

The International Forum on COVID19 in Asian Context, Japanese Health Econ Association

- COVID-19; policy reaction and the contribution of Health Economics-

December. 4th, 2021 (Sat) 14:00-17:40

Online Meeting (Cisco Webex)

1. Opening Remarks from JHEA Delegates :

Prof. Haruko Noguchi (Waseda University)

My name is Haruko Noguchi who is in charge of Chair of the International Exchange Committee of Japan Health Economics Association, JHEA. My affiliation is Faculty of Political Science and Economics, Waseda University, Tokyo, Japan. Welcome onboard everyone.

First of all, Hideki and I are very happy to organize today's International Forum on COVID-19 Pandemic in Asian Context. We really appreciate all people participating in today's forum, in particular presenters from five countries: Taiwan, Korea, India, Singapore, and Japan, in order to share the experience of COVID-19 in each country.

We also thank Mr. Matsuda, and Mr. Tsurumoto from the Institute of Health Economics and Policy, called IHEP, to support all the administrative work for this, as well as our appreciation goes to Prof. Yasushi Iwamoto, the President of JHEA, and then Professor Wataru Suzuki, the head of Secretariat of JHEA.

Before we move on the presentation from each country, I would like to talk a little bit about the general background and agenda of today's forum.

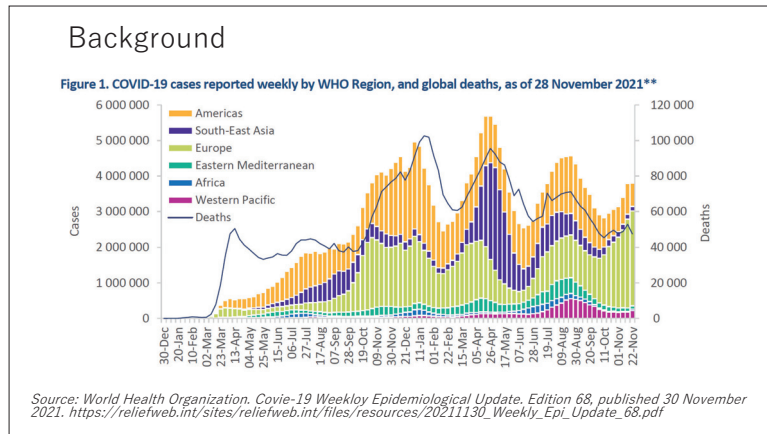
First, as a background, let us see COVID-19 cases reported weekly by WHO Region and global deaths, as of the end of November 2021. This figure shows that the world has experienced similar waves of infections from last March to date. The largest wave seems to happen in the Americas following South East Asia and Europe. Cumulatively, over 260 million confirmed cases, and nearly 5.2 million deaths have been reported all over the world until today. If you see Slide 1-1, the total number of infected people in Asian countries seems to be the second largest in the world next to the Americas. However, I have to notice that this figure does not concern of the size of population.

Let's look at the Asian situation from different aspects (Slide 1-2). As I said, although the size of infectious population is huge in South East Asia, the ratio of cumulative cases and death looks slightly in better situation than that in Europe and America. This table shows that about 70% of cumulative cases in globe can be accounted for the cases in Europe and the Americas. Out of the rest 30%, the cases in South East Asia explain 17%.

Likewise, about 75% of cumulative death can be accounted for by the ones in Europe and the Americas. Out of the rest of 25%, the deaths in South East shares 14%. Therefore, Asian countries seems to be relatively doing well compared to other regions.

Further, COVID-19 pandemic has been both a public health and socio-economic crisis on globe scale. Let's see the impact on the world economy. Slide 1-3 shows the trend of annual percentage of GDP growth from 1990 through 2020. The annual rate of change in global GDP was -3.3% for the Lehman shock, and -1.1% for the Asian financial crisis, while it was -6% for COVID-19 pandemic. In Asia, the annual rate of change in GDP for East Asia and the Pacific region was -4.5% this time compared to -1.8% in the Lehman shock and -3.6% in the Asian financial crisis.

In South Asia region, the annual rate of change in GDP was -10.2% in COVID-19 pandemic, which is quite a



Slide 1-1

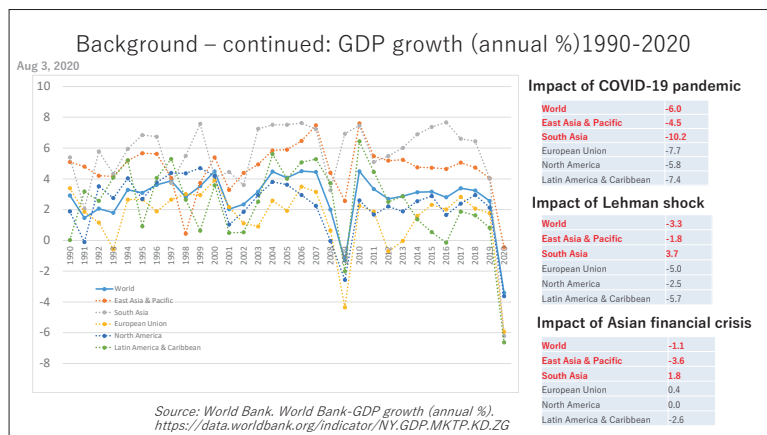
Background - continued

Table 1. Newly reported and cumulative COVID-19 confirmed cases and deaths, by WHO Region, as of 28 November 2021**

WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days*	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days*	Cumulative deaths (%)
Europe	2 660 956 (70%)	7%	86 151 591 (33%)	29 096 (61%)	-2%	1 540 178 (30%)
Americas	659 605 (17%)	-24%	96 627 452 (37%)	9 397 (20%)	-36%	2 346 007 (45%)
Western Pacific	220 501 (6%)	24%	10 170 912 (4%)	3 160 (7%)	0%	140 984 (3%)
South-East Asia	120 704 (3%)	-11%	44 529 941 (17%)	3 574 (8%)	26%	706 336 (14%)
Eastern Mediterranean	94 382 (2%)	2%	16 751 411 (6%)	1 772 (4%)	-8%	309 105 (6%)
Africa	43 730 (1%)	93%	6 261 502 (2%)	525 (1%)	7%	152 731 (3%)
Global	3 799 878 (100%)	0%	260 493 573 (100%)	47 524 (100%)	-10%	5 195 354 (100%)

Source: World Health Organization. *Covid-19 Weekly Epidemiological Update, Edition 68, published 30 November 2021.* https://reliefweb.int/sites/reliefweb.int/files/resources/20211130_Weekly_Epi_Update_68.pdf

Slide 1-2



Slide 1-3

serious negative growth, although it had been positive during the Lehman shock and Asian financial crisis. Conclusively, we can see how globally large and serious the impact of current COVID-19 pandemic is compared to the Lehman shock in 2008 and the Asian financial crisis in 1997.

Based on these backgrounds, today, we will learn the past and current situations of COVID-19 in five countries: Taiwan, Korea, India, Singapore, and Japan. These Asian countries report somewhat lower COVID-19 cases and deaths than countries in other regions like the United States and European countries, which remains something of a puzzle. We can discuss how and why so from several epi and/or non-epi aspects.

Secondly, socio-economic impacts of COVID-19 pandemic for these countries are also important to be discussed. Macro-economic studies find that the pandemic has produced both supply and the demand shocks to the economy. For example, lower consumption and fewer foreign visitors reduce demand. Factory utilization has dropped in connection with efforts to lower the spread of infection. Economic vitality remains sluggish as measured by bankruptcy and employment over 2020. Furthermore, government policies such as lockdowns, emergency declarations, and vaccine policies have had a significant impact on the socio economic activities of people and firms in these countries. It is worthwhile for us to learn experience in each country with each other.

In today's forum, we will seek to draw lessons on how to minimize the cost of uncontrolled public health epidemics while balancing them with the socio-economic costs of reduced production and the consumption from public and private sector responses in Asian countries to COVID-19 pandemic.

Thank you for your attention.

2. First session

(Prof. Noguchi) Shall we start the first session?

Each presenter has 15 minutes. I will remind you all at one minute left.

First speaker is Dr. Li-Lin Liang from National Sun Yat-sen University, Taiwan. Please welcome, Dr. Li-Lin.

(1) Dr. Li-Lin Liang, Taiwan

I am Li-Lin Liang from National Sun Yat-sen University in Taiwan.

In today's presentation, I will be introducing Taiwan's model for combating COVID-19. I will talk a little bit about case management and non-pharmaceutical interventions in Taiwan. Also, I will be presenting changes in healthcare before and after COVID-19 outbreak. Then, if we still have time, I will talk a little bit about post-corona health policy discussion. [Slide 2-1]

Taiwan is an outlier. I will say outlier, because when we compare cumulative cases per million people, Taiwan actually has a very low incident rate. In Asia, the cumulative cases is 17,000 and Taiwan is way below the Asian average. Also, Taiwan holds the world record of the longest period without a local infection. As you can see the trend, the line here is very flat. [Slide 2-4]

The same trend can be observed for cumulative deaths per million people. Taiwan is very, very low compared to other countries. [Slide 2-5]

It seems that Taiwan is quite successful. Taiwan's success has gained a large media coverage. [Slide 2-6]

I will summarize Taiwan's model for fighting against COVID-19 into 2S and 2T. S means speed, solidarity, and T means trust and technology. Speed means that Taiwanese government implemented border controls very early in January 2020. Because Taiwan has collective memory of SARS and a culture of civic-mindedness, it fostered a sense of solidarity during the COVID-19 pandemic, which in turn seems to promote high compliance with public health measures such as mask-wearing. [Slide 2-7]

To build trust in government, CECC, the Central Epidemic Command Center was established and the daily press conference has been held non-stops since the outbreak of COVID-19, and coordinated information campaign has been introduced nationwide. Lastly, technology. With the high technology, Taiwan conducted very comprehensive contact tracing and installed a digital fencing system for quarantine. [Slide 2-7]

CECC was established by Taiwan CDC to lead and coordinate actions across ministries. [Slide 2-8]

Because the SARS experience, the government has maintained high vigilance against new virus. COVID-19 was listed as a notify disease as early as in January and travelers from Wuhan in China was banned in January. By the end of March, all the foreign citizens were not allowed to enter Taiwan. Taiwan has a total border closure between March and June 2020. [Slide 2-9]

Here, we can see that every day, government officials from CECC hold press conferences in front of the camera. The coordinated information campaign was spread out through traditional and social media including LINE. [Slide 2-10]

In 2020, Taiwan performed quite well. Taiwan has a positive GDP growth rate of 2.54, which is relatively high compared to other countries. [Slide 2-11]

However, Taiwan encountered a major outbreak this May. The outbreak was short. It was only two months, but the situation was very serious and National Taiwan University Hospital even called for help because of overrunning their capacity. [Slide 2-12]

What happened in May? The story could go back to this April when CECC shortened aircrews' quarantine to three days after which virus were brought into communities. For the first time in May, Taiwan entered the community transmission stage. The daily new cases increased from 11 to more than 700 within 10 days. It was very shocking. CECC imposed Level 3 lockdown immediately. The lockdown has been imposed for two months. Because by end of July, the case number decreased, the lockdown was lifted. Level 3 lockdown is next to Level 4, the full lockdown. From May to July is the darkest period in Taiwan. [Slide 2-13]

What went wrong was Taiwan's model, why Taiwan performed so well at the beginning, but cannot contain the community outbreak? Some people said that this is because of Taiwanese government's over-confidence or complacency. In my personal opinion, the delay in government response to community transmission is likely to play a key role. [Slide 2-14]

When we look at the case fatality rate, we can see that Taiwan actually has a very high Case Fatality Ratio (CFR). CFR is calculated by dividing number of deaths by number of cases. Why Taiwan has so serious fatality rates, it is 5%, which is way above the world average of 2%? Two possible reasons. One, because at the beginning of the May outbreak, the vaccine coverage was very, very low and people did not have any protection from virus. Second, because Taiwan did not implement the widespread testing, so the number of cases was likely to be underestimated. We have a very high numerator and very small denominator. The case fatality rate would appear high. [Slide 2-15]

If we look at the cumulative tests per 1,000 people in Taiwan, in May, Taiwan actually ranked bottom, lower than Indonesia. We do not have enough testing. [Slide 2-16]

When we look at the coverage of vaccination, we could discover that, in May, the percentage of population received at least one vaccine dose was less than 0.5%. [Slide 2-17]

When we talk about the fully vaccination rate, it was basically zero. This is very, very low. During this period, many people died without any vaccination and proper treatment. [Slide 2-18]

The short concluding is that Taiwan is very good at controlling the border, but once the virus entered Taiwan, the government is not well prepared.

For case management, like other countries, Taiwan has very specific criteria for identification of suspicious cases.[Slide 2-20] The most interesting thing is epidemiological criteria. If we look at the criteria in detail, here we have the history of traveling or living abroad. How do government obtain information of traveling? Taiwan applied high technology and big data. All the information about traveling was collected from national immigration system and this system is linked to National Health Insurance MediCloud System. [Slide 2-21]

MediCloud is a system for providers to identify high-risk patients during a pandemic. MediCloud recorded not only the traveling history but also individuals' occupation and medical record. Whenever patient go see a doctor, the doctor can see all that related information from a cloud system. [Slide 2-22]

This is really helpful for contact tracing and identification of suspicious cases. Once the case was confirmed, the government will conduct very comprehensive contact tracing, and also investigating into the source of infection. [Slide 2-23]

Contact tracing is very interesting. Taiwan utilized a lot of different data from disease surveillance system, camera footage, electronic toll collection, and even personal phone record. Trust in government actually enabled implementation of contact tracing and quarantine policies that exploit personal data and restrict civil liberties. I think most of the policies in terms of personal data collection is likely to be impossible in Western countries when people value the human rights. [Slide 2-24]

Quarantine and isolation, we have the civil affairs system and local health systems. [Slide 2-25] We also have the digital fencing tracking system. Every people that was quarantined and isolated was required to turn on their smartphones and the government would track their individual position and those who left premises without permission will be arrested by policemen and heavily fined. [Slide 2-26]

When we look at the non-pharmaceutical interventions, as I said, strict border controls or coordinated information campaigns and contact tracing are the major interventions. Widespread mask-wearing is also very helpful for Taiwan to contain infection. [Slide 2-28]

I do analyses by looking at the distribution of Non-Pharmaceutical Interventions with different severity level in the past two years. The green color means that there was no policy and the red color means the policy was fully implemented. As we can see that we do not have full closure of workplace closing. We only have the partial closures. [Slide 2-29] We do not have lots of cancellation public events because most of the color is green. It is green here, it is green here. [Slide 2-30]

The picture is totally different when we talk about border control and public information campaign. These policies were implemented fully to the highest level of intensity. [Slide 2-31] Also, contact tracing and facial coverings. [Slide 2-32]

When we talk about vaccination policy, I would say that it's a mess because the allocation of priority is determined by the ranking. The ranking is determined by CECC but we do not know actually the logic behind the ranking and the estimated eligible people is very different from the cumulative number of people. So I think I'll just skip this part. [Slide 2-35]

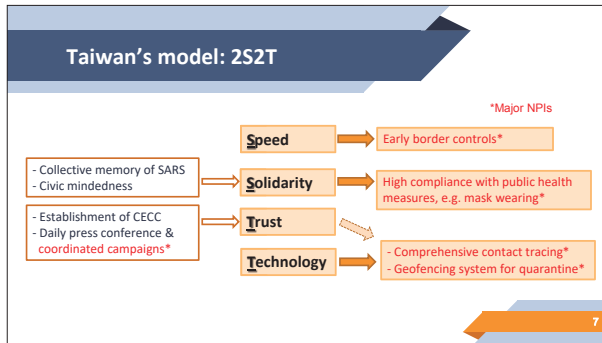
When we compare healthcare before and after COVID-19 outbreak, we observe that there are reductions in non-COVID-19 infectious diseases, especially enterovirus infections and influenza. [Slide 2-38] Public behavioral change, especially facial covering, is likely to play a key role, but we do not know how long the voluntary responses will last. [Slide 2-39]

We also observed reductions in preventive care especially colon cancer screening and cervical cancer screening. [Slide 2-40] A key question is, "What would be the health effects of delayed or missing preventive care?" [Slide 2-41]

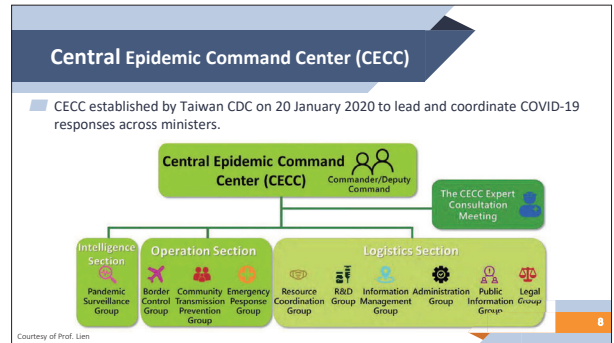
We have also reductions in outpatient visits. When we compare the first half of 2020 and 2019, we observed that clinics were hit the hardest. The reduction of outpatient visits was 11% and 17% in 2020 and 2021. In terms of the specialty, ENT and pediatrics were hit the hardest. [Slide 2-42] We do not know whether the reduction is related to unnecessary visits or deferred critical necessary care. It could be a mixture of both. [Slide 2-43] We also observed decreases in revenue in hospitals and clinics and also increases in costs because of inflation. [Slide 2-44]

For the post-corona health policy, actually COVID-19 has exacerbated pre-existing weakness of Taiwan's healthcare system. [Slide 2-47] For example, the amendable mortality was high in Taiwan compared to other countries and there seems to be health inequity in Taiwan. [Slide 2-48] There is a disparity in distribution of medical resources across cities and counties. [Slide 2-49] Also, health expenditure as GDP was not high enough. It was quite low. [Slide 2-50]

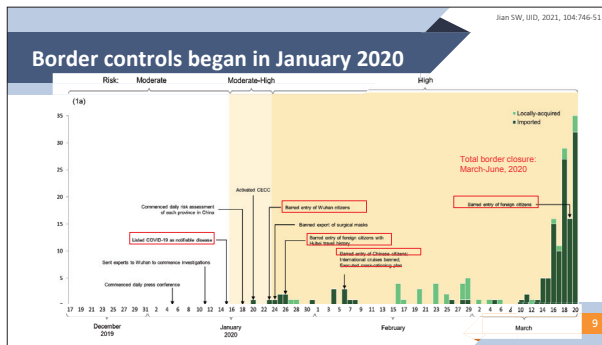
We have a shortage of doctors, so these are questions that we need to face when we tackle the COVID-19 pandemic. [Slide 2-51] There are also problems with health services delivery. [Slide 2-52, 2-53] Because of time, I think I will leave other questions until the discussion session. Thank you very much for your participation.



Slide 2-7



Slide 2-8



Slide 2-9

CECC daily press conference and coordinated information campaigns

Taiwan: 2020/01/22

Taiwan: 2021/01/22

Name-Based Mask Distribution System Updates

More Masks for a Lower Price

10 masks in 14 days NTS\$4 per mask

Starting from 12/31

Starting from 12/22

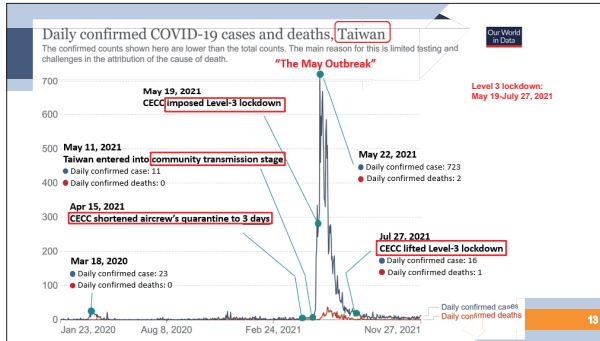
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Slide 2-11



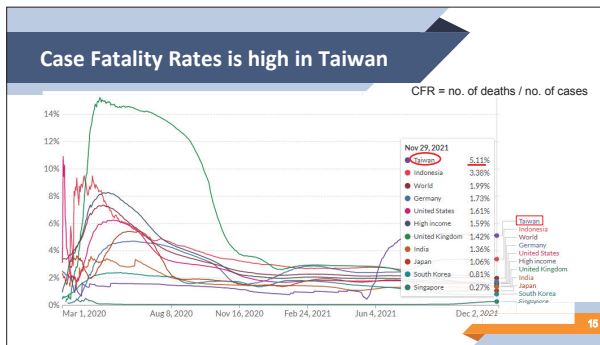
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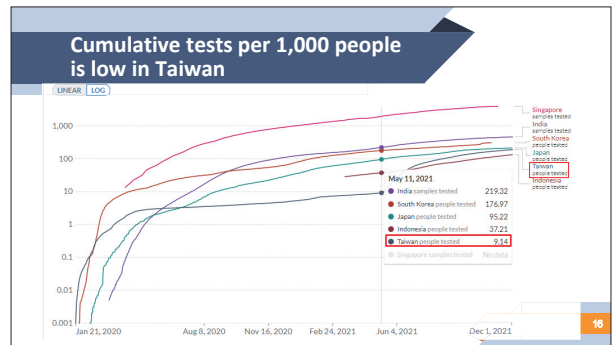
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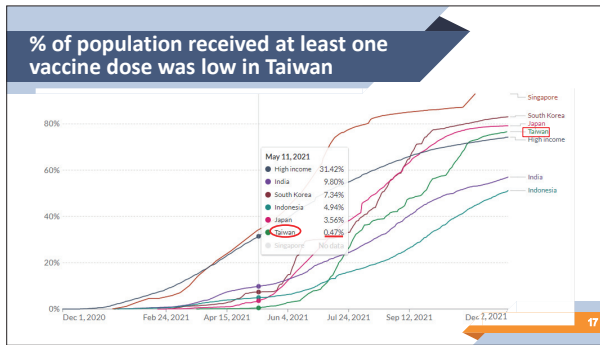
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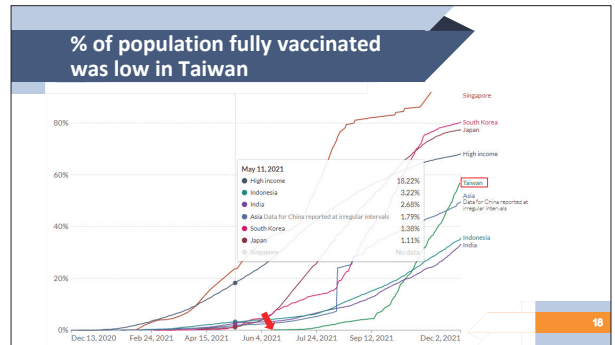
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Slide 2-16



