such as medical workers. Recently, there have been increasing cases of requesting a negative PCR-test certificate within 48 hours for business trips, event participation, etc. In urban areas, one can find multiple places, which provide PCR tests for 24 hours with relatively low expense, 60 RMB ($\approx$ 10 USD). The test result will be available on his or her smartphone within about 6 hours.

[5] http://www.gov.cn/fuwu/2021-09/14/content_5637283.htm
[6] https://www.163.com/dy/article/GJQFRT7O0534B3AC.html

Dynamic Zero-COVID Strategy The Chinese measure consists of three points: (1) strict border measures to prevent the influx of infected people for keeping cities with no starting point of the infection chain reaction, (2) a test system to detect rare re-expansion of infection as soon as possible, and (3) taking all possible measures at the time of re-expansion to recover normal in a short period of time. It can be called the *Dynamic zero-COVID strategy*, which takes into account deviations from zero.

By the way, the expression "zero COVID" is misleading because it is similar to the word "zero risk" that does not tolerate any risk. Thus, some people may understand it as a strategy to aim to eradicate the virus. This is why the authors use the expression *green zone strategy*[7], which is the same idea as the Dynamic Zero-COVID strategy.

How long will it continue? One of the advantages of the Dynamic Zero-COVID strategy is the low number of casualties. Although the infection number is basically 0, even when new spreading is occurring, all of the infected persons are found before severe symptoms and hospitalized for isolation due to thorough testing with the aim of suppression in a short time. For this reason, the mortality rate since April 2020 is much lower, even before vaccination.

If a low-risk area can be maintained, the impact on domestic economic activities will be small. And the impact on school education is small compared to other countries (however, high schools and universities in China are very cautious about infection in schools because there are many shared rooms in the dormitory system). If the effective reproduction number is maintained below 1 by reducing contact, the economic loss and the impact on education are proportional to the time to the end. People's exhaustion is inevitable if it is prolonged.

This Dynamic Zero-COVID strategy requires thorough border measures, making it extremely difficult to travel to and from foreign countries. Compared to human life and domestic economic activities, the impact of difficulty in traveling to and from foreign countries is limited. Still, for a prolonged period of two or three years, the effect may not be negligible.

The Chinese government might have aimed to exit from the Dynamic Zero-COVID strategy when herd immunity with vaccines is achieved. For a period of one to two years for vaccine development and vaccination, it is rational to prioritize human life and domestic economic activities, even at the expense of foreign traffic. However, due to the emergence of highly infectious variants, the vaccine herd immunity becomes difficult to achieve. Currently, China may be waiting for the situation to change with the advent of next-generation vaccines and new therapeutic agents. As long as the Dynamic Zero-COVID strategy is continued, the number of victims will not increase in proportion to time, so waiting for a change in the situation is also one strategy. Even if China finally decides the drastic policy change to allow for spreading under a certain amount of sacrifice to return to the original social activities, as in other countries, they can have sufficient scientific discussion for the decision. In situations where economic losses and deaths continue to increase over time, it is not easy to make a calm judgment.

Summary Various conditions are different between Japan and China. When we learn from the media about strong measures in China, such as large-scale mass testing and

[7] https://greenzoneproject2021.wordpress.com

strict lockdown against a tiny number of infected people, we tend to think that only China can do so because of their powerful political system and strategy not helpful for us. Certainly, the differences in social systems are large, and it may be difficult to take exactly the same measures. However, the target of the measure, COVID-19, is the same. We can return to genuine "normal life" and economic activities only when we create a situation where we feel that the infected person is not around us. Finally, we would like to emphasize that the desires of people who want to live their daily lives with peace of mind and work hard at work and school are the same in any country.