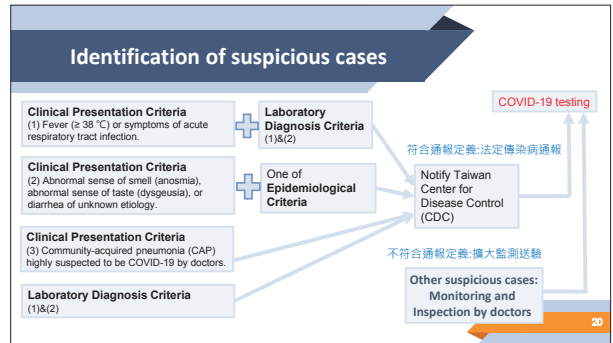
Slide 2-17



Slide 2-18

2 COVID-19 case management

Slide 2-19

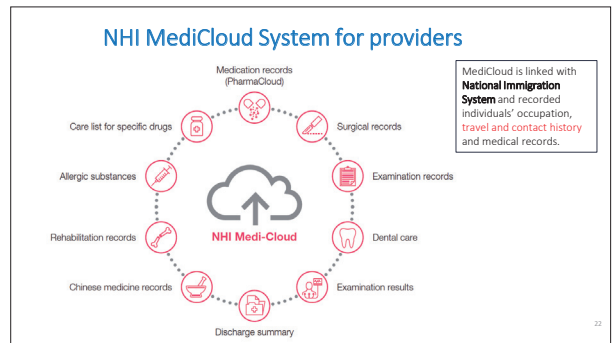


Slide 2-20

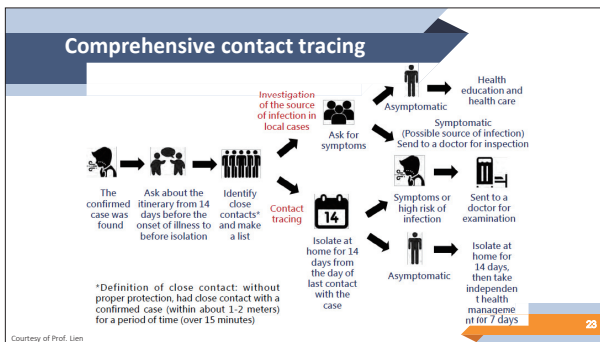
COVID-19 Case Definition, Specimen Collection, and Diagnostic Tests

1 Clinical Presentation Criteria One or more of the following:	(1) Fever ($\geq 38^{\circ}\text{C}$) or symptoms of acute respiratory tract infection. (2) Abnormal sense of smell (anosmia), abnormal sense of taste (dysgeusia), or diarrhea of unknown etiology. (3) Community-acquired pneumonia (CAP) highly suspected to be COVID-19 by doctors.
2 Laboratory Diagnosis Criteria One or more of the following:	(1) Pathogen (SARS-CoV-2) isolated and identified from a clinical specimen (nasopharyngeal swab, throat swab, expectorated sputum, or lower respiratory tract aspirates). (2) Positive molecular biological testing for viral (SARS-CoV-2) RNA from a clinical specimen (nasopharyngeal swab, throat swab, expectorated sputum, or lower respiratory tract aspirates).
3 Epidemiological Criteria One or more of the following within 14 days prior to symptom onset:	(1) History of traveling or living abroad, or contact with symptomatic (fever or other respiratory tract infection symptoms) individuals returning from abroad. (2) History of close contact with symptomatic suspected or confirmed case(s), including caring for or interacting with these individuals, or direct contact with body fluid or respiratory secretions without adequate personal protective equipment (PPE). (3) History of cluster related to confirmed cases.

Slide 2-21



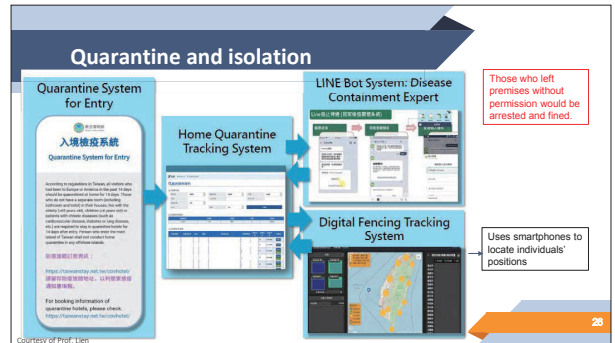
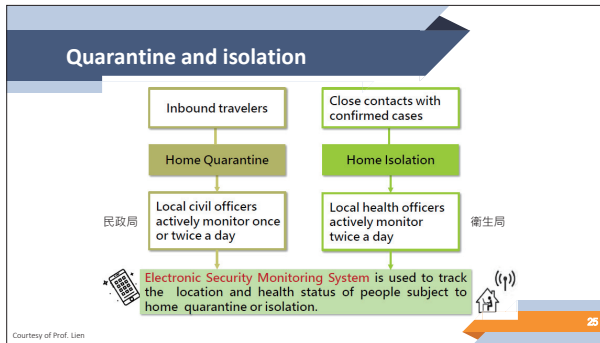
Slide 2-22



Slide 2-23

- ### Comprehensive contact tracing
- Detailed retrospective contact tracing uses data from
 - Disease surveillance system
 - Camera footage
 - Electronic toll collection
 - Personal phone record
 - Trust in government enabled implementation of NPIs that exploit personal data and restrict civil liberties.

Slide 2-24



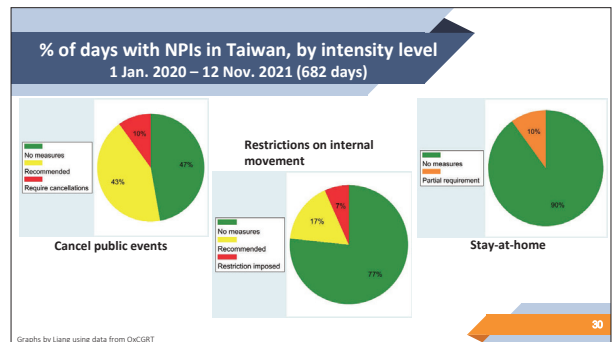
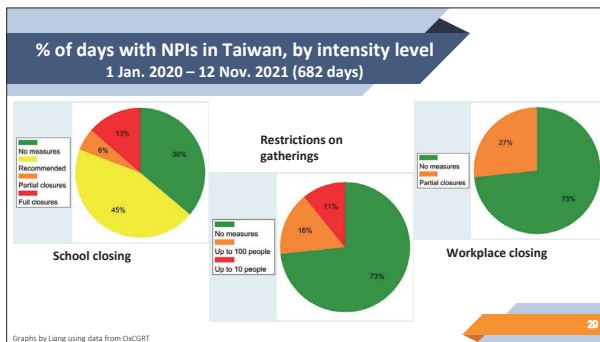
4 Non-pharmaceutical interventions (NPIs) in Taiwan

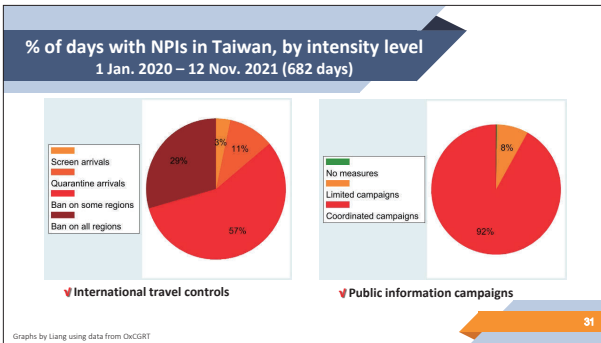
Slide 2-27

4 Major NPIs

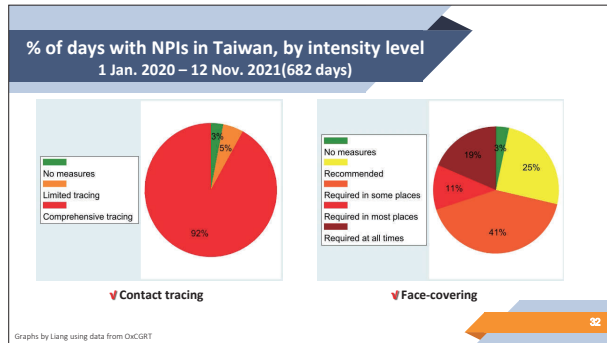
- ✓ Strict border controls
- ✓ Coordinated public information campaigns
- ✓ Comprehensive contact tracing
- ✓ Widespread mask wearing

Slide 2-28





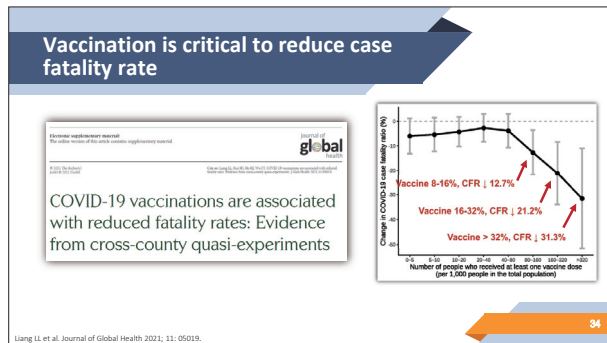
Slide 2-31



Slide 2-32

4 Vaccination policy

Slide 2-33



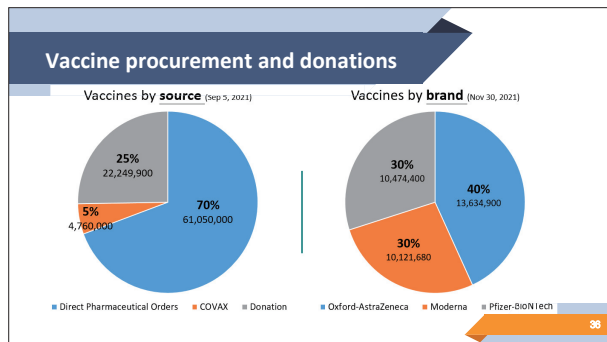
Slide 2-34

Vaccination plan

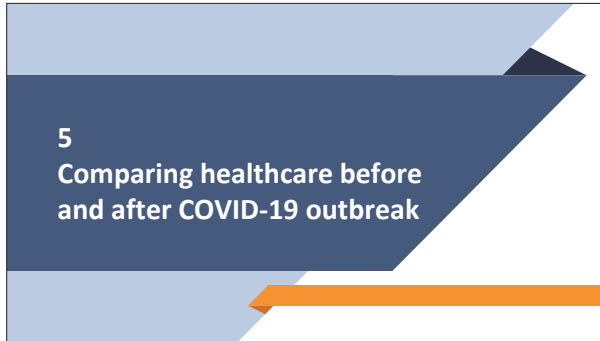
Rank	Category	Estimated number of eligible people	Cumulative number of people
1	Medical or Health Personnel	528,000	528,000
2	Central or Local Government Epidemic Prevention Affiliated Personnel	166,000	645,000
3	High-risk Front Line Personnel	61,000	706,000
4	People with Special Traveling Needs	2,000	708,000
5	Nursing Centers and Dialysis Affiliated Personnel	467,000	1,175,000
6	Age 75 or above; Pregnant Women	180,000	2,904,000
7	Security and Social Function affiliated Personnel	860,000	3,764,000
8	Age 65-74	1,985,000	5,749,000
9	Age 19-64 Individuals with High Risk Medical Conditions	3,875,000	9,624,000
10	Age 50-64	5,300,000	14,924,000

36

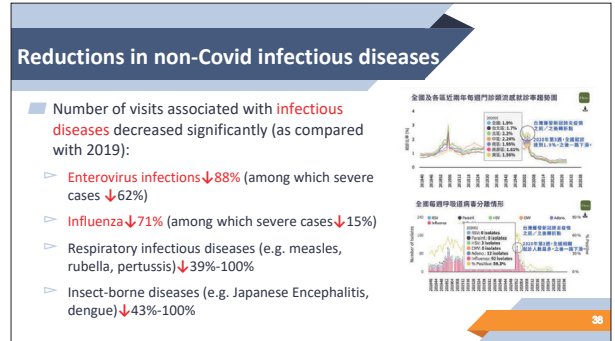
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Slide 2-36



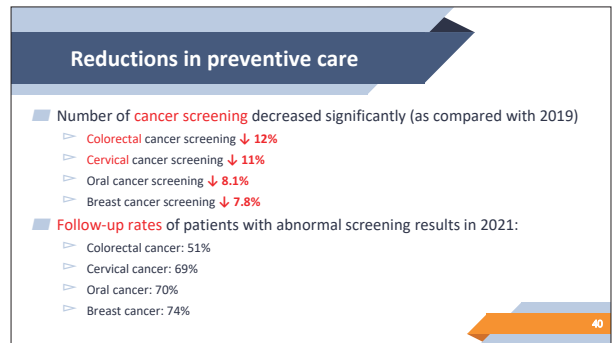
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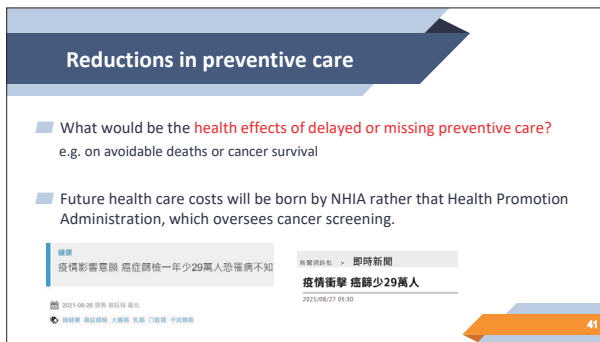
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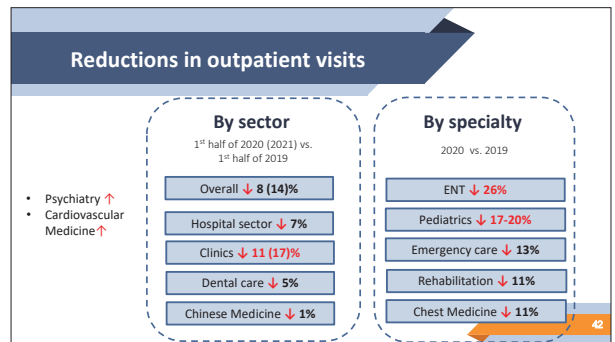
Slide 2-39



Slide 2-40



Slide 2-41



Slide 2-42

Reductions in outpatient visits

- Reductions in **unnecessary visits** or deferred **critical/necessary care**?
 - Likely to be a **mixture of both**
 - Number of visits quickly bounced back after SARS outbreak
 - COVID-19 lasts longer and has greater impact than SARS
- Require rigorous evaluation of what types of services were deferred and possible health outcomes for different patient groups

Slide 2-43

Decreases in revenue and increases in costs

- COVID-19 has greater financial impacts on clinics than on hospitals.
 - Risks of closures of clinics and small local hospitals that had higher marginal costs.
 - Physician offices have less cash flows and capacity to absorb **income shocks**
 - How would closures affect **competition, access to care, and quality of care**?
- Relief packages for the health care providers
 - 2020: NT\$ 400 million (1INT\$=0.036 US\$)
 - 2021: NT\$ 2 billion (**0.25% of total NHI expenditures**, or NT\$ 800 billion)
 - 16.2% of medical institutions (mostly clinics) received subsidies as of October 2021.
 - Subsidy level: to reach 80-90% of service revenue in 2019

Slide 2-44

Decreases in revenue and increases in costs

- Shortage of medical supplies and staffing
 - Labor shortages associated with lockdown
 - Global logistic backlogs
 - Raw materials and finished product shortages (e.g. gloves, tubes)
- Inflation and restrictions on imports** drives up costs of medical consumables and devices

Slide 2-45

6 Post-corona health policy discussion

Slide 2-46

COVID-19 signified importance of health system resilience

A **resilient system** is defined as a system that has capacities to absorb and recover from shocks, while maintaining its core functions and serving the needs of communities.

(Haldane V. et al, 2021. Nature Medicine)

COVID-19 has exacerbated pre-existing weaknesses of Taiwan's health care system

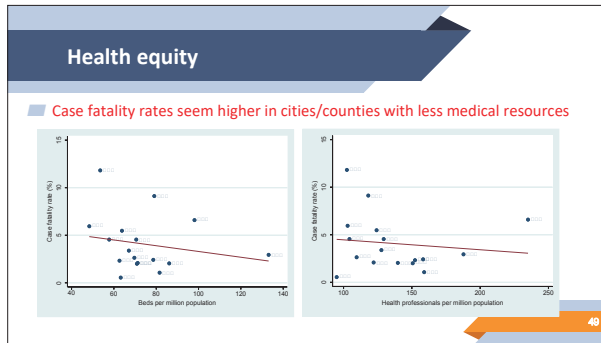
Slide 2-47

Health outcome

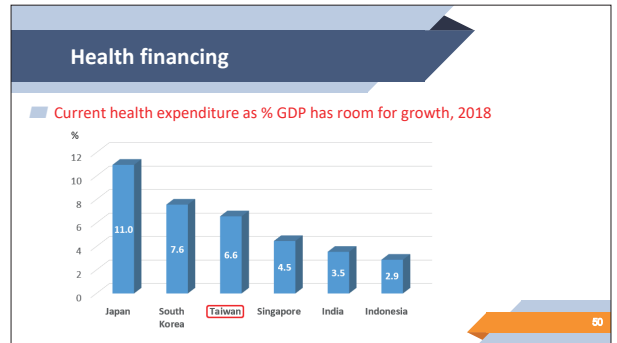
- Taiwan ranked **45th in global amenable mortality ranking**

- 75 countries: Japan (89), South Korea (86), Singapore (86), **Taiwan (78; ranking: 45)**
- Taiwan obtained high scores for acute diseases but low scores for chronic diseases

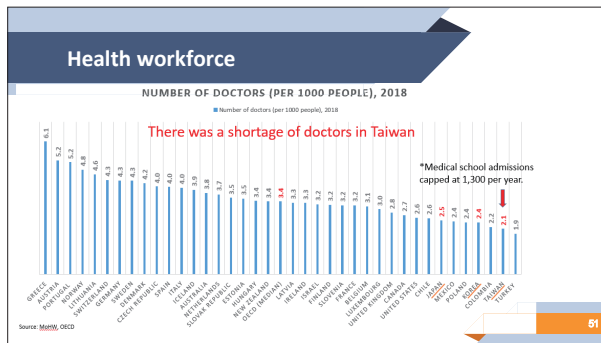
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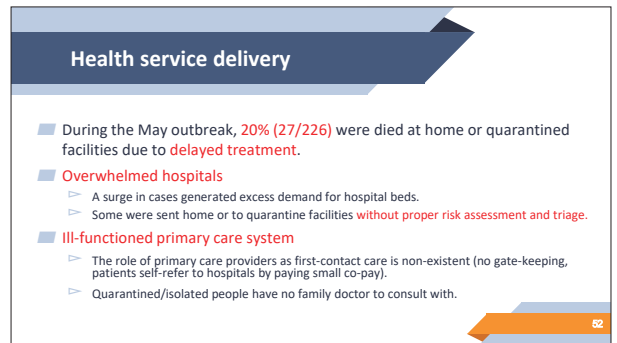
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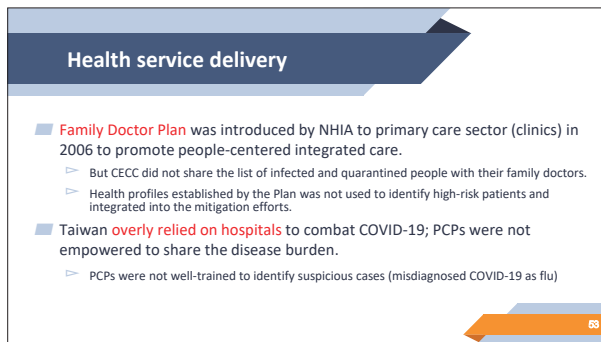
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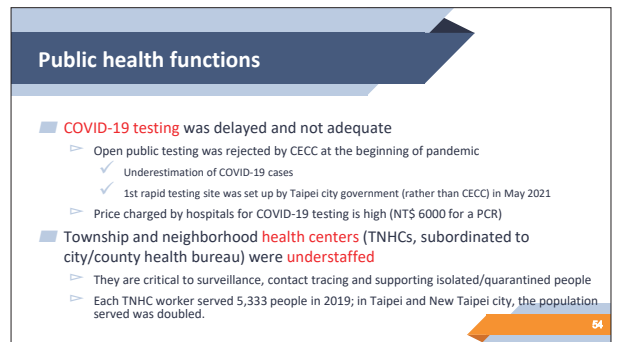
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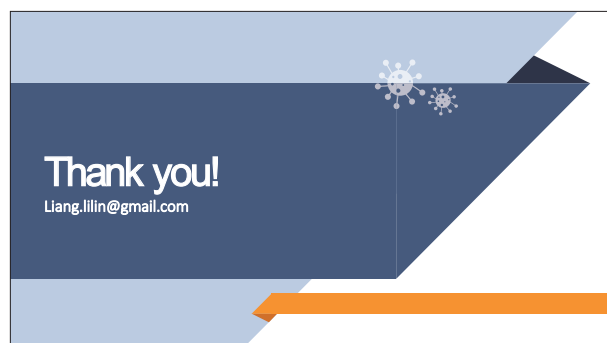
Slide 2-52



Slide 2-53



Slide 2-54



Slide 2-55

(Prof. Noguchi) Thank you very much, Dr. Li-Lin. I would like to take questions for just clarification. If none, let's go for the second speaker. Our second speaker is Professor Juhwan Oh from Seoul Medical School. Please welcome Dr. Oh.

(2) Prof. Juhwan Oh, Korea

Thank you so much for inviting me. I enjoyed Li-Lin's presentation.

Let me start with the epidemiology statistics followed by Hideki's suggestion.

We had the first attack from February to March last year. Now we are having the fourth or fifth outbreak in this winter. This is the cases and deaths outbreak from last year to right now. It is the first of the five. [Slide 3-3]

If we compare the performance of the epidemiological results, we might be next to Taiwan as Li-Lin presented. Taiwan has one of the best results in terms of cumulative deaths and cumulative cases. Although the case fatality is a different story, cumulative deaths and cases are under a quite good control. We are really next to Taiwan in this sense. [Slide 3-4]

If we see the outbreak pattern within the six countries, it is not the same pattern, not the same period, so that we are sequentially attacked by virus. [Slide 3-5] Delta did not hit at the same time. It is almost three months from the first country to the last country within our six countries. Delta's dominance became the most popular in the world and now same in these countries together. [Slide 3-6]

Case management in South Korea is similar to Taiwan. [Slide 3-8] Once we find out new cases, diagnosed by PCR testing, they are treated in isolated spaces. For the confirmed cases, 100% isolation-based treatment has been achieved. [Slide 3-9] Previously, isolated space is prepared as makeshift hospital beds, but nowadays we also utilize home together.

As for the test-based trace and quarantine, all contact to an indexed case can be traced by a manual way of epidemiological contact tracing then hopefully all cases of contact should be quarantined to minimize the transmission. However, the contact tracing might not be high enough, and the transmission rate is going up now.

In terms of non-pharmaceutical interventions, we mainly utilized the face mask and physical distancing between people, and also indoor ventilation together. [Slide 3-11] Then contact tracing based isolation and quarantine is another way of the non-pharmaceutical intervention. We did not rely as much on the gathering banning, school closure like lockdown, as in other countries.

We are very similar to Taiwan before the lockdown period in terms of the stringency index. [Slide 3-12] However, after having the Taiwan's outbreak, it suddenly turned into a strict lockdown policy, while we kept similar level or

less severe lockdown these days compared to other countries.

We mostly restrict small business sectors in terms of the number of visitors allowed for social distancing, but general lockdown like business closure, general workplace closure or school closure was not done much. Still, we Korean people do not feel like freedom even in this low level of lockdown. It is very difficult time for us.

Vaccine policy. [Slide 3-14] Our vaccination started a little later than Singapore. However, it is very close to Japan's steepness that recently we reached almost saturated level of the fully vaccinated level.

If you see the impact and performance of the COVID-19 control, our test-based and phase-based quarantine and isolation seems quite successful. For example, high quarantine ratio per one case. Many contacted people are well quarantined, then one week later, the transmission rate is still low. The degree of quarantine in the week and transmission incidence in the next week showed a high negative association. This is quite consistent regardless of local vaccination status.

Test. Compared to Taiwan, we set up the test capacity pretty earlier, earlier than Japan. We utilized this test quite actively while we are tracing the key contacts. If we utilize the negative test per case ratio as an indicator of the activeness or eagerness of contact tracing, then we could observe the same pattern of negative associations between the eagerness of Test-Trace-Isolate-Quarantine (TTIQ) and the regional incidence. (data not shown, available at <https://ssrn.com/abstract=3954082>)

Once we see the test activity, the eagerness, then Singapore was very high and Taiwan caught up, [Slide 3-18] but recently Singapore showed very low test of eagerness so that it might be one of the reasons for the Singapore's recent outbreak. I was very curious to see the reason in Singapore. We will listen to Singapore's presentation today.

Once we see this pattern in the global level, then the same pattern can be observed. In terms of cumulative death and of infection incidence, the active tracing show the low level of incidence or low level of cumulative deaths. That is really consistent across different levels of vaccination coverage across countries (data not shown, available at <https://ssrn.com/abstract=3954082>). Active TTIQ makes a better result that is quite consistent over the world.

Recently, I have updated in the metropolitan area of Seoul and the neighborhood of Incheon, Gyung-gi, because of this high prevalence recently. [Slide 3-20] The TTIQ activity is translated well into the lower incidence in one week. However, if we'd compose the quarantine ratio and one province nearby Seoul, Gyung-gi province is very active over time, active more and more over time, while Seoul is decreasing their activeness in terms of quarantine ratio so that it will be translated or it will be the reason of the worse condition over time recently in the Seoul areas. [Slide 3-21]

We compared this TTIQ activity and vaccination together and mobility changes. [Slide 3-24] Interestingly, this TTIQ is quite well negatively associated with a one-week later incidence while a higher vaccination coverage also relates to a lowered incidence. However, it looks like some threshold impact at 40% or something. More than that we can see a decreasing pattern now, and the mobility restriction does not seem really helpful for the decreasing incidence.

The mobility change is not statistically significant here in Korea but once we see the international pattern of the mobility pattern, we see the decreased association between mobility restriction reducing and then incidence reducing. Our first outbreak and second outbreak showed very good relationship but in the third and fourth outbreak, we did not really have a good impact by the mobility reducing onto incidence suppression. (data not shown).

If we compare to India, I wish India's presenter likes this, India showed a very standard result. The first one, the TTIQ activity is going up actively then the lower incidence was observed in one week. The vaccination is completed. Vaccination coverage is higher then we can observe lower incidence of cases in one week. Mobility is going down, then lower incidence is going out in one week. All components are working very well in India while South Korea showed only TTIQ is working well with a vaccine after the third wave. (data not shown here)

Health System Disruption. Maybe this should be updated. However, this is a result equivalent to the Li-Lin. However, it is only until last year. It seems like our health system service utilization pattern was a little bit

disrupted but not seriously, but definitely disrupted than before. The outpatient emergency room visit and the outpatient and inpatient, all the three, our service is a little bit disrupted than before. [Slide 3-28, 3-29, and 3-30]

Pneumonia and then diarrhea show a very similar pattern. [Slide 3-31 and 3-32] Probably the spillover effect of the antigen and mask wearing. This is very similar to Li-Lin's presentation in Taiwan. Mostly 80% decrease we observed. No disruption is also found out in the direct hypertension management and also diabetes management together so that probably we can expect no complication later higher up even after.

The Korea showed quite good health and wealth outcomes even in this difficult COVID-19 period by this TTIQ activity without so high hard lockdown policies. This might be a good lesson for other countries, while lockdown measures can help for some countries to reduce the incidence. However, it is aggravating economic situation which has Taiwan leads some time but its economy is quite high. Also other countries showed that, so that countries where more likely TTIQ performance is high, utilized less lockdown: those countries like Japan and Korea. This is really translated to better health outcome and better wealth outcome together.

Thank you.

The International Forum on COVID19 in Asian Context, Japanese Health Econ Association
- COVID-19; policy reaction and the contribution of Health Economics-

COVID-19 South Korea

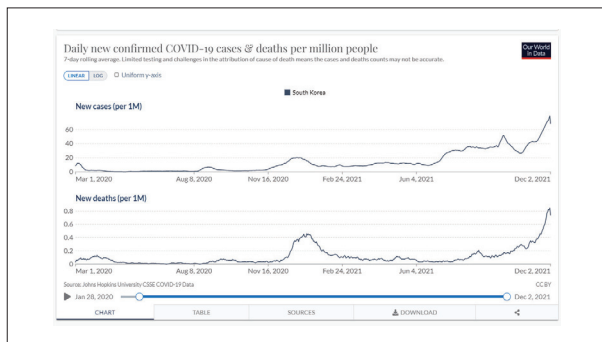
Juhwan Oh MD MPH PhD
Seoul National University College of Medicine
Seoul National University Hospital

Slide 3-1

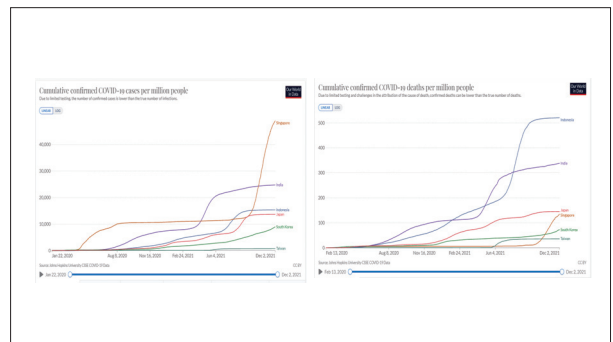
Epidemiology statistics

Infected, deaths and the time trend

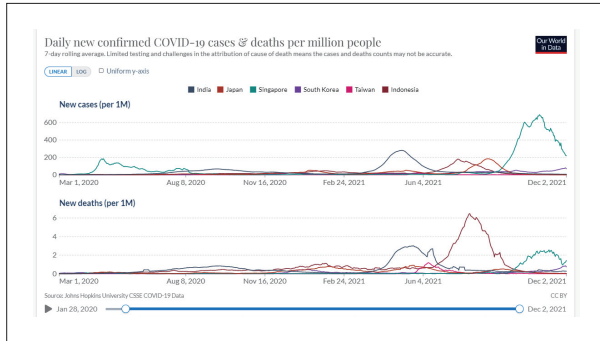
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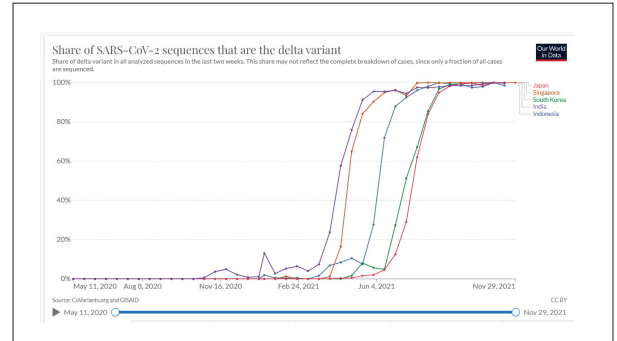
Slide 3-3



Slide 3-4



Slide 3-5



Slide 3-6

Case management including lab test
 Case identification (RT-PCR) &
 Tracing been done by District health authority

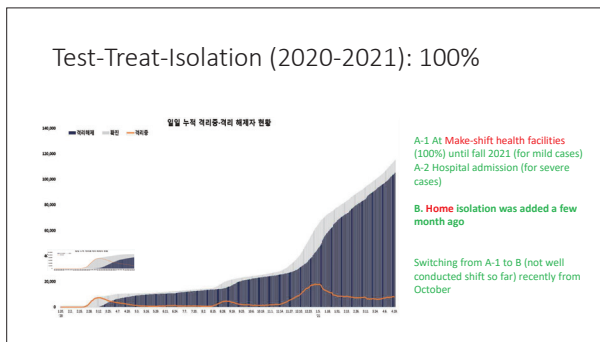
Slide 3-7

A TTIQ cascade begins once a case confirmed

For confirmed cases (F0)
Test-Treatment-Isolation: TTI
 By district health authority

For contacts [F1] to the confirmed case [F0]
Trace-Test-Quarantine: TTQ
 By district health authority

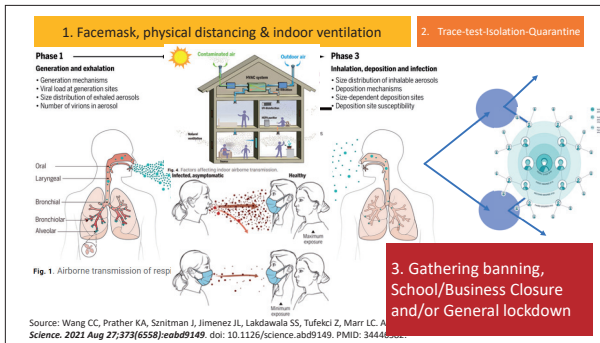
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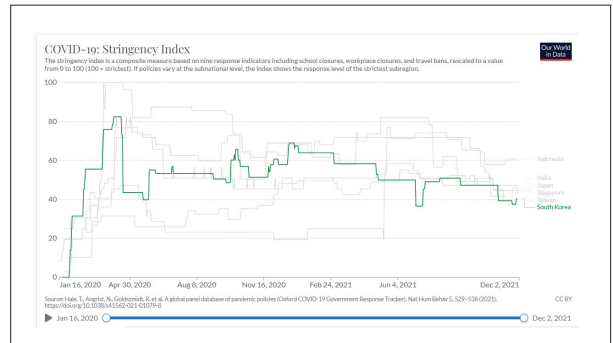
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Non pharmaceutical intervention

Slide 3-10



Slide 3-11

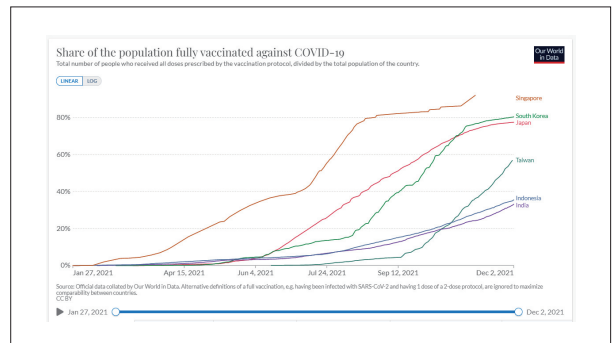


Slide 3-12

Vaccine policy

Recommended, not mandatory, but vaccine pass for some indoor recreational area

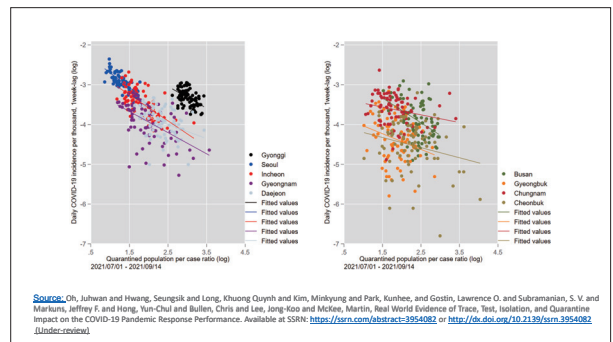
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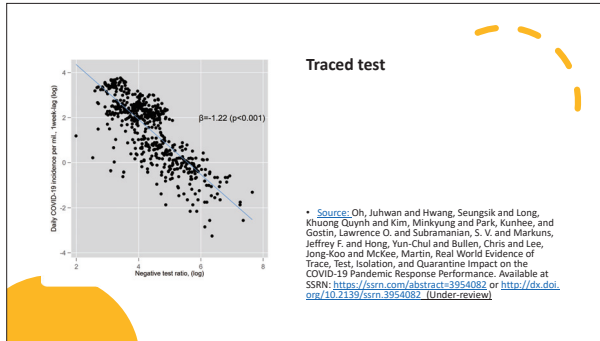
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Impact on COVID-19 control

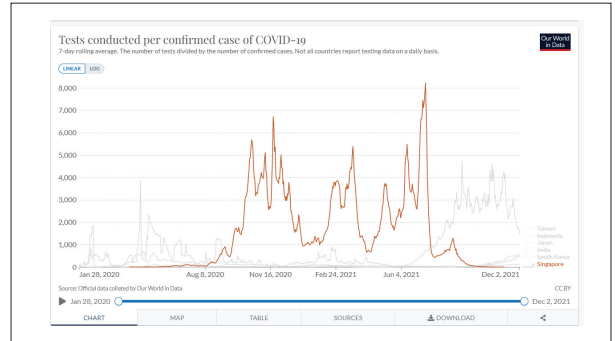
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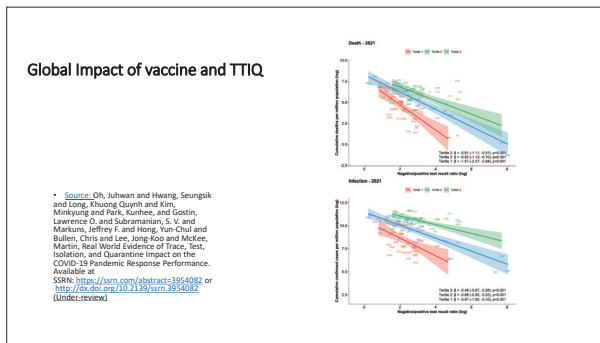
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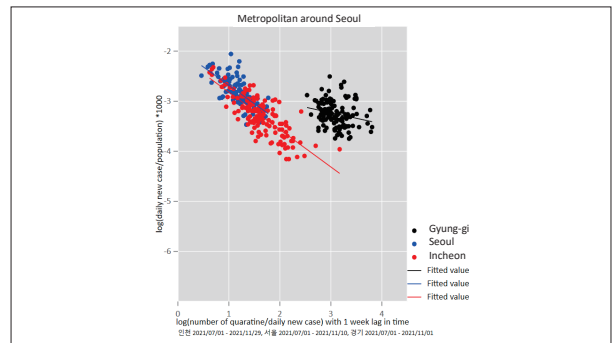
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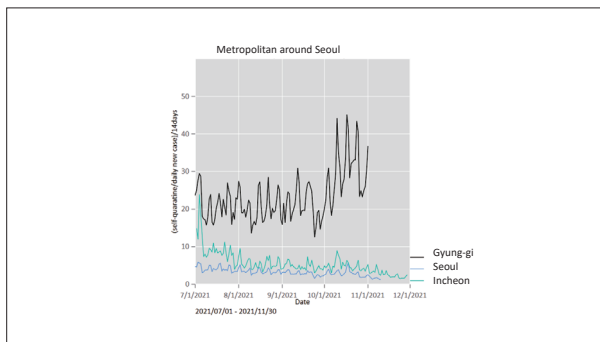
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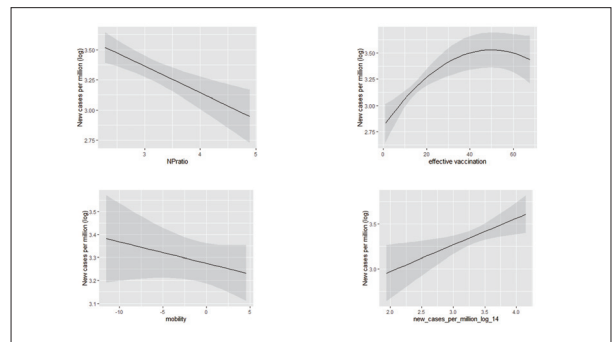
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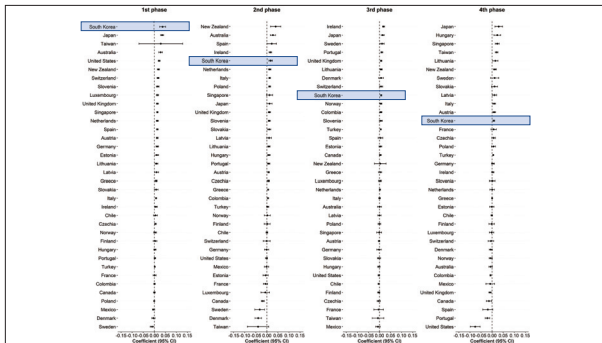
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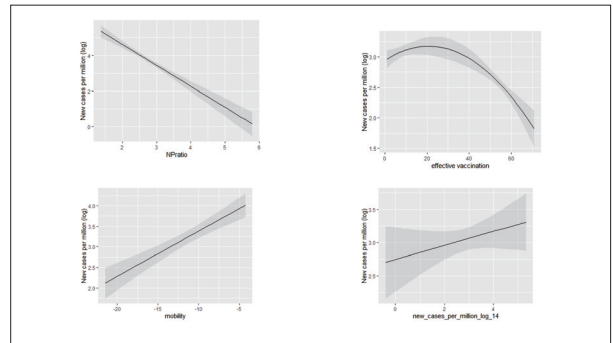
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Slide 3-22



Slide 3-23



Slide 3-24

Impact on healthcare sustainability

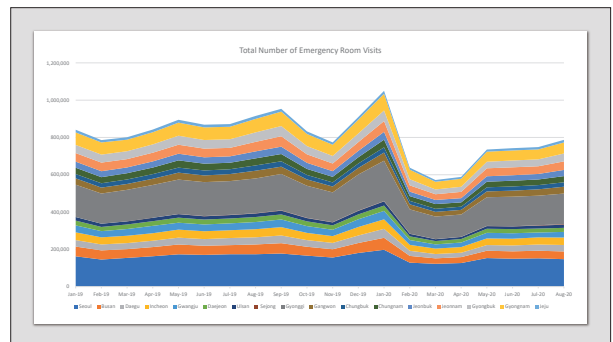
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Health System Disruption Profile: South Korea
 Juhwan Oh
 Seoul National University
 Sukyung Park
 National Health Insurance Services

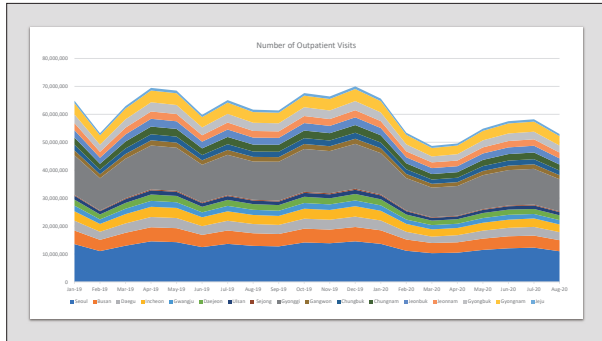
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Disrupted Services (or reduced need)

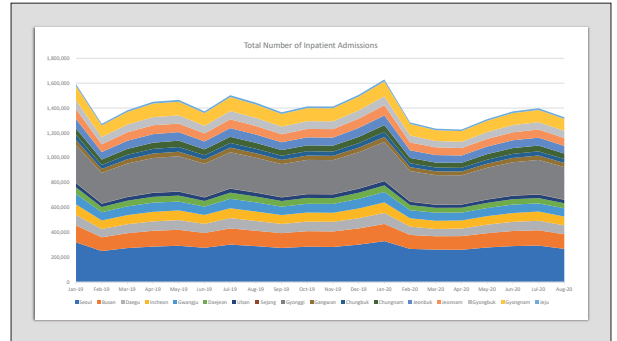
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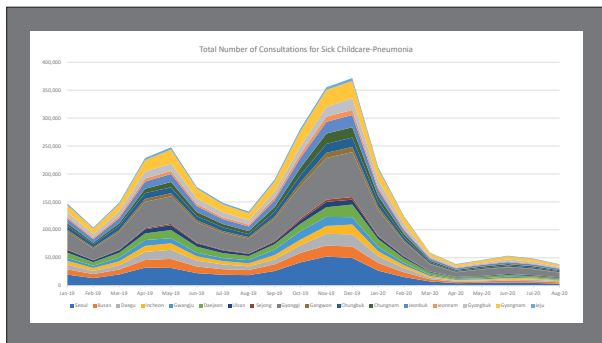
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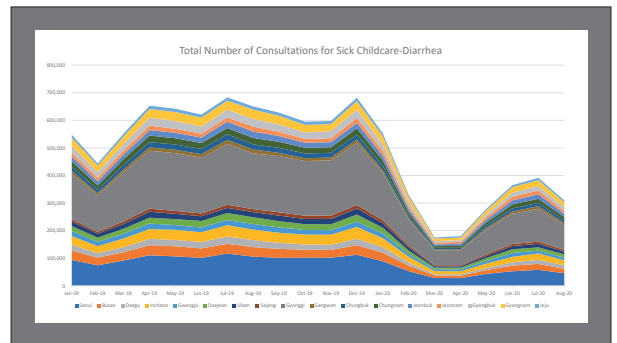
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Slide 3-30



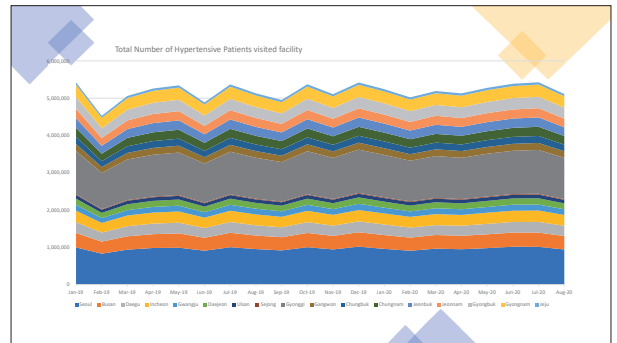
Slide 3-31



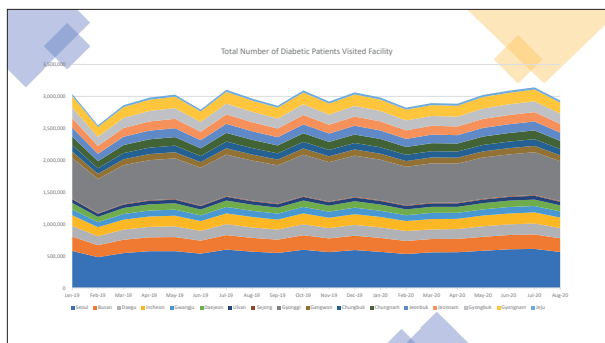
Slide 3-32

Almost No Disruption

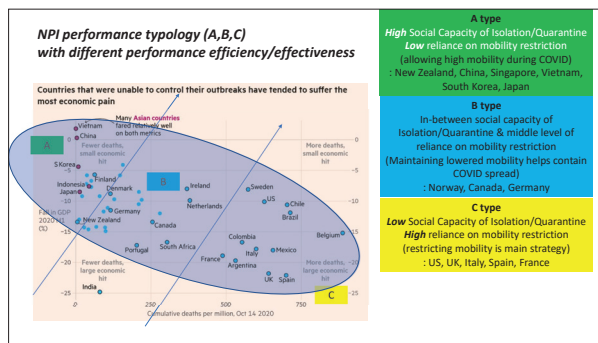
Slide 3-33



Slide 3-34



Slide 3-35



Slide 3-36

(Prof Noguchi) Thank you very much, Dr. Oh.

Would someone like to have a questions or just clarification?

Now, the third speaker in this session is Professor Hideki Hashimoto from the University of Tokyo. Please welcome.

(3) Prof. Hideki Hashimoto, Japan

Thank you very much. I am very honored to join this international conference to exchange the information and knowledge experience regarding this COVID-19 policy response and social response.

Allow me to report Japanese case for the next 15 minutes.

As we already see the reports from Taiwan and South Korea, even though we face the same COVID-19 pathogen, the reaction and policy reaction and the epidemiologic pattern of the pandemic waves are quite different across the countries. We published about country-uniqueness of the experiences during the early phase of this COVID-19 pandemic.

In the collaboration at the strong leadership by Professor Yeoh in the Chinese University of Hong Kong and joined with South Korea, Japan Malaysia and other countries. As we see in this comparison of the early phase, even though we have the first wave, big wave, but still the component of this wave is quite different. Some countries suffers more from immigrant impact, whereas like in Japanese case we do see more community-based epidemic rather than of immigrant cause. As you can see, the different structure of this pandemic is observed across Asian countries in terms of the size of the imported case, the size and number of the clusters and the pattern of the clusters. These are suggesting that each country faced a unique pandemic. [Slide 4-1]

Let me show the overall Japan profile since January 2020. Until now, we observed five waves of epidemic in Japan. The first wave was here, April to May 2020, which is just after we had Wuhan immigrant case and a large cluster case within a luxury cruiser. [Slide 4-2]

Looking over the past year, the first wave was very small, but the social impact and economic impact was so large, simply because we were not prepared, socially, economically and systematically. We did have some kind of lessons from the former SARS and MERS in Taiwan and South Korea, but all these lessons were not translated into the implementation of actual system response in Japan. Everything was the first time experience. [Slide 4-3]

The second wave was somewhat small and easy, but since then, the size of waves gradually grew, and the experience of the fifth wave was the largest in size. In terms of the impact or the death tolls as you can see shown in the red bar we experienced the largest impact in the fourth wave compared to in the latest fifth wave. Suggesting that in this fifth wave, even though we have the large prevalence of the diagnosed, still the case fatality becomes

lower in the latest wave experience.

Overall, until today, we have almost 1.7 million Japanese diagnosed COVID-19 case, which shares almost 1.3% of the total population. The death toll is about 18,000. The case fatality is around 1 %, not so high compared to the European case, but still it is about 10 times higher than the usual seasonal influenza case.

Let me make some short summary on this table comparing the points from the first wave to fifth wave. The time spans and the size of the peak are as I mentioned already. The pathogen for the each wave is quite different. First one is of the European origin one and second and third waves were mainly due to a Japanese origin strain. The fourth and fifth are caused by the variants. The fourth one was caused mainly by the alpha variant and this fifth one is of the Delta variant. [Slide 4-4]

Due to the difference in terms of the pathogen, the severity and the types of high risk subpopulations varied over the five waves. For the first wave to the third wave, a high risk sub-population was limited to the older people or those who has comorbidity conditions, such as diabetes or the COPD and other type of chronic functions. Since the alpha variant and the Delta variant became main, the high risk population was not limited to the older and the comorbidity, but also extended to the younger people. Actually the death tolls among the young increased in the fourth wave and especially in the fifth wave, when medical systems were overwhelmed and many people had to bear at home treatment even though they needed hospitalization treatment. Among them, those in the age between 20 to 40 were given lower priority for hospitalization, and about 100 reportedly died at home before they were hospitalized in August 2021.

As for the epidemic path, this is also changing over the time. In the first wave, we had local clusters such as restaurants, bars, clubs, or we had a large cluster in hospitals. Since the second and afterward, this hospital-based cluster became very limited in size. Instead, we observed consistently the major epidemic route in community transmission, worksite or household. Especially in the fifth wave, we observed the larger number of infection within household because many patients had to stay at home due to overwhelmed capacity of hospitals and other quarantine treatment accommodations.

For policy response, in terms of non-pharmaceutical interventions, compared even to Taiwan and South Korea, Japan's policy was very modest. The government exercised a very soft policy rather than a hard policy with economic compensation as an incentive. Because of the constitutional structure and political feasibility, the government only asked voluntary collaboration for staying home, social distance and others without any strong penalty. Only thing that the government asked voluntary collaboration was restaurant and bar closure with financial compensation. If they do not follow, they were rejected for their financial subsidy.

Finally, let me mention about medical system and public health systems. As I said, the Japanese government did not take a strong policy in the case tracing because of the concerns about confidentiality, privacy, an information treatment. Instead, the Japanese government did introduce some ITC-based tracing system called COCOA system for only volunteer registration, without the geometric information or other type of personal information such as credit card numbers.

In reality, this ITC-based tracing system did not work well in Japan. Instead, basically, the Japanese case tracing is based on the manual following the existing system of the infection control in the case of tuberculosis and other traditional acute infection in the community through the public health centers. However, the public health centers has a very limited capacity for case tracing in such a magnitude of epidemic like COVID-19.

For the first wave, even though the number of the prevalence was very small, this public system, the case tracing, was easily overwhelmed. After that, each municipality local government strengthened the manpower of this public health tracing system but still, the overwhelming number of prevalence, especially during the fourth and the fifth big waves, this public health tracing system was easily and totally overwhelmed and leaving undiagnosed cases in the community, especially asymptomatic cases.

For the medical system, the government repeatedly asked hospitals collaboration to provide additional beds and other supplies to other hospitals. The majority of hospitals in Japan are private and the effectiveness of these voluntary collaborations was limited. In social and public hospitals, the number of intensive care unit's beds for treating severe COVID-19 patients was physically limited and reached almost their capacity limit in the fourth

wave. In the fifth wave, it became overwhelmed. Again, how to make suitable and flexible resource allocation in case of emergency across private and public sectors in the local system is an ongoing hot debate in our policy table right now.

Finally, for vaccination case, we started vaccination in early May, which is very slow compared to European and American countries and almost at the same time as Taiwan and South Korea. Thanks to the government's strong push to local governments, we achieved a high vaccination rate in August already. However, the vaccination program was very confusing with unplanned logistics problems, and many local governments who are responsible for actual vaccination supplies are put in very hard and difficult decision making situations. [Slide 4-5] Japanese vaccination rate reached 70%, very nice number, but only after the off-peak, suggesting herd immunity is not the main factor to explain the current off-peak we enjoy.

The health impact other than COVID-19 is the suicide trend. We observed the excess mortality due to suicide, especially among women and young. We did observe the decreased mortality due to respiratory conditions such as non-COVID-19 or community pneumonia thanks to decreased influenza epidemic, as you can see in the South Korea and the Taiwan cases. [Slide 4-6]

The government subsidy to the hospital beds made a positive profit thanks to other subsidy, though delayed subsidy provision evoked serious concerns for financial stability of tertiary hospitals in local. Otherwise, the impact on other spheres of healthcare provision waits for evaluation. [Slide 4-7]

As for economic impact, as Haruko already mentioned in the global comparison, we see an increase in unemployment rate and a decrease in salary ratio, but this impact is relatively limited to restaurant business, customer service industry, and part-time workers. The growth rate is somewhat fluctuated, mainly due to the decrease of consumption rate in leisure traveling and eating out. [Slide 4-8 and 4-9]

Finally, let me mention about the political economy issues. We observed resign of prime minister, Mr. Suga in August despite of his contribution in the vaccination dissemination. This is because there was some political instability and uncertainty about future projection of economics and social stability, and the conflict between the central and the local governments, and such politico-economy instability disturbs the governance structure for effective COVID-19 policy reaction. This makes a very complicated and confused inefficiency in terms of the case tracing, using information control, and effective and efficient information dissemination to make a rational decision making and behavior among business and people. [Slide 4-10]

For this part, we can expect what economists, especially behavior economists can do. I want to put this for the later discussion part.

Thank you very much for your attention.

Covid19 in Asian Context

東京大学 SCHOOL OF PUBLIC HEALTH
THE UNIVERSITY OF TOKYO

Covid-19 in 2020-21
Case report of Japan:
Epidemiological, Behavioural and Political Considerations

Dec 4th, 2021

Hideki HASHIMOTO, MD DPH
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Slide 4-1

東京大学 SCHOOL OF PUBLIC HEALTH
THE UNIVERSITY OF TOKYO

One Health
Journal homepage: www.elsevier.com/locate/oneh

Assessing the impact of non-pharmaceutical interventions on the transmissibility and severity of COVID-19 during the first five months in the Western Pacific Region

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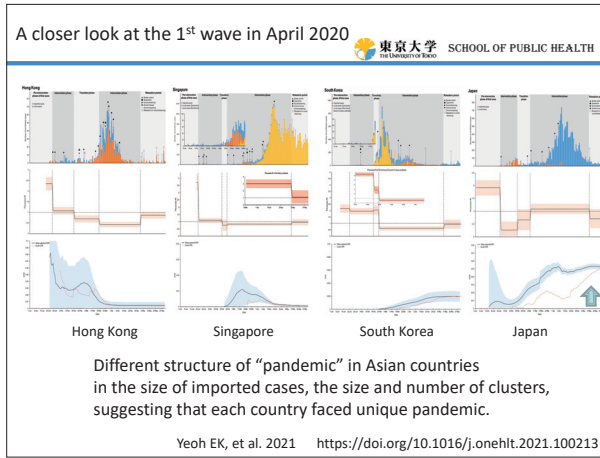
^kSchool of Public Health, National Institute of Health, Singapore

^lSchool of Public Health, National Institute of Health, Singapore

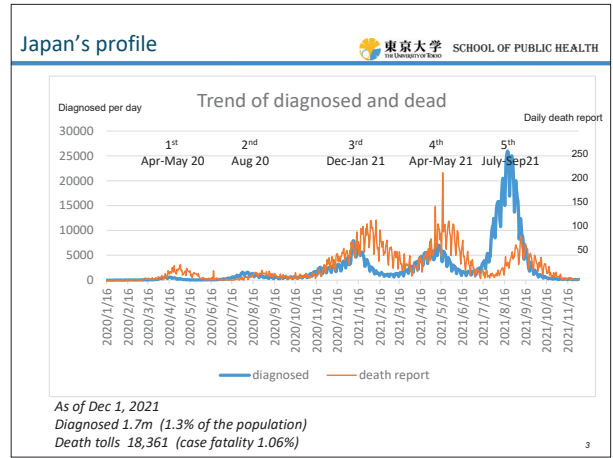
ABSTRACT

While most countries in the Western Pacific Region (WPR) had similar trajectories of COVID-19 from January to May, their responses to it were heterogeneous. To better understand the impact of non-pharmaceutical interventions (NPIs) on the transmissibility and severity of COVID-19, we compared the impact of NPIs on the reported case-fatality ratio (CFR) in the different phases of the epidemic during the first five months in WPR. In this study, we evaluated the potential transmission reproductive number (R_t) and the reported case-fatality ratio (CFR) in the Western Pacific Region (WPR) during the first five months in WPR. We used a compartmental model to estimate the R_t and CFR. According to the results, implementing NPIs was associated with an apparent reduction in the transmission R_t in the epidemic curve in general. However, high CFR rates indicate that the persistence of a high level of R_t was observed during the NPIs' rollout in the Western Pacific Region. The estimated CFR ranged from 0.09% to 1.09% across the region, except in Japan where an increase of 0.23% might be due to its aging profile. The results, in conjunction with further control measures to reduce the level of reported cases which might cause local outbreaks, show NPIs including social distancing, community-wide mask wearing, hand hygiene and other measures to prevent person-to-person contact are essential to reduce the transmission R_t. Implementing lower CFR may reduce the health system capacity of these jurisdictions, in order to keep track of sustained disease transmission for the remainder of epidemic activities, in case re-emergence of disease transmissibility is encountered in the relative phase. The report of transmission of SARS-CoV-2 to pigs in Hong Kong and to ducks in Iran indicates high risk for the impact of COVID-19 on food security and food systems. The One Health approach is critical in understanding and responding for how human, animal and environmental health are interlinked.

Slide 4-2



Slide 4-3

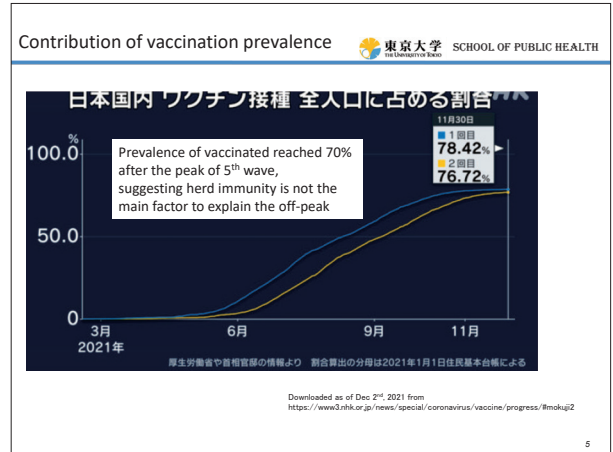


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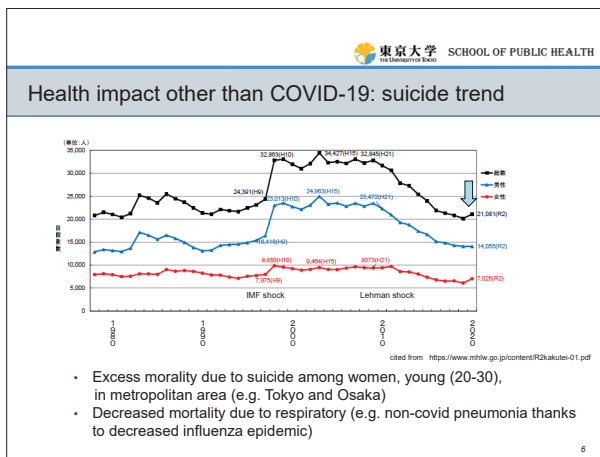
Summary

	1st	2nd	3rd	4th	5th
Time span	Apr-May 2020	July-Aug 20	Dec 20-Jan 21	Apr-May 21	July-Sep 21
Peak	500	1000	7000	6000	26000
Pathogen	European-origin	Japan-origin	Japan-origin	alpha variant	delta variant
Severity	High-risk (older, comorbidity)	High-risk (older, comorbidity)	High-risk (older, comorbidity)	Extended to young	Extended to young
Epidemic route	local cluster (e.g. bar, club, hospital)	community (household/ worksite)	community (household/ worksite)	community (household/ worksite)	household
Policy response	1st emergency Apr 7th- May 25th	Mitigation policy for economic boost	2nd emergency Jan 7th- Mar 21st	3rd emergency Apr 25th-June 20th	4th emergency July 12th-Sep 30th
Social response	panic	easy	face the reality	getting serious	and more serious
Medical system			threatened but maintained	reaching capacity limit	overwhelmed
Public health (tracing) system	not ready		overwhelmed	overwhelmed	totally overwhelmed
Vaccination			targeted to high-risk (healthcare worker and older)	extended to general adults	

Slide 4-5



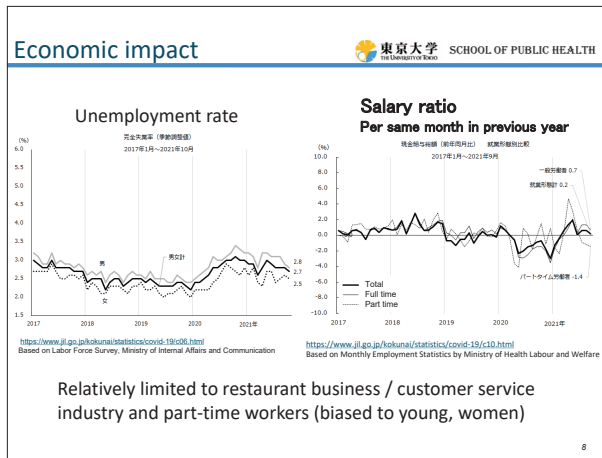
Slide 4-6



Slide 4-7

- ### Impact on healthcare system
- Finance
 - Government subsidy to the hospital beds for COVID19 care
 - -3.5% profit loss without subsidy => 6.6% profit thanks to subsidy (MOF Oct 11th Financial System Council report)
 - Resource allocation
 - Shortage of clinical nurses and public health nurses
 - Acute beds without contribution to COVID19 treatment
 - Function
 - Impact on non-COVID19 treatment to be articulated (e.g. cancer surgery)
 - Impact on public health service and welfare program for non-COVID19 condition (e.g. maternal child program including maltreatment cases)

Slide 4-8



Slide 4-9



Slide 4-10

- Political economy of COVID-19**
- Politics
 - Resign of Mr. Suga despite of contribution in vaccination dissemination
 - Central vs. local government conflict
 - Lack of governance in healthcare system, information control, vaccine logistics, and economic compensation policy
 - Contribution by “behavioral economist” vs. “specialist in infection control”

Slide 4-11

(Prof. Noguchi) Thank you very much, Hideki.

Li-Lin, Juhwan, and Hideki, thank you very much for your great and wonderful presentation and also keeping time. I think this is a great start for our discussion today.

<Q&A session>

(Prof. Rachel Lu) I have a quick question. This is Rachel Lu from Taiwan.

It is more of a clarification for Hideki.

In your slide, the fifth wave, does that have anything to do with the Tokyo Olympics or has the Japanese Government assessed the impact of Tokyo Olympics on COVID-19?

(Prof. Hashimoto) Thank you for asking that.

There is a very heated discussion on whether we should stop the Olympics in fear of the fifth wave or not. Actually, there is still an ongoing debate about the contribution of the Olympic Game for the fifth wave impact, but the estimated current numbers showed we did not see such a large number of immigrant cases. Also, the majority of the cases are the Delta variant and community infection, which is not directly relate to the Olympic Game, but instead, the Olympic Game may make people’s atmosphere about their social gathering and activity things which

may or may not contribute to the fifth wave. My personal saying is that this is mainly Delta variant, not Olympic.

(Prof. Noguchi) I think this is still undergoing debate, I mean, inconclusive so far. Thank you.

(Prof. Hashimoto) May I ask to Juhwan and maybe a comment from Li-Lin?

Juhwan's analysis/study suggested that it is not the social mobility in the case of South Korea, but more of the strict and comprehensive case tracing that contribute the infection control, right?

(Prof. Juhwan) Yes, that's right.

(Prof. Hashimoto) In the Taiwan case, it is something more about the immigrant borderline case. Once this borderline protection was broken, and then what was the most significant contributor to make the infection control better in Taiwan case, Li-Lin?

(Dr. Liang) Thank you for the question.

I think you are absolutely right that once the border control is broken, Taiwan is very vulnerable to community transmission. I think one key factor is solidarity because Taiwanese people have very high consideration of others. When the situation is just out of control, people would try to stay at home and wear face mask everywhere they go, even if we do not have really full lockdown, but people would automatically reduce the mobility by themselves. It is a self-response in Taiwan. I will say Taiwanese people sacrificed a lot in terms of the mobility and freedom to save the outbreak.

(Prof. Hashimoto) Thank you.

(Prof. Noguchi) I am so impressed that Li-Lin said, such that the trust in government enable to implement the National Immigration System linked with the MediCloud system in Taiwan, and also Juhwan emphasized the trace, test, isolation and quarantine policies in Korea. On the other hand, Hideki emphasized the sensitivity of Japanese for privacy and individual medical information. That is completely opposite, so it is very interesting, Anyway, we can talk about this in the later discussion part.

<5 min Break>

3. Second session

(Prof. Hashimoto) It is time for the session 2 and allow me to chair this second session. I am Hideki Hashimoto from the University of Tokyo, the member of this international affairs in the Japanese Health Economic Association with Prof. Noguchi Haruko.

Let us continue case reports from countries. For this second session, we asked the report from India, Indonesia, and Singapore.

At this stage, I cannot confirm Professor Hasbullah Thabrany from the Indonesia. Let me change a little bit in the presentation order.

May I ask Professor Shankar Prinja from India first and followed by Dr. Joanne Yoong for the Singapore case, may I?

(Dr. Yoong) Of course.

(Prof. Hashimoto) Thank you.

Let us start with Professor Shankar Prinja of the School of Public Health at the Post Graduate Institute of Medical Education in India and also as a delegate for this time from the Indian Health Economic Association. Please welcome, Professor Prinja.

(1) Professor Shankar Prinja, India

Thank you very much for the invitation. I'll try and describe the Indian response to COVID-19 pandemic.

First I will try and describe a little bit about the epidemiology, how the epidemic panned out in India, then I will try and cover the initiatives that have been taken to respond to the COVID-19 pandemic. I will also touch upon some similar experiences that the colleagues from other countries had also tried to describe in terms of the negative externalities of COVID on some of the other health conditions. Then finally, I will try concluding by

giving some illustrations or significance of the use of economic evidence for policy formulation.

To begin with, in India, the cases started to appear in early March of 2020. We had the first peak in India that came close to nearly September 2020. The peak in terms of the height of the peak was not that severe, although, in some states, it did lead to scarcity of hospital infrastructure, beds, etc. [Slide 5-4]

In general, still, the extent to which the requirements for health care could be managed did not exceed very significantly, although in some focal cities and some focal states it did increase. Then we had another peak, which came around between April and May of 2021. That was a very steep rise in the number of cases that occurred, which was unprecedented, and which led to very severe shortage of healthcare resources in order to manage the influx of cases that happened. This ultimately reach to a level of which exceeded nearly about 250 cases per million, which was quite significant.

Similar to that is the trajectory that you can see for the number of deaths in India, and this slide represents on the Y axis scale, which is deaths per million population. [Slide 5-5] You can see that this closely matches the number of the occurrence of the cases as well. The two peaks that we see somewhere in September 2020, and then around May 2021, that the number of deaths increased.

This was computed by a number of different policy initiatives. [Slide 5-7] Broadly speaking, the range of policy initiatives that were undertaken can be broadly classified into the prevention interventions, then the scaling up of the testing facilities. The third was related to the surveillance of the cases and tracking the contacts of those who have been found to be positive, followed by treatment of those who were infected. Then later on as the vaccination came, then the vaccination that is started picking up.

In the next few slides, I will try to give you an overview of the different policy initiatives that had been undertaken.

This is a quite a busy slide, but I will try to run you through the different types of interventions that took place. [Slide 5-9] Starting the beginning of the pandemic, as was evident in a number of different other countries, there were severe travel restrictions and lockdowns that were put in place. These lockdowns were instituted in about the end of the March. There were several legislations that were also invoked, such as the Epidemic Disease Act and the Disaster Management Act that gave more tips and more force to the regulatory agencies to ensure the provisions of the lockdown. There was complete suspension of the international flights around that time.

This was then followed up with significant impetus on trying to raise the capacity for testing, which was absolutely quite low in the beginning of the pandemic. [Slide 5-10] there were introduction of certain mobile applications, web-based applications that help to map the geospatial locations of the cases and were used by the health departments across different states in order to track the cases at the moment of the cases. This app, which is shown here, is Aarogya Setu app which was the one that was the web-based platform.

The lockdowns continued until nearly the end of June when the process of easing out of the regulation started to be put in place. Thereafter, there was significant emphasis on the provision of the treatment, care, the surveillance systems, etc. By the latter half of the year, we did see quite significant unlocking, easing out of restrictions, reopening of the schools, and following up the preventive measures. Subsequent year, by April or May, we started to again see the rise of number of cases. As a result, curfews and lockdowns were again put in place.

For the difference between the physical distancing, regulatory measures that were put in place earlier and the ones that were put in place in 2021, was that now it was much more focal and specific to certain areas where there were certain cases. Whereas in the early part in 2020, we saw national level or state level lockdowns that were being imposed, restricting the movement of people across different regions.

During the early part of the pandemic, as I mentioned, the number of laboratories that hired the facilities available for testing of COVID-19 were very few. We are just about one reference laboratory that was providing the testing of the COVID-19. Since then, there was a very rapid increase in the number of laboratories that started providing for the COVID-19 tests. These were labs that were not just in the public sector. The early few months, it was the public sector that was taking care. Then subsequently, there was accreditation of the private sector laboratories also, that started to play a significant role in testing for COVID-19. The testing was then also increased

in terms of the range of tests that were subsequently approved. Many new type of tests like the CBNAAT, the GeneXpert, TrueNat, and the rapid antigen and/or antibody tests that were also approved by the Indian Council of Medical Research for use of testing.

This led to quite significant increase in the number of testing. [Slide 5-11] As you can see, this particular graph where you are seeing the new number of tests per 1,000 individuals, the rate at which the population was being tested, it started to increase. It does also, to an extent, match with the peak of the pandemic as well. Then the number of testing facility is demonstrated by the rate at which it was being tested. The positivity rate matches with the points where we had the peaks of the pandemic. Then we saw a declining trend of the reproduction numbers since the beginning. This is just to summarize the epidemiology and the testing of this.

This was followed by containment process. [Slide 5-12] The perimeter of the containment strategy comprised of complete blockage of the area where the cases were being reported. There were extensive contact listing and tracking and follow up that was done by the health care workers. All suspects in high-risk cases were being tested. All these suspects were also quarantined, and the public places were closed. There was also a perimeter control around the containment zone where there were relatively lesser restrictions on essential services, et cetera, but still continuing.

Besides this, there was a concerted effort towards building the health system's preparedness towards such pandemics. [Slide 5-13] Given the scarcity of the hospital beds, to manage the number of cases, there were a number of new COVID care centers, which were being opened up in public facilities, such as fosters, schools, hotels, stadiums. Even the railway coaches were being converted into places where patients could be hospitalized, monitored, and put on oxygen or some kind of IV drugs if required.

Then there were certain health centers that were designated as COVID health centers, where there was a provision of oxygen support as well. These were the places where moderate cases were being treated. The COVID care centers were only being used to admit the mild cases who did not have enough facility at home to isolate themselves from their own home contact. They were put in the COVID care centers, but the ones who had requirement of oxygen were shifted to a dedicated COVID health center where oxygen supply was available. Then for the ones who were severe cases, there were dedicated COVID hospitals that were equipped with the ICU and ventilator beds that were providing this facility.

There were significant social media campaigns got carried out in order to create more awareness for promoting COVID appropriate behavior. [Slide 5-14]

Subsequently, there was the vaccine procurement that started taking place. [Slide 5-15] There was an indigenous vaccine that was produced within India as well by the name of COVAXIN, which was produced by the Indian Council of Medical Research, along with one of the private companies, the Bharat Biotech. India was one of the major manufacturers of the vaccine. The CoviShield vaccine, the AstraZeneca vaccine was also produced in India by the Serum Institute. It was also ultimately transported to a number of different other countries.

There was a priority set for the delivery of the vaccine, [Slide 5-16] which began with first vaccinating the ones who were the priority groups, which included the health care workers and the frontline workers. The next in line came those who were 60 years and above. Then the vaccination was open to the ones who were either between 45 year and above and finally to the ones who were 18 and above. Yet not started the vaccination of the children.

If you see here, the coverage rates for the first dose and the second dose, as of September 2021, we have pretty high rates of coverage for both the first and the second dose for the health workers and the frontline workers. [Slide 5-17] We have nearly two-thirds individuals, more than 60 years who've been vaccinated with at least one dose. Same as the case with the ones who are between 45 to 59. The vaccination coverage also continued to increase over a period of time. At the same week, we can see the coverage, according to the different age groups. It had a trend which we can see is increasing. [Slide 5-18]

One of the problems was that there were negative externalities of COVID-19. [Slide 5-19] On the demand side, there were lockdowns. There was a public perception because of catching infection and so decreased willingness to access care, and there was a loss of income to individuals. All of which ultimately reduced the demand for seeking care for the non-COVID conditions. Then our supply-side determinates, which arose as a result of

diversion of the resources towards COVID-19, and even a perception, whether the healthcare workers not to engage too much with provision of care for fear of infection risk. All of this ultimately led to a reduction in supply of services for the non-COVID conditions.

We did some study in order to evaluate the impact on primary care. [Slide 5-20] You can see that there are different services that are listed here, the primary care services on the first column. You can see that during the periods of lockdown and even during thereafter as well the ones that you see in the red are ones that were completely disrupted. They were completely suspended. Preventive services such as immunization as well as primary care including treatment of diabetes and hypertension were significantly disrupted. Some of the other services continued, the ones that are shown in yellow, but they had poor coverages. It was only the ones that are shown in green that still continued to take place. There was significant impact of these lockdowns on primary care services.

It also had impact on provision of care for chronic diseases, such as cancer. [Slide 5-21] In one of the studies, we found that there was a significant drop in the provision of outpatient care or radiation therapy for the cancer patients. [Slide 5-22] This is exactly the time when these lockdowns were put in place. This time series analysis show a significant drop immediately after the introduction of the lockdowns.

We also evaluated that these lockdowns ultimately had significant reduction in the life-years. There was several thousand life-years that were lost, and disability adjusted life years that were incurred as a result of the COVID-19, just the lockdowns alone.

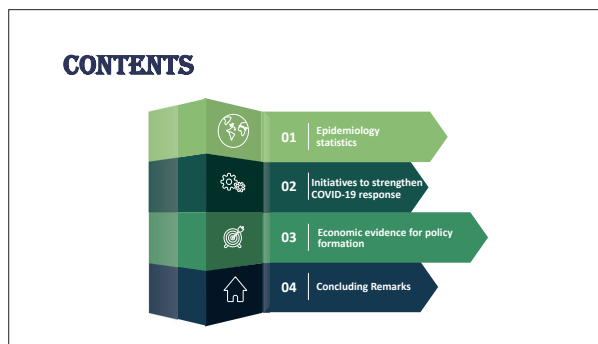
This is just the number that we found in our estimation of impact among those who have cervical cancer. [Slide 5-23] If you look at the entire spectrum of cancer cases or other, this number would be much higher.

This is the final slide on the trade-offs for policy choices with regards to economics. [Slide 5-24] The COVID-19 introduced to us several new paradigms. We, earlier, in terms of making policy choices, were only focused on health consequences, but now there were newer paradigms related to either the economic welfare or the social welfare, and which meant that the broader context, broader perspective of the health technology assessment that we would be undertaking to inform evidence-based priority setting. You could not use a narrower perspective or a health system's perspective, but you had to broaden your horizon to a perspective, to a societal perspective in order to assess these policy trade-offs.

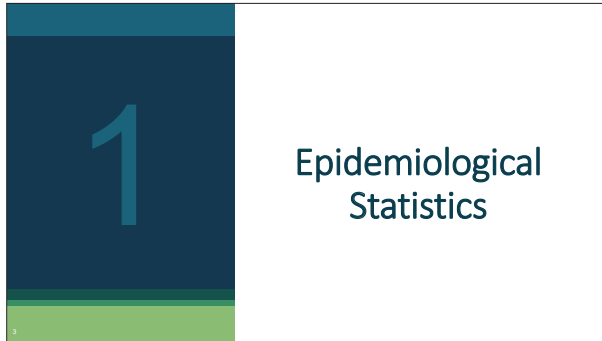
There were several examples that we had where the health economic evidence in India was used for decisions around COVID-19, [Slide 5-25] which were either related to regulation of prices, determination of certain strategies, such as diagnostics, epidemiological and health economic models were used for making decisions, etc. Because of the limitation of time, I will skip over, but I will be happy to answer more questions at the time of discussion. Thank you very much.



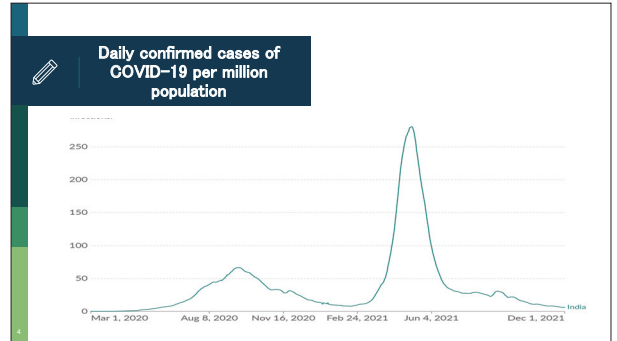
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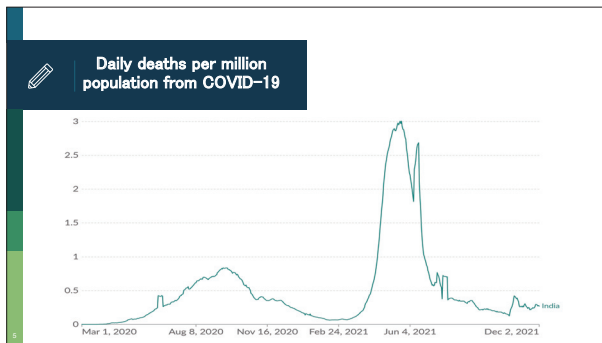
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Slide 5-3



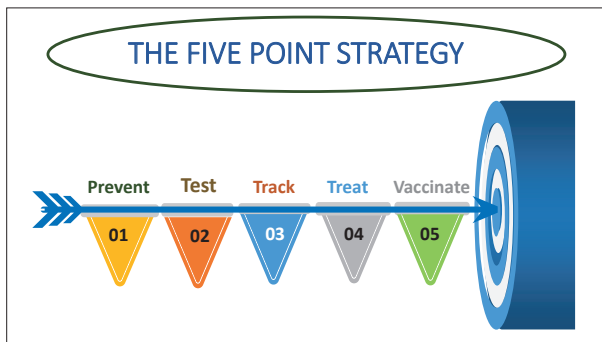
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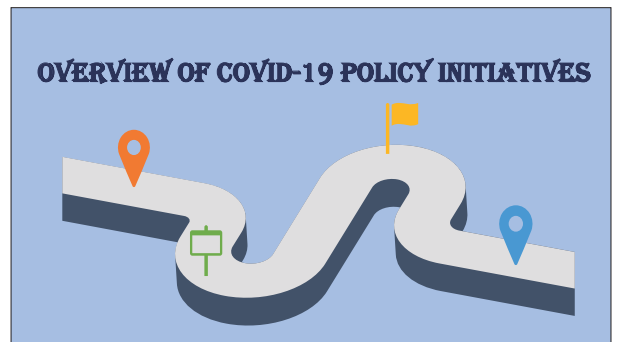
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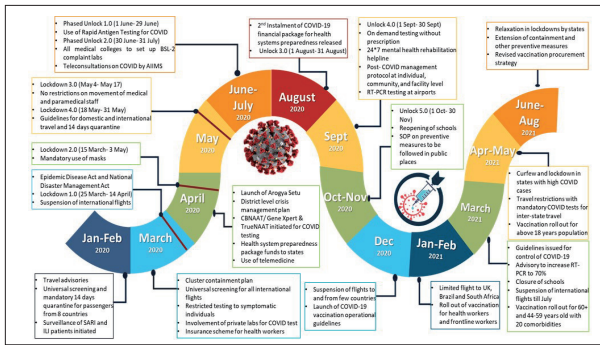
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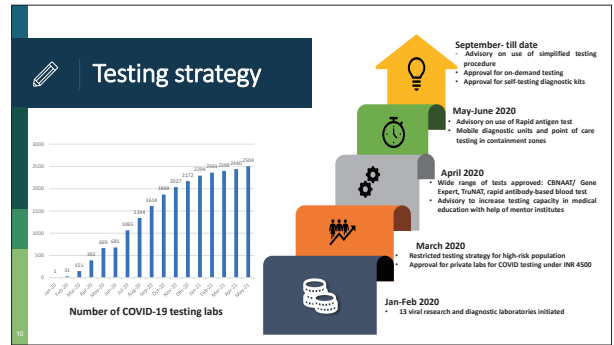
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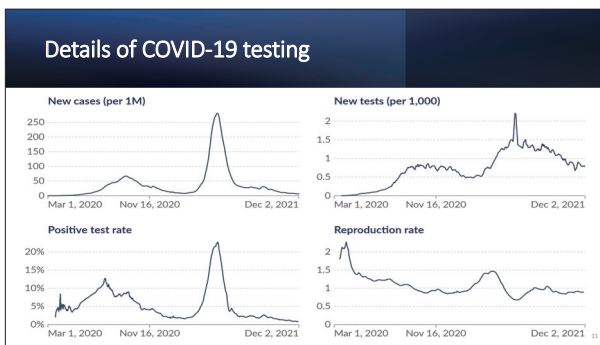
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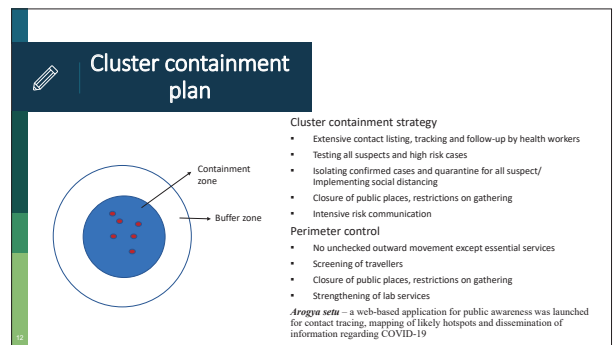
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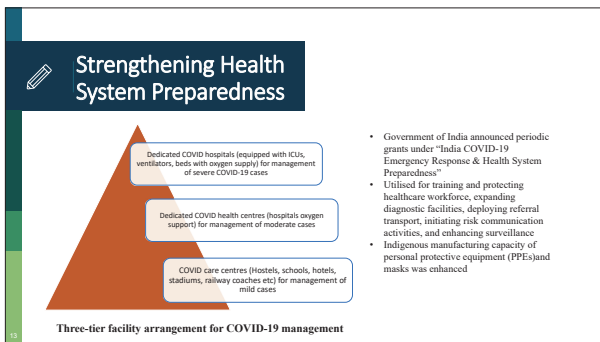
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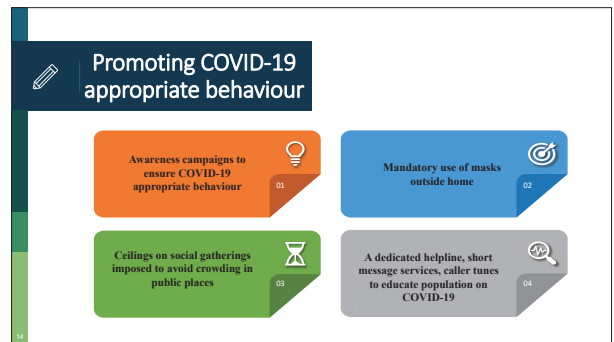
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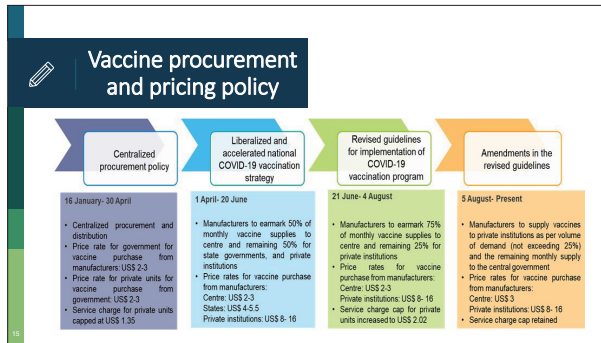
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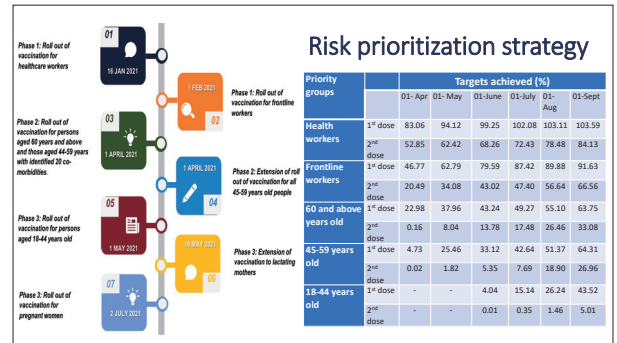
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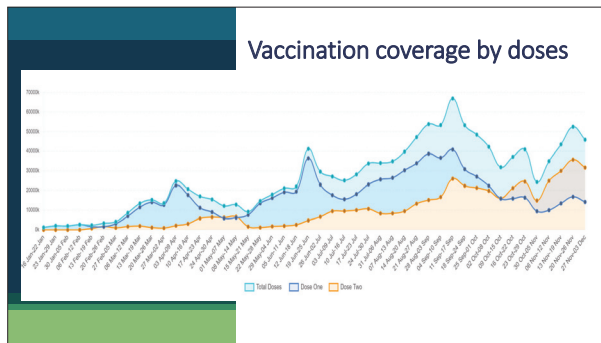
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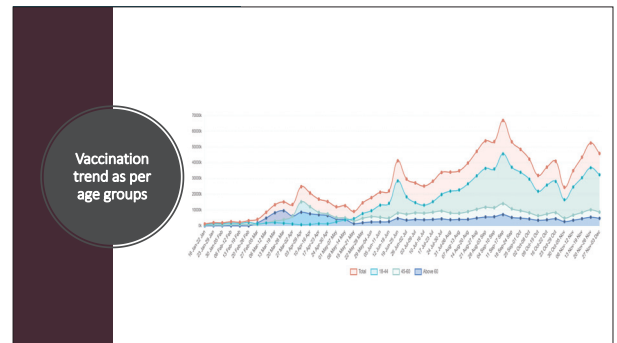
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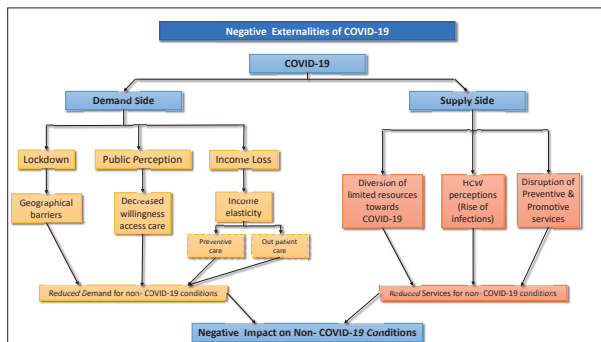
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Slide 5-17



Slide 5-18

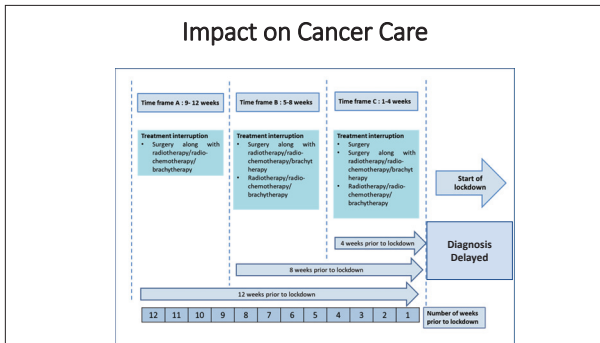


Slide 5-19

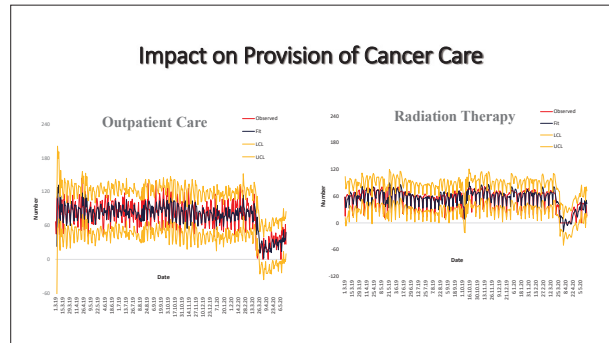
Impact on Primary Care

Service	During lockdown	Remarks	During initial unlocking	Remarks
Immunization	Severe impact	Immunization services were initially completely suspended	Moderate impact	MAMTA Disha has been re-initiated
ANC	Severe impact	Conducted by ASHA with telephonic follow up by ANMs. Involvement of ANM in these activities was reduced and number of follow ups had decreased since the lockdown.	Moderate impact	Activities have been re-initiated, home visits have been started. However the number of visits remain lower than usual.
Follow up of high risk pregnancies	Severe impact	Conducted by ASHA on call. No face to face meeting was done.	Moderate impact	Status quo
HBNC visits	Severe impact	Conducted by ASHA at village level, in a need based manner.	Moderate impact	Status quo.
Follow up of TB and leprosy patients	Severe impact	NCD screening and follow up of patients was halted	Moderate impact	Has been re-initiated at most centers. Patients have started visiting the centers again. But NCD camp have not been re-started.
Family planning services (Distribution of condoms and oral pills)	Severe impact	Condoms and oral pills were distributed by ASHA at village level, in a need based manner.	Moderate impact	Status quo.
Family planning services (Health education and referral services generally provided at the HWC, could not be provided due to devalued footfall. Few people visited centers.)	Severe impact	Health education and referral services generally provided at the HWC, could not be provided due to devalued footfall. Few people visited centers.	Moderate impact	More individuals have started visiting the HWCs but the footfall is still lower than usual. Individuals requiring procedures are being referred to higher facilities.
General OPD (Acute minor ailments)	Severe impact	A decline in OPD footfall was observed at all centers.	Moderate impact	More OPD visitors are being observed now with the relaxations in the lockdown. But the total footfall still remains low. CHOs are still more involved with COVID related duties.
Malaria	Severe impact	Conducted by MPW(M) in normal conditions. Due to the involvement of MPW(M) in COVID related activities Malaria activities had been suspended in most centers.	Moderate impact	MPW(M) are still posted on COVID related services hence these services are not available.

Slide 5-20



Slide 5-21



Slide 5-22

Impact of COVID-19 on Outcomes for Patients With Cervical Cancer in India

Neha Gupta, MD¹, Akashdeep Singh Chohan, PhD², Shankar Prinja, MD³, and Anandh Kumar Pandey, MD⁴

RESULTS We estimate 2.52% (n = 795) to 3.80% (n = 2,160) lifetime increase in the deaths caused by cervical cancer with treatment restrictions ranging from 9 weeks to 6 months, respectively, as compared to no delay. On the contrary, 88-238 deaths because of COVID-19 disease are estimated to be saved during this restriction period among the patients with cervical cancer. Overall, the excess mortality because of cervical cancer led to 18,159-53,626 life-years being lost and an increase of 16,808-50,035 disability-adjusted life-years.

Gupta N et al (2021). JCO Global Oncol 7:716-725.

Slide 5-23

Trade Offs for Policy Choices

Policy choices/ public goals	Health	Economic welfare	Social welfare
	Impact on Covid-19 related health	Impact on other diseases	
Physical distancing*	Reduced infections in overall population	Increased mental health problems because of isolation; improved health through improved air pollution	Reduced household income and consumption through reduced tourism, export, foreign direct investment, and inflationary pressure.
School closure	Reduced infections in children; reduced infections in overall population	Increased mental health problems because of isolation	Reduced income if parents have to take time off work without compensation; loss of income for education sector workers if they are not compensated; increased demand for substitutes like online education
Expanded health sector response	Reduced mortality and morbidity	Treatment delays	Increased exposure of children to violence and exploitation; poor nutrition if children rely on meals provided at schools; stress for teachers for creating and maintaining online learning; challenges measuring and validating learning.
		Increased health insurance premiums	Displacement of other public expenditure, such as on culture.

Vassall A et al. Welcome Research Open. 2020; 5:272 Prinja S, Pandav CS. Indian J Public Health 2020;64:5231-3.

Slide 5-24

Health Economic Evidence Use

- Regulation of Prices
 - Provider payment rates, Price capping
- Determination of Strategies
 - Diagnostic methods strategies
- Epidemiological and Health Economic Models for Decision Making
 - Lockdowns, school closures, vaccination
- Allocation of Resources
- Macroeconomic Decisions for Welfare

Slide 5-25

(Prof. Hashimoto) Thank you very much Dr. Prinja for very comprehensive report from the India. Now, may I invite any quick question or clarification for the current presentation?

(Prof. Noguchi) Can I ask one quick question? In India vaccine was not provided free, like any other country?

(Dr. Shankar) No. The vaccine and public facilities was all provided free of cost. In the private sector, there was a price regulation on how much the private sector could charge on provision of vaccination. The supply of vaccine was also distributed in a way that at least 75% of the vaccine manufacturing was reserved for the public sector and only 25% was made available for the private sector to purchase. Eventually, if you look at the provision of vaccination, 97% happened in the public sector, and just about 3% had happened in the private sector. It is only this 3% that there was a charge that was placed by the private providers.

(Prof. Noguchi) Thank you very much.

(Prof. Hashimoto) Let us move on to the second speaker. Currently unfortunately, I cannot see Professor Hasbullah from Indonesia, so I have to ask Dr. Joanne Yoong, for the second speaker, if you are ready.

(2) Dr. Joanne Yoong, Singapore

In fact, I would continue some of the conversations from our colleague from India, so I would be very happy to move on.

Thank you very much for having me today. It is actually really wonderful to be here. It is also a real pleasure to come at this point in the agenda because it has been wonderful to benefit from all the discussions that have gone before. In particular, I thought that Dr. Shankar's table of the consequences of COVID applies very much to what we are seeing in Singapore in terms of the spillover effects. Even I think in the first presentation about Taiwan, we find ourselves in many resonances as well.

At the beginning of the pandemic, people were saying a lot about how Singapore had done so very well. We sat on this for a little bit, and then things have changed so rapidly. Indeed, I think in every presentation, there has been something to connect with.

I would like to talk just a little bit now about Singapore and where we are today. This picture that you see in front of you, we choose red because Singapore, we call it the little red dot, we are very small. This actually is a picture of one of our vaccination centers today. [Slide 6-1] You can see how Singapore is. We like to say we think outside the box, but we put our people inside the box, sometimes, for their own benefit.

Singapore, much like Taiwan, the initial conditions in which we approached COVID-19 were particularly favorable to us because of the SARS experience. Singapore, like Taiwan, had learned a lot from SARS and had actually taken very strong actions to make investments in pandemic preparedness. I think honorarily even though we are a very small economy, we had made, in terms of health systems preparedness, very significant investments, to ensure that we were prepared if we had another pandemic come away. Coincidentally, a number of the investments that we had made came about just in time for COVID-19.

One of the things that we had done in Singapore is that we had invested in a National Center for Infectious Disease, an entirely new facility that has state-of-the-art isolation rooms and negative pressure rooms. This officially was opened only a few months, literally only a few months before the first cases of COVID-19. [Slide 6-2]

In addition, our entire health system had adopted a preparedness approach, we had been talking about health, business and resilience, and preparedness for some time now.

Of course, prior to COVID-19, I think Singapore had been as usual tilted very strongly on these efficiency indexes, and that our healthcare spending was climbing but still relatively lean. When we were confronted with the COVID-19 pandemic, we were in a situation where we had a health system that was already thinking about preparedness and resilience, both for the long term as well as from the pandemic point of view. We were in a relatively strong position.

Because of that, when the first wave of COVID-19 came in, Singapore actually faced it with very strong protocols, and with very strong plans that had already been in place. I will maybe take a double step back to just say that in Singapore what we have seen over the course of the last two years is three waves of the COVID-19 pandemic that actually revealed to us the three weaknesses in our pandemic preparedness plan. [Slide 6-3]

From the aspect of health economics, each of these three waves revealed to us as something of vulnerability that was very particular that did not actually respond to the plans that we had laid around our labor, around capital investments, around using high technology. These three waves exposed the three vulnerabilities that were very specific.

What you can see here is that when we look at the trajectory of the COVID pandemic, we have one wave that swept us together with the rest of Southeast Asia, and that was managed. We had a second combat wave. After that, a second surge in the middle of 2020, that, again, was managed down. Now today, we cross our fingers at the end of a third surge, which is much larger, following the Delta variant.

I'll just say a little bit about what, in my perspective, these three different waves made for us. The first wave, when we were hit with COVID-19 cases from overseas, was a very much in the paradigm that we were prepared for. [Slide 6-4] In the sense that Singapore is a small open economy and that this vulnerability was what in terms of our planning had always been something that was forefront in the minds of economic policymakers. The immediate interventions that took place when that happened, and this graph is from my colleagues at the Saw Swee Hock School of Public Health. I also want to make a note that my colleague, Cynthia Chen, from SPH is also with us here today.

When the first cases came into Singapore, the immediate response was to constrain travel and to impose travel restrictions and quarantine restrictions that were very onerous. What you can see here on this graph, and these are the first few months of the initial introduction of the COVID-19 epidemic, is that the black bars, here are the imported cases, and the yellow bars here are the local cases. Very strong controls imposed one after the other, to ring-fence cases coming in from overseas, and that had a very strong effect at the beginning, a number of things were done.

In addition to restricting travel, this was also done in a tiered way. For example, individuals with employment passes were not allowed to come back. Everyone who came in was subject to quarantine no matter what. This brought down imported cases fairly quickly. When this got into our community, then it became something that beyond our control. Travel bans for a small open economy was something that we were planned for, but it was hard for us to manage after it got into our community, and in particular, some of our community care centers.

That being said, with very aggressive testing and tracing, and treatment protocols, Singapore managed to control that first wave. A lot of what has been said by my colleagues here were all protocols that were adopted in Singapore. Almost immediately, we mobilized a very strong test and trace protocol supported by some of the manpower that we have in Singapore, from our national servicemen, to literally very aggressively employ contact tracing and isolation protocols.

Our first wave of community spread was kept very much under control relatively quickly. That is when Singapore began to receive a lot of accolades for something that at the end of the day was not sustained for many more months because we then face the second wave.

The second wave of our COVID pandemic revealed a great weakness in the Singapore health system, which I think is also very emblematic of other health systems where we have a two-track system for individuals who are permanent residents and citizens and a dual health system for migrant workers. [Slide 6-4] What happened in Singapore was that our second wave was very much driven by the fact that infections in a migrant worker community began to spiral out of control.

In Singapore, we have again a very large migrant labor force that supports the rapid rate of construction and infrastructure development in Singapore. This migrant workforce is very large. It is housed actually in large dormitory facilities apart from the Singapore population, and it has almost a second healthcare system. If you are a Singapore citizen, you are entitled to a very highly subsidized public health care system, which covers you through a health savings account from MediShield. On top of that, you have medicine savings. You have public insurance, and you have a medicine savings account, which you contribute to your employer savings program.

For migrant workers, that healthcare system is not accessible to them. A lot of that health care provided by employers. Seeking preventive care as well as acute treatment is very contingent on employer practices.

Moreover, as you can see here, this is a typical dorm in Singapore. [Slide 6-5]

Our housing development board estates are large, but they are very well planned. Even though they are very dense, but our migrant worker friends live in dormitories that are communal and are not very well planned. One of the things that we find is six or seven people to a room, and so because we lacked the public health infrastructure to manage this quickly, infections in the migrant worker community became our second wave as you can see on the right-hand side.

This was, again, only brought under controlled by extensive action from the Ministry of Health so we set up a parallel testing and treatment system in a very vertical intervention way.

For the dormitories, a number of healthcare workers were deployed to set up this parallel system to manage COVID-19 in the dorms. We actually moved several of the individuals out into structures, including vacant housing board estates flats, into at one point a cruise ship, and then move them back. Once that was under control, in fact, until today, a fair number of restrictions, mobility exists for migrant workers who live in this community so they go to work, and then they come back as well.

This vulnerability was very critical because it exposed to us the fact that even in a very high income, well-established, very efficient healthcare system, the situation that we have created, because of the two sectors of labor can be very threatening for public health.

The third wave, which we are in now today, I think, speaks to the third challenge of healthcare systems, which is a very fundamental challenge of demographics and behavior. [Slide 6-6] What we have seen here, and this is a graph of deaths, and what you will see here is that Singapore's case fatality rate of the number of deaths that we had in the country, overall, was very low for the first two waves.

In the first wave, I would say it was because we had very aggressive management, and it was very intense, anyone who had COVID-19, you could get treatment for free, and you would go straight to the hospital and be looked after. In the second wave, which was largely driven by migrant workers, this was a pandemic that was very confined to individuals who were mostly young, healthy males. Because we had a very large number of cases, we did not have a very large number of fatalities. Today, we are in a post-Delta world. What you will see is that in our third wave, the death rates are much higher.

This is because we are seeing that this is largely a pandemic of the aged and unvaccinated. We now have much higher case rates, but the deaths that we are experiencing are in the older adults. For the most part, what we see in Singapore very sharply is that the cases in the ICU and the death cases are distinctly different between individuals who are vaccinated and unvaccinated. [Slide 6-7]

Singapore, although we are a society that has been very well-known for mandates has not imposed a vaccination mandate. We are, currently, in terms of ramping up from the moment that we had vaccines available to us, our rate of increase of vaccination was very, very high. On absolute level, we are one of the most vaccinated populations in the world. That being said, like much of Asia, we are an aging population. Part of the issue that we have is that there is a very strong overlap between the individuals who refuse vaccination and our aging population as well, which is something that we are really working to today. Again, this is something for us, that has revealed a number of the weaknesses that we had known about before that population aging, health communications, health behaviors, all of these are coming together for Singapore, in a very challenging way.

One of the really interesting things to think about Singapore is because we are a very young country, all things considered, our population across age cohorts, is actually in many ways, a story of very rapid development. We have very much younger generations that are almost completely English speaking, extremely highly educated. We have cohorts of older adults who are 80 or 90 who do not speak English, let alone standardized Mandarin speak dialects and have virtually no education. Within a span of cohorts of 5 or 6, 10-year bands, we find drastically different populations in the same country. This is what we are seeing now in the third wave of the COVID pandemic.

How have we managed to cope throughout? I think, again, with very strong resonance to some of the things that have been mentioned with my other colleagues, technology has been a first principle of Singapore's response to COVID pandemic. [Slide 6-8] We have a very strong messaging and communication system through WhatsApp and other messaging.

We also have our TraceTogether app, which anchors our contact tracing system. In Singapore, your vaccination

status, as well as your entry to various locations, are all controlled through TraceTogether. When you go, for example, in Singapore to a shopping center, you scan the app and it records where you are. It has a Bluetooth-enabled functionality so it is able to track your interactions with other users, and then if you are exposed, you get an alert right away.

Even in Singapore where privacy or where people assume that the government has all our data, privacy was a very large concern. People felt it was very intrusive. When it was introduced, the government made a pledge that they would not be using TraceTogether data for purposes other than contact tracing. This has been very controversial for Singapore.

One of the things coming back to this issue of aging and demographics, one of the things that have been very important for us is to understand in the dark side individuals without digital access, who cannot use a smartphone have a lot of issues. For example, in Singapore, now we have the TraceTogether Token for older adults, that replaces the handphone, but one of the big questions that we have really had to face is that so much of what we have been doing, using the TraceTogether app, shifting our primary care to telehealth, or notifying people about their health status and other things through the phone has become very mobile-centric, which is a challenge for many of our older adults who actually cannot access those technologies. That is something again, that is coming down the line for us.

Another two things that I want to mention a little bit about Singapore, is that we face a very strong emphasis on human capital and protecting other aspects of human capital. Unlike many other countries, Singapore plays a very, very strong emphasis on continuity of education and return to in-person teaching as quickly as possible.

When the pandemic came in Singapore was somewhat prepared. We have a home-based learning program that was already in place of infrastructure for in-home learning. [Slide 6-9] In fact, e-learning is something that Singapore had practiced for a week, every year, even prior to the pandemic, in case such a thing happened. When the pandemic came, we switched over to home-based learning, but much more quickly than some other economies, Singapore brought children back to school. Therefore, for us, that is a very important part of long-term recovery.

The other thing was continuity of business. [Slide 6-10] One of the issues we have in Singapore is before this, we have had very low unemployment. With COVID-19, very quickly, we saw unprecedented levels of unemployment. A huge fiscal stimulus, we passed an unheard number of supplementary budgets through providing enterprises and businesses, we support grants to grow jobs, to maintain workers. We received a wage subsidy. All companies in Singapore that has Singaporean workers received a wage subsidy called the job support scheme, basically, to ensure that enterprise was able to continue.

Today, where are we now in Singapore? We are trying to live with COVID-19. [Slide 6-11] What you can see on the right-hand side of this graph is actually something that one of our newspapers put out there. I just want to show this to you. It is a chart of all the MPIs in Singapore that shows you that at the beginning, what the shutdowns were and that we have been moving from face to face in a very tiered approach towards relaxing restrictions within Singapore. Singapore has taken a very incremental approach across different sectors. Work from home, for example, remains a default, but individuals can come for up to 50% in the workplace.

What we can see here on the right is the COVID-19 stringency index that is provided by Our World in Data. What you'll see is that at the beginning, a very sharp and stringent response, and today that we have leveled off where we're really trying to understand how to live with COVID-19.

A huge part of that is our vaccination policy. [Slide 6-12] We are almost universally vaccinated, to try to sweep and you can see at the bottom of this graph that we are now creeping up the booster rate. You can now walk in for a booster if you are above 30.

That is about a month ago today, I would expect that that rate is much higher. We're almost universally vaccinated. Singapore has also taken the unprecedented step to say that if you are not vaccinated, you will now be responsible for your medical bills. Taking that public health care system benefits away from individuals who are unvaccinated by choice.

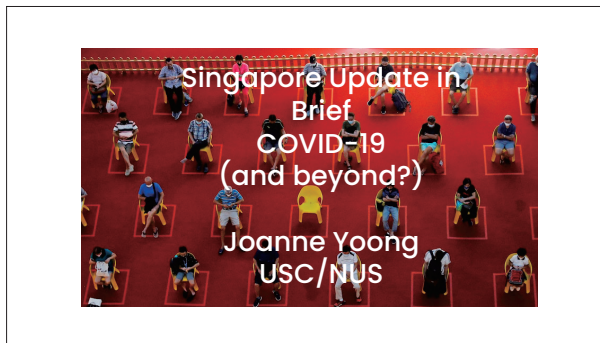
What are some challenges that we continue to face? Public messaging and confusion sometimes we have a very strong mass mandate. [Slide 6-13] At the beginning, there was some confusion about what we should do. In

general, I think people feel that, with a strategy that aims to be very fine-tuned, the communication has been challenging because some of the rules have been difficult to follow without the flip flopping.

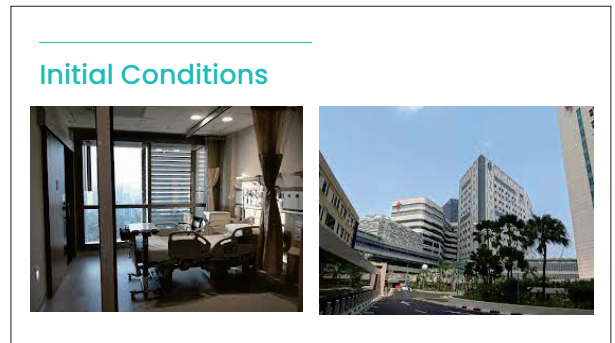
People are very tired. [Slide 6-14] Our mental health is suffering. You can see on the right here, this is a migrant worker standing on top of a building in Singapore. We have an unverified spate of migrant worker suicides. The good news is that our infection ratios are falling. [Slide 6-15] We have, for sustainability reasons, moved towards home recovery rather than institutional care. Again, with our outside partners, we have adopted a tiered strategy and vaccinated travel lanes for different countries so that we can resume trading and passenger flows especially with our close neighbor Malaysia as quickly as possible.

This is where we are at today. [Slide 6-16] This is literally from the Ministry of Health. What you can see is I wanted to put that up there to also let you see that a very huge pillar of what Singapore is doing is to provide clear communication to the population at all times. If you are a Singaporean, the Ministry of Health website will provide you exactly this information every day with these metrics very clearly and simply organized and to give everyone the message that, in fact, we are vaccinated. Vaccination is the pillar of our strategy going forward and that that is what we need to do.

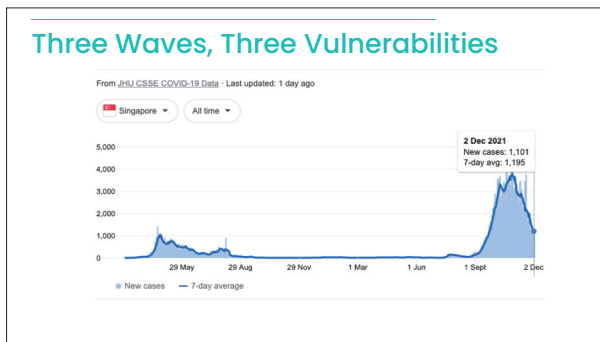
Of course where we are now, who knows. [Slide 6-17] With that, thank you very much. I think I may have gone a little over time so I will stop and pass this back to the moderator. Thank you.



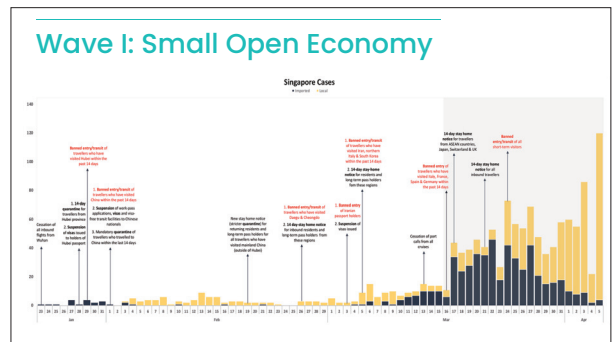
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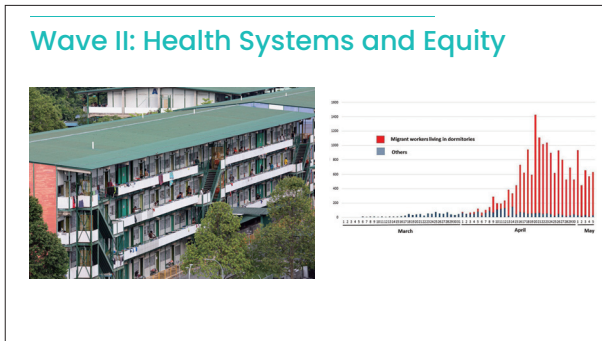
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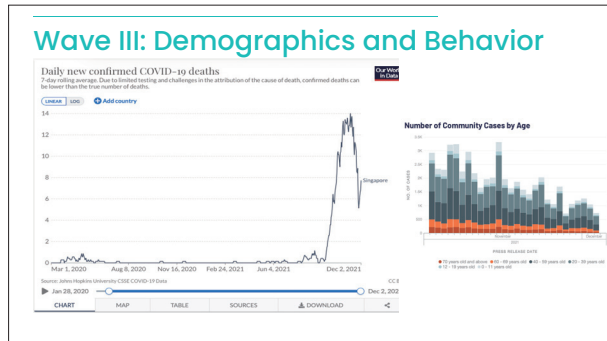
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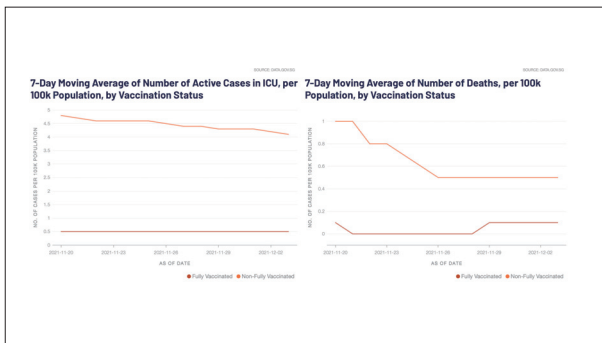
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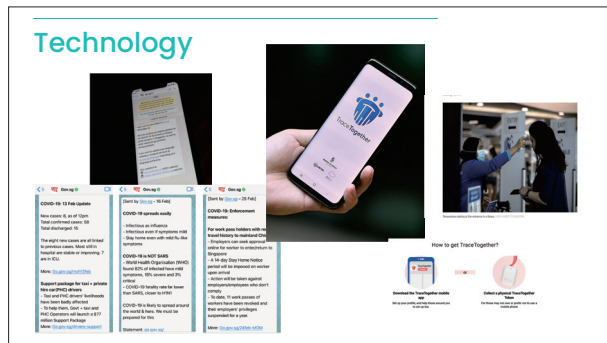
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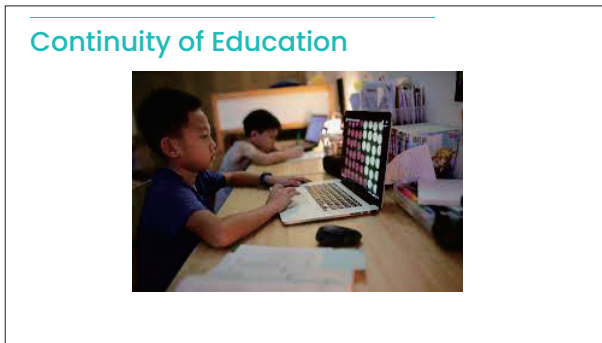
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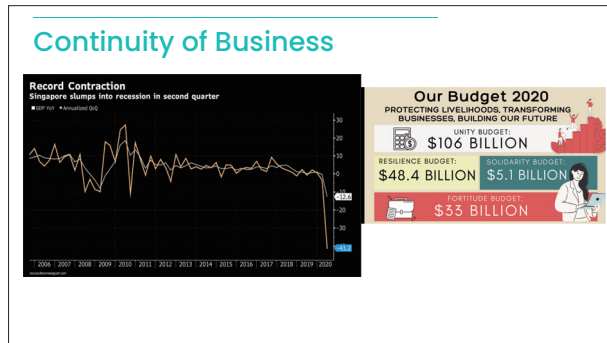
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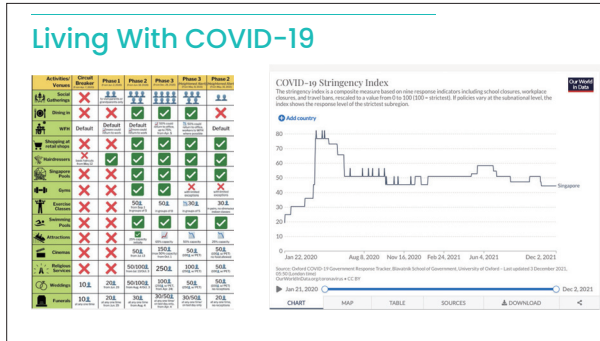
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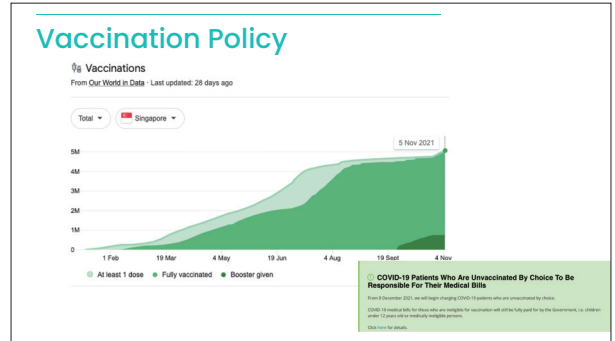
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Slide 6-11



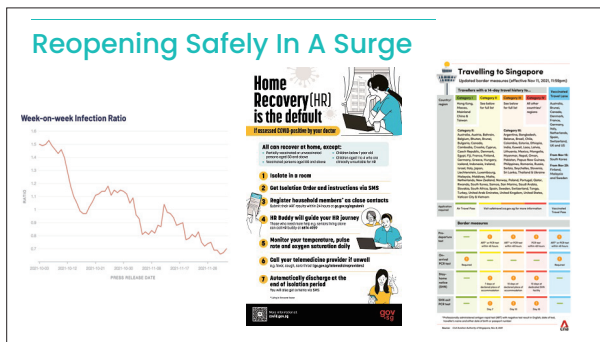
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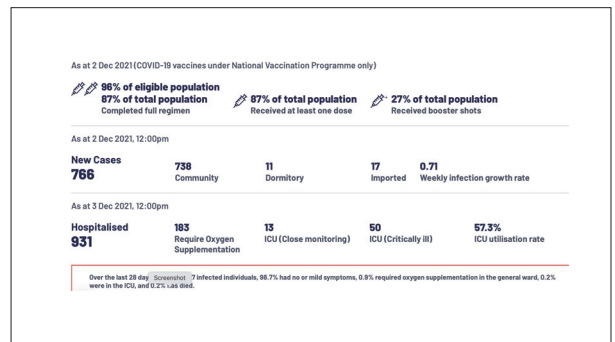
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Slide 6-14



Slide 6-15



Slide 6-16



Slide 6-17

(Prof. Hashimoto) Thank you, Joanne. Very, very comprehensive summary from the Singapore case. Now, we may invite a quick question about the Singapore case for clarification or any other burning question if you have any.

(Dr. Liang) I am Li-Lin. Thank you, Professor Joanne, for your wonderful presentation. I think Taiwan and Singapore share a lot of experience.

I have one quick questions. I noticed that the total health expenditure as a percentage of GDP was quite low in Singapore. It is 5%, is it?

(Dr. Yoong) Yes.

(Dr. Liang) I was quite amazed. How did Singapore do so many things with limited investment in health?

(Dr. Yoong) That is a very good question. I think one of the things in the past is that Singapore has been on the top of all of these efficiency indexes for that reason.

I would say that a number of this is one is that Singapore with the public healthcare system has been very focused on cost containment. The second thing is that we have a very strong healthcare system in the sense that we do have to pay a lot of attention to capacity building and investments.

The third thing is that in Singapore, we do have a first dollar that hits the patient. We have a copay system in our public health care. Even if you go to a public clinic, you have to pay even fully subsidized at \$ 12. In some sense, the idea in Singapore is that individual responsibility must be there. It was one of the founding things that was built into the Singapore healthcare system even at the beginning.

The good thing about that is that it has helped keep costs down. I would say that this number is also changing very rapidly because once we age adjust those numbers to the rest of the world, actually that expenditure number does go up. Our projected healthcare budget because of chronic disease has been increasing year on year by about 30%, so that is not a situation that will stay for very much longer.

We recognize that one of the issues that we've had because of this is that people have not invested as much in preventive health as we would like. In a way, we have won some battles in the past, but we also recognize that going forward this is not how it will look in years to come.

(Dr. Liang) Thank you, professor Joanne.

(Prof. Oh) Thank you, Professor Joanne. I think you have very high rate of the digital proximity app as you presented in your presentation as a TraceTogether. Even in your high incidence recently, probably this proximate app may contribute quite well. However it looks like that information is not translated into quarantine very quickly or timely well, partly because of any reason such as the human resources, the deficiency, or et cetera compared to the incidents. I was wondering what is the reason.

(Prof. Yoong) One of the issues that we have had with the proximity app is that it does alert people very well, but Singapore is a very small country and we do not have a lot. We have a lot of manpower shortages. Part of the issue with moving to home recovery is that when we went through the third wave, there were a very, very large number of people that had to be contacted and having people sent to containment centers and having people move from place to place.

That information was not getting through, and people were very confused about what was happening. Even if we do have the identification and if we do not have the manpower to follow it up clearly, then things go very wrong. The citizens in Singapore, if I may say so, have a very high expectation that the government should communicate with them a lot. They have a very low threshold for ambiguity and uncertainty.

One of the things I think that our ministries are thinking about now and our clinicians are actually saying, "How do we get people to self-manage responsibility without expecting to hear everything from the government all the time?" That is a problem that we have now also.

(Prof. Oh) I understand. Thank you.

(Prof. Hashimoto) Thank you very much, Joanne. It seems I have to miss the Professor Hasbullah Thabrany from School of Public Health University of Indonesia for this time.

Juhwan, can you answer and respond to the Rachel's question about what is happening in South Korea in the third wave surge?

(Prof. Oh) The question is a tough question since we had not scientifically analyzed the reason yet. However, that is expected during the last two months partly because the incidence became high. However, the sliding scale of human resources to tackle the high incidence to follow, to make them to be traced and then quarantined that should be done timely.

However, that decision was done very late, three months later after instance began increasing. That effect of the increased human resources is not coming yet. That is not translated into a lowered or consistent incidence clipping.

I guess this pattern can go up and cannot be reduced for some months, and that is my concern. However, the government is much more likely to send the ball to people itself because the government said people's movement is going up, that is the reason. The mobility is going down and staying at home more than before, that is the prescription of the government. However, that is not the true genuine cause of that. Maybe they do not want to be blamed by not facilitating enough of human resources or digital approximate application adaptation as Singaporean do. It seems like the debate of government responsibility and individual responsibility without science.

(Prof. Hashimoto) Policy discussion without the scientific information is always our enemy.

(Prof. Oh) Yes.

(Prof. Hashimoto) Let me get back to Shankar, if you are available. Since I had to ask you to keep stringent time limit and you may have skipped some of your presentation part on the policy reaction in India. If you want to add some comments or mention on that part, could you please continue that part?

(Dr. Prinja) Sure. I had a couple of slides towards the end. I can try and share my presentation.

(Prof. Hashimoto) Yes, please. I think you can use it. Thank you.

(Dr. Prinja) This was just one slide that I wanted to show you. During the very initial phase of the COVID pandemic in India, there is a national insurance program that has also been started. The national insurance program was incorporating a benefit package for treatment of COVID as well. They wanted to have evidence on how much should be the price for paying the providers for treating COVID patients. In order to do that, they tried getting inputs for cost of healthcare services. Based on the evidence on cost of healthcare services, there were consultations that took place that helped to determine the provider payment rates. That was one area where we were involved in forming the policy through provision of evidence on health economics. That was one.

The second was around the capping of the prices for certain drugs as well as for certain provision of services as well because in the private sector, the charges for treatment and the charges for the provision of certain services were quite higher. We again tried providing evidence on the cost of providing such services that helped the

government to regulate the prices in the private sector. COVID was one situation which actually provided an opportunity to the government and the public sector to regulate the large, vast private sector which during the pre-COVID times were relatively much unregulated, especially with regards to price control. There was hardly any regulation on the prices on that part.

The second area where we felt that there was significant contribution of HTA or economic evidence in general, was around determination of strategies, strategies specifically for either therapeutics or diagnostics. There were questions around the provision of diagnostics. When there were certain specific questions, for example, in the genotype testing or in the RT-PCR testing where there could be alternate technologies that could have been used in order to perform the same diagnostic test. They wanted the health economic evidence on cost-effectiveness of using either of the two approaches towards the provision of diagnostic tests.

Plus, there were also certain operational questions such as, "How do you set up a lab?" "Do you have an outsourced model of a laboratory where a private sector is asked to run a laboratory and charge the full cost?" "Should it be government-subsidized or government puts in certain cost of infrastructure and then the private sector operates it and charges a certain subsidized amount?" Or the government sector could send a full investment of both the capital and the human resource and also runs the facility in order to do the testing facility. Trying to estimate that what could be the long-term costs of either of these three strategies, such kind of evidence was used to make decisions in the Ministry of Health.

Then, as I mentioned that there were a range of epidemiological models and health economic models that were being used to guide the strategies for the non-pharmaceutical interventions such as physical distancing, use of masks, and the lockdowns in particular. One of the issues that was discussed quite significantly in the National Technical Advisory Group on Immunization was around vaccination.

Different strategies to vaccinate the population for making certain decisions around setting the priorities, for example, which high-risk groups to consider for vaccination in the first round. Or there was a question around, how much should be the spacing between the two doses? There was another question around the placement of the vaccination between a facility-based and an outreach-based vaccination campaign, et cetera. There were quite a number of issues that were discussed in the National Technical Advisory Group on Immunization that ultimately gave recommendations to the government for considering. There were cost effectiveness analyses as well that were incorporated to guide that.

One major issue that confounded a lot of these analyses and use of health economic evidence was the changing paradigm of how you conduct analyses and what kind of evidence do you use because there were a number of macroeconomic implications of COVID disease as such. This is what I was trying to explain in the previous slide. There were trade-offs when you made those choices.

There were trade-offs with regards to each of these different policy choices. They may have some beneficial impact on COVID-19, but then it may have certain alternate impact on even the other diseases within the health sector. Then there were broader implications for economic welfare as well as social welfare. As a result, we found that the straightforward application of health economic evidence that used to be the case in certain instances during the pre-COVID period failed to cut the ice because you could not really just have a narrower focus and run an efficiency analysis to look at either the cost effectiveness or the good implications and make decisions because there were implications of making alternate choices that went beyond the health sector, and even within the health sector, beyond the COVID-19 disease itself.

That added to the challenge both for the researcher who was undertaking the analysis as well as for the decision-maker who was to use the evidence. That we felt and we tried documenting that in a couple of papers that we published which highlighted the changing paradigm of decision-making or evidence-based decision-making to inform policy decisions.

Those were the two points that I probably missed out to illustrate a little bit. Thank you very much.

(Prof. Hashimoto) Thank you for adding information to be shared. This really opened the next open discussion with other participants on what we can do through the health economics discipline.

<10 min Break>

4. Third session : Round table discussion

(1) Cross-country QA cont'd

(Prof. Noguchi) Shall we start our roundtable discussions as today's final session? Since this is a round table session, I want to see your faces on zoom. Thank you for cooperation.

We will do cross-country QA session in the first 20 minutes, and move on what the healthcare after COVID-19 pandemic should be, and also what the contribution of health economics is to this global scale difficult public health crisis for 40 minutes. Finally, Hideki will wrap up today's forum. Li-Lin, please speak up.

(Dr. Liang) I am glad that the presenter has a chance to ask question.

My question is for Dr. Shankar. I enjoyed Dr. Shankar's presentation. I am very glad to see that in India, economists actually participated in decision-making, because in Taiwan, we think that the decision-making team set up by the government does not include economists.

Because I saw the slide from India, and some immunization program stopped it because of the pandemic. How does India government set priorities for different preventive care programs? How does India government decide which program is more important and shall be continued, and which one is less important and can be stopped?

(Dr. Prinja) Thank you very much. I think that the extent of decision-making was as ad-hoc and as haphazard in India as it would have been in any other place in a pandemic situation. It was no different.

Just that in terms of priority-setting, there is an HTA body that has been set up. During the pandemic, frankly speaking, there was a very little role that the HTA body itself also played in the decision-making. Because the pace at which the decisions had to be undertaken was really compressed to very short timelines. There was hardly any time for researchers to generate evidence that could be used for policy-making. It was more in situations where there was some previous engagement and previous-- The nature of the work that was already being carried out helped to inform certain decisions.

For example, as I was trying to show in the context of primary care, how the COVID-19 was affecting the primary care, it was linked to a piece of work that we were already doing. We had set up an innovation and learning center for implementation of comprehensive primary health care. Within that context, we saw that what was the impact that the COVID-19 was having another alert. We were able to inform the government on how it would take place.

Similarly, we were already working with a national insurance program. We were trying to help them develop a pricing structure for the health benefit packages. This was being backed up by a cost database that was being created. At that time when the COVID came up, because we were already having that engagement, we helped to inform or make some contribution to the pricing.

I would say that there were precedents to the system that was in place that enabled the health economic community to make certain contributions in the decision-making, but it was not the novel system that was created at that time.

(Dr. Liang) Thank you.

(Prof. Oh) I would like to ask Joanne. During the last outbreak in Singapore which is huge as you mentioned. In terms of digital approximate apps not translating into human resource based quarantine, similarly, I saw the test ratio per case is extremely decreased during that time. I do not know that is the cause or the result.

However, it seems like two possibilities. One is government's active decision not to use test, tracing, and quarantine procedure from some time, or it can be the result of the ceiling of capacity of the testing or daily capacities, so that outbreak may reduce the test ratio per case. Which one is correct?

(Dr. Yoong) Testing capacity, I think still for us at the later stages of the pandemic was not a major, major constraint because Singapore has invested in a huge amount of capacity for this. I think what it is is that we pulled

back some of the routine testing at this time. We had actually a very high rate of routine testing in many other sectors.

For example, now because we have schools open, it used to be the case that you had to test yourself every time. All doctors, for example, have to test themselves two or three times a week, and all educators have to test themselves very frequently. One of the other things is that now if you were a close contact, you had to get a test. At the end of the day, there is now a rationale that unless you have a very close contact, you do not have to go for a PCR test. You can do an ART test at home. Some of that has been pulled back. My sense is that we have moved over from the PCR to ART testing regimes which are more sustainable. For that, we have no issue at all. We introduce ART tests, and we are very excited about that.

In terms of the frequency of testing, and also in line with the government's general approach to say that we live with COVID-19 that has been why the testing rates are not as high as they used to be. In fact, today, some people feel that the routine testing is too high. My daughter, for example, every two weeks, has to take a test regardless of symptoms and upload the results into a national school reporting database.

(Prof. Oh) Thank you.

(Prof. Noguchi) Just a quick follow-up question. Joanne, who pays for the test, the government?

(Dr. Yoong) The government has issued some number of free tests. If you do go to a testing facility on your own, the test itself is not free, but tests required for school and work have been distributed and paid for by the government. For example, Workplace Safety announced that you had to test yourself, every household would receive eight tests, and enterprises also have each received a certain number of tests commensurate with the work from home period for their employees, so this ART testing is in fact free. PCR testing is free if identified through contact tracing. However, otherwise ART and PCR is not free.

(Prof. Hashimoto) Let me go back to the question you raised in chat. Any plan for booster shots in South Korea, Japan, Singapore? Can you start from Juhwan to respond to this question?

(Prof. Oh) South Korea also began booster shot from the seniors. The sequence is the same as the beginning. The senior first and the health professionals next, then the others.

(Prof. Hashimoto) In Japan's case, the government recently announced that they will start the booster shots in the coming February or something, and are prioritizing the health workers and the older population, and then they open to the younger adults. What about in Singapore, Joanne?

(Dr. Yoong) For the booster shots, we rolled them out initially again, similarly for all healthcare workers, and then for individuals 60 plus. Now, the way that booster shots are working now is that everyone is eligible for the booster shot for free. If you are 30 and above, you can walk-in. If not, you have to make an appointment. What's interesting is that free walk-in is currently only for the Moderna. For people who have Pfizer, it is still available, but it is more limited in terms of the rollout.

Coming back to this question of who pays for vaccine, in Singapore, the Pfizer and the Moderna, which are distributed through public healthcare system is free. The booster is free. If you wish to have Sinovac, Sinovac is available through the private clinics. You can receive Sinovac at a private clinic at your own out-of-pocket expense if you would like. That is done separately. You can also receive the free booster if you have had the Sinovac as well. There is the mixing of the mRNA booster following the two Sinovacs is also encouraged.

(Prof. Hashimoto) May I also add one question about the vaccination policy for very small children, aged under six. The country, as you may know, the CDC recommended the vaccination even for the small children. Some countries adopted the CDC's decision, I think.

Japan also are discussing about it very recently, but still there is controversy about the cost and benefit balance in the small child case. It is still shaky. What about your case in South Korea, Singapore, and Taiwan for my reference?

(Prof. Oh) We are not really active in the school children age with the vaccination. This under six is naturally social debating now. School children have 20% or 30% of vaccination rate at the moment. One of the reason is based on the expert recommendation was not high enough considering long-term side effect. It is not certain yet, but they are a little bit reluctant to actively increase it to school children to get vaccination. That is one of the

reason of the low rate of the school children.

(Prof. Hashimoto) What about in Singapore, Taiwan, and India, please?

(Dr. Yoong) In Singapore, the vaccination for the 5-11 group has not yet started. The discussion has really been still in that phase. What we understand is that in the new year, very likely that it will begin, but we are doing our local site testing now of adverse effects. There is a study ongoing. We project that. Under five, I think it is still some time away.

(Dr. Liang) In Taiwan, if I remember correctly, the vaccination plan covers only population over 18 years old. I am not sure if Taiwan has any plan to vaccinate young children. Because over 18 years old, and they are mostly university students.

(Prof. Lu) Middle school students and high school students are getting vaccinated now, at least the first shot. My son is a ninth-grader. He got his first shot already and it is a Pfizer/BNT. They got the shots at school.

(Dr. Yoong) I think there is also some concern with the Omicron variant and what does it mean for small children. That may also change some of the discussion about what does the Omicron boosters look like and how does that interact with this new population. We are monitoring that also closely.

(Prof. Hashimoto) Thank you.

We already discussed about this vaccination thing. Who pays for whom and who is in priority in what order.

Also, we have some exchange in terms of the response of the health care systems and the financial impact on the systems in each country, which seems to have similarity and difference, depending on the public-private mixture, and the payment scheme by the public payment versus the private payment, I guess.

(Prof. Chung) I am Wankyo Chung from the Seoul National University, and the Korean Association of Health Economics and Policy.

I thank you Professor Hideki Hashimoto and Haruko Noguchi for hosting this seminar to discuss the important issues.

Let me discuss one issue we did not discuss today. It is just a minor issue, but I think it is important.

It is about the fertility and the infant health during the pandemic. [Slide 7] We discussed many different issues, incidences and mortality of COVID-19, but another issue is the fertility and infant health. In Korea, we have the lowest total fertility rate of 0.84 in 2020. This is lower than 0.92 in 2019.

I expect we will have even smaller number of babies this year because it takes time people to make a decision and to adjust to the pandemic. At the same time, the infant health is declining. One measure is lower birth weight, less than 2.5kg. In 2020, it is 6.73%. It is higher than 6.58% in 2019.

Lower fertility and infant health during the pandemic
Wankyo Chung,
Seoul National University and Korean Association of Health Economics and Policy

Because we discussed many things,
I want to add up talking about some other issues, that is fertility during the pandemic.

In Kore we had the **lowest total fertility rate of 0.84 in 2020 (vs 0.918 in 2019)**. This will end up with lower population in the future.

Other thing is infant health. One measure of infant health is **lower birth weight (<2.5 kg, 6.73% in 2020 vs 6.58% in 2019)**.
Lower birth weight has been shown to have longest impact on child health, their academic achievement, labor market outcomes (employment and wages).

Moreover, lower weight infants will grow up to be mothers who will give birth to lower weight infants. Therefore this **intergenerational transfer of health** could be an important mechanism of intergenerational transfer of income and wealth.

We needs to wait and examine more data. But these infant health during the pandemic will be an important issue in the future. thanks.

As we understand as health economists, lower birth weight has been shown to have a longer impact on the child health, their academic achievement, and the labor market outcomes.

At the same time, lower weight infants will grow up to be mothers, who will give birth to lower weight infants. There is an intergenerational transfer of health, and this will become one mechanism of intergenerational transfer of income and wealth.

I think we need to get more data about and examine more data. As for now, the infant health appears to be declining, and I expect it can have some lingering long impact in the future. Thank you.

(Prof. Noguchi) This is a very serious and important issue. Wankyo, what do you think of the mechanism behind this?

(Prof. Wankyo) As of now, I tried to find and summarize the fact, but there are some mechanisms to study behind this fact. During the pandemic, there is an increasing uncertainty within the society and within the family such as the change in employment and in the chance of infection. Under these uncertain circumstance, the joint decision between fathers and mothers is being made not to have babies.

I think it can be one of the main factors, but I need more time to figure out the decisive factors among the factors.

(Prof. Noguchi) Toshi, do you have any word because since you were doing the research for the infant healthcare in Japan?

(Prof. Iizuka) Toshi Iizuka from University of Tokyo. You mean the cause of the low birth weight?

(Prof. Noguchi) Yes. Any comments on this.

(Prof. Iizuka) Demand side, supply side, what will be the main causes? I think uncertainty would be quite a big issue. Mental stress might be something. I understand there are many excellent studies from Korea and Taiwan about the causes or the impacts during the fetal period.

Maybe Ming has something to say.

(Prof. Lien) I would like to say a few words. My name is Ming Lien. I am the head of the Taiwan Health Economic Association.

I want to echo a little bit about this South Korean finding. Taiwan also has one of the lowest fertility in the past probably 20 years. I want to emphasize the marriage rate is also the lowest in the past 20 years.

I have talked with some of my student. I asked them, "How come that marriage rate is so low?" A lot of my student told me that, "Why do you want to get married if you cannot go abroad to have a honeymoon?" They are specifically delay the time of the marriages so that they can enjoy their vacation.

I think that probably is another contributor for the low fertility rate, because in Taiwan, particularly for the young couple, if they are not going to get married, they simply do not want to have kids. I expect it is going to be a rebound after the COVID, but I do not know the magnitude of the rebound. That is the first comment.

Second, I think I totally agree that the low fertility rate is going to be a huge problem in the future. So far, I am not quite sure whether it is temporary or it is going to be a permanent reduction. Particularly during COVID, it seems like a lot of people are able to-- It used to be the case if you live at two different places, a young couple, they are going to find a way to get back together. Somehow, because of all those Google Meet and everything, it seems like everybody is getting used to just to live at two different places. I am not quite sure whether it is going to generate long-term effect in terms of the fertility.

I think probably we are going to just wait a few more years to see whether there is going to have a long-term impact. That is my two comments on the South Korean's number. Thank you.

(Prof. Noguchi) Thank you. I think this is very serious and one of the most important issues for East Asian countries.

(Dr. Ling) I have a reaction on Asia. I think looking at the impact of COVID-19 fertility rate is very interesting. Especially in Taiwan and Korea, we have national health insurance database. I think we could do some interesting research on this topic.

Another thing is that as the country roll out the lockdown policies, when parents stay at home longer, I saw the news data, domestic violence increased dramatically. I am not sure if that would affect fertility rates and harmony

between parents. There are a lot of issues we could take in too. Thank you.

(Dr. Yoong) I will also contribute that in Singapore what we see is rise in the divorce rate, which is also quite significant. Again, we do not know if this is something that is a permanent situation that people will now choose to remain single, or if it is something that we will see a rebound.

I will also say that in Singapore, a lot of people put off not the honeymoon, but because it is a very big deal to have the wedding dinner. During the pandemic, we did not see any weddings because people could not have the wedding dinner. Once our restrictions were lifted-- In fact, last weekend I went to a hotel, and there were seven wedding dinner at the same time of 50 people each. Such that now we have a manpower constraint in the wedding dinner industry.

I suspect that we will see some changes there as well as in peoples delaying those choices. There will be some delay and there will be some permanent change, but what the fraction is in Singapore, I do not know.

(Prof. Noguchi) That is very interesting research topic, and very significant.

(Prof. Hashimoto) May I also add an extra pandemic impact aftermath of this COVID-19 thing, especially about people moving in and out. We observed one of the low fertility rates in Japan last year, but another thing that we observed the decreasing population for the first time in Tokyo metropolitan area. Actually, Tokyo is the only area which enjoys increasing population compared to other rural and urban prefectures who suffer a continuously decreasing trend in population. For the first time in past 30 or 40 years, Tokyo metropolitan decreased population last year.

There are lots of discussions about this. People hate to live in the concentrated, high density area under the pandemic era. Another thing is that because, thanks to the COVID-19, many workplace introduced remote access using online, ICT systems. So we do not have to commute. Then, many people like to live in nice rural area without a long time commute. They actually continue their job in their office.

Early next year, a lot of changes in people's lifestyle was observed already in metropolitan area. I would like to ask if something similar happens in Taipei, Seoul or larger city in India.

(Prof. Lien) I think that the situation in Taipei is a little different. First of all, of course, that it is possible that you can use remote access to work during the lockdown. The lockdown in the Taipei, Taiwan is not as stringent as a lot of other country. I think a lot of people still actually go to their working place in most of the cases. That is the first one.

The second one is that there is a lot of overseas Taiwanese people coming back to Taiwan during the pandemic. I was told that like 1% to 2% of the population are actually coming back to Taiwan who used to live in the States and many Europe countries decided to come back and to stay for a certain period of time. In fact, I would expect the number of population in the large city increased, not decreased during the pandemic in Taiwan.

I do not think that the pandemic changed the schedule and also the meetings. I am not quite sure whether it is going to have a permanent impact just like other countries. I think at this point as far as I understand, it does not seem to be a very, very different working style or the population change in Taiwan.

Rachel, I am not quite sure whether you concur with my observation, but I would say this is what I have observed so far.

(Prof. Rachel Lu) I do not think there are too many changes in Taipei or in Taiwan because our life is pretty as normal as you possibly can get. When we had a lockdown, the students could not go to school, but the faculty could. We could still work in the office. If you are with young children, you do not get to go to the office because you need to stay at home to "supervise" your kids taking on-line courses, as young children may not be well-disciplined as you can imagine.

My observations in the US are that whether there is an impact on urban residency has a lot to do with the fun activities in the city. If you are in San Francisco and the bars are closed down and the restaurants are not open, young people will move out of the city to live with their parents in the suburb because when there is no fun activity in the city, what is the point of staying in the city?

Imagine if you cannot go hanging out at a bar with your friends, you cannot hang out with your friends, it makes no sense to stay in the city. That is what I have observed from my son's life in San Francisco.

Basically, they have seen an outflow of people moving out of the city. It also affected the rental price in the city, like New York, San Francisco, again, major cities.

The rent went down because supply exceeded demand in rental market as young people were moving out of the city (no job and no fun due to lockdown). They moved out of the city to live with their parents in the rural area. Not rural area, but suburban.

That we probably saw more in the US, but not much in Taiwan. I do not think there is a difference. As Ming said, a lot of my friends and relatives actually moved back to Taiwan, at least for a few months or sometimes even for a year. Just because in Taiwan, people can have a normal life.

Basically, we did not have a strict lockdown (at least not the "shelter in place" type). The restaurants or the bars were not forced to close except from May till mid-July. Only for that 71 days we had a level 3 alert (lockdown). Other than that, our life is as normal as any day. However, you have to wear a face mask everywhere you go.

(Prof. Noguchi) I think this is another interesting topic, rent prices and business activity in the metropolitan area.

(Prof. Hashimoto) Haruko, may I ask another thing? Some missing in the discussion focus is the extra impact of the COVID-19 on the older people, especially about their cognitive function and their frailty part. Anecdotally, we have some cases after this voluntary lockdown situation, even under this soft policy, the older people tend to refrain from going out which are resulting in declining in physical and cognitive functions and potential increase in the frailty burden, and maybe in the dementia case. I acknowledge that Indian, European and American cases in elder and HRS, they already conducted additional survey on this part, the COVID-19's impact on the frailty and decline in cognitive function.

I want to ask if any such kind of survey has already started in the Taiwan, South Korea, Singapore and other countries. Could you share if you know?

(Prof. Noguchi) How about Korea?

(Prof. Oh) That seems to be very plausible trajectory. However, I did not see the scientific report yet.

(Prof. Hashimoto) Thank you. What about Taiwan and Singapore?

(Dr. Liang) I cannot think of any surveys about the COVID impact on frailty and cognitive function of the elderly. Other than old people, some people who usually do exercise before the pandemic, and because of the pandemic, although Taiwan does not have lockdowns for a long time, but people try not to go to gyms. For example, my brother is an orthopedic, and he discovered that after the May outbreak, lots of patients returned to hospitals because of lack of exercise. They have problem with knees. They have back pains, knee pains, something like that. That is not particularly related to the old people, just general public.

(Prof. Hashimoto) Thank you. Joanne.

(Dr. Yoong) In Singapore, I myself have been involved in some qualitative research looking at older adults and coping mechanisms. We do find that a number of older adults have switched to the digital platforms for health consultations, as well as health promotion, but this is very few. For the most part, it is not just the mental and physical well-being, but really the social well-being, because in Singapore, many older adults in the community live in very small apartments. The community is designed for the older adult to go out and spend time in the public spaces, and this is precisely what is cut off. Many of them say, "Regularly once or twice a week, I have my line dancing, and then I see my friend, and this is something that I am no longer able to do."

In terms of the scientific approach to this, we have in Singapore, our primary study for the well-being of the elderly is called the WiSE study. This was done in 2015. It will be done again in a few months. This is the primary study that we have to look at dementia and things like that in the population, so this is going to be done by our Institute of Mental Health.

I will say that we have been involved in another trial, looking at frailty for older adults. What was very interesting is that exactly, I think, as Li-Lin said, is that from the patients, we are hearing that the frailty rates have gone up. We were not able to continue our study because COVID-19 meant that the core investigators on the ground were so busy managing the excessive frailty that they did not want to recruit for the trial, so they did not have enough bandwidth. It is very ironic for us that the sites were not able to enroll into this randomized trial study because the

baseline problem was so large.

I think that is one of the challenges that we have, I would say that I hope we come to in a little bit, which is that precisely what we want to study is so complicated, especially on the ground, in this pandemic.

(Prof. Hashimoto) Thank you for sharing that. Now, back to Haruko, please.

(Prof. Noguchi) Should we move on the next topic? Post COVID-19 healthcare and contribution with health economics to this situation.

(2) Healthcare after COVID19 and health econ's contribution

(Prof. Lien) Can I ask a question in probably maybe not actually post-COVID?

I know that many Asia countries now are trying to switch from the zero case policy to more like a border open policy. I know that Singapore, and probably Japan and South Korea, are a tourist direction, and Taiwan is still trying to see what is going to happen and what will be the consequence of the border opening.

If possible, can you just share a little bit of your own country experience so that you can give guidance of other country who aims to open the border, whether you have the most important strategy or the consequence that you should look after, and it should be cautiously. Thank you.

(Prof. Hashimoto) Let me begin with the Japanese case.

During the first wave and third wave, from the end of March to September 2020, we did have a very strict borderline shutdown. We refused any immigrants to Japan. Even for Japanese who want to come back to country, they were not allowed to do so. After that, we opened the border for very limited purpose, like business purpose, education or any other working visa status only with the condition of 14 days quarantine and the follow-up using some ITC application for the tracing.

As far as we see, until Omicron variant happened, we think that all these reactions to the immigrant and the border controls makes a relative success. We do not have such a strong immigrant epidemic since they opened the borders.

For this Omicron variant case, very recently, three days ago, the Japanese Cabinet Office suddenly announced the shutdown the border for any entry into the country, but with the strong political objections, quickly the Ministry of Transport changed their policy and decided to reopen the border under some limited conditions.

We are still very shaky at the policy direction on whether we should shut or control the border. My concern is that even though this cross border control is relatively open, still with current Japanese quarantine system, especially their cross border PCR tests, the capacity is very limited. Whether we could do a very quick lab test at the airport and other cross border gates is still under question. That is the Japanese case.

(Prof. Noguchi) How about Korea?

(Prof. Oh) Our test capacity is quite high enough. However, we are also having some trouble in many things to strengthen the trace test and isolation quarantine performance. Compared to previous years or previous outbreak time, this is still continued or even strengthened, more efficient TTIQ is necessary. However, it goes backward actually so that it can make a very chaotic message can be delivered to the public from the expert side.

Recently, I am feeling very difficult to deliver a message within a short minute of time because of the complexity of the message now. To exploit our East Asian Health Economist Association, it might be useful for us to speak more loudly to the global audience, the merit of our society's successful result.

I believe that western country does not mention during their debate about the importance of test, traced, isolation, quarantine. That is the main secret of our East Asian country's success. Although, we have recently variation over time or across countries, however, commonality is that Western country is debating is like lockdown or not. That is the debating of last year without mentioning of the strengthening of the TTI to capacity. This year, now with vaccine, even with the Delta variant make the vaccine a little bit weaker than expected, still is useful.

Vaccine only option without lockdown or with lockdown, that is variant of the last year's debating in the western country, so that still they omit the importance strengthening of the TTIQ with the vaccination together so that once we can speak out that importance of vaccination or/and the importance of the TTIQ together, then that will make our society more free to move. That will not disrupt the socio-economic activities. That will not translate

into the lower economic growth so that nobody else from beyond our East Asian economic health economists can say that very scientifically, that we may employ our association to speak in the iHEA or any global forum for this mentioning.

(Prof. Noguchi) Juhwan has got the very important point. I think that is related to the last topic we are going to discuss, Asian contribution to the International Health Economics Association, or to the globe. I think that is a wonderful point.

How about Singapore?

(Dr. Yoong) I think for Singapore, the open economy has been very critical for us. Part of what we have is, we have led the largest part of our economy that depends on both our port and our airport. These are our flagships of industry. For us, travel is very, very, very important. A part of what we were trying to say is that, in fact, control of that again, through contact tracing. If you come to Singapore, you have to get the trace to get the app and also be followed around and subscribe to that. That has been a very big part for us.

In Singapore, opening as quickly as possible, but safely as possible with these other adjuncts is really key. I think we had adopted again, this tiered system, just to distinguish between both the economic significance and the health conditions of the other countries. For us, especially Malaysia. Because prior to COVID-19 our population is about 5 million. Every day 400,000 people go between Singapore and Malaysia. For us, this was not something that we could-- Of course, we have no natural resource in terms of any of the food or things like that. All of that had to stay open as much as possible.

That being said, I think, now you see with this Omicron, the response that we have had is to try to maintain as far as possible, this wait-and-see approach, although now people coming in on our vaccinated travel lane have to test every day. For a period of seven days, they take, obviously, the PCR test before and after they enter, they take a rapid test every day. On the third and the seventh day, that rapid test has to be supervised. If they do not, they have to upload it or they are not allowed to exit their house. It is a combination of testing and quarantine.

We are trying to move towards these protocols. The part of the issue is that being sensitive to these changing conditions has led to a lot of confusion as well around the travel guidelines. This itself is also very frustrating and challenging for people. With this balance between wanting to stay open, wanting to be responsive, wanting to be adaptable, and yet not cause widespread confusion, is something that we are grappling with.

(Prof. Noguchi) Thank you, Joanne. Any additional comments from Prof. Maruyama, recently moves to mainland China, Guangzhou.

(Prof. Maruyama) I am here. Thank you very much for inviting me and thank you for this great conference. I am not prepared at all. I am very new to China. I arrived a month ago. China, it is a big market and it is a bigger country, of course. People are getting started traveling or visiting other universities, other places, and lots of people travel for fun within China.

In Guangzhou, where I am now, traveling to Hong Kong and Macau is still very difficult but many people actually do not care. There are other alternative places to go. Also the dependency on international trade is getting lower and lower over the years. It was once very high, decades ago, but now, the important thing with international trade is relatively lower, compared to before.

First of all, the current quarantine policy is very strict. I experienced the three-week hotel quarantine in Guangzhou, and there are many other cities like that. If you are going to Beijing, for example, it may be longer. It is a very strict quarantine. As you can see, in statistics, it is been very successful.

Traveling overseas is really difficult but within the country, it seems people are now happy and it is very safe. I found this a very unique policy. There is domestic support for this very strong quarantine.

What is surprising to me coming from Australia or Japan is the IT technology here is very extensively used. It is now one of the top IT countries in the world. Basically, everybody is supposed to use software called WeChat, Weixin. Using that, you can show the green code, online passport, or whatever, to enter a building or entering some facility. It is very strictly enforced and everyone is very used to it.

One issue is old people. Many of them do not have proper education, then they do not know how to use a mobile phone and it can be an issue. In a big city like Guangzhou, I do not see such an issue very often. So this digital

passport is working very well here.

(Prof. Hashimoto) Thank you for sharing the current situation in Guangzhou. I appreciate it.

(Prof. Noguchi) Li-Lin Ling, please.

(Dr. Liang) I have a question. Hello, Shiko. Do you know if China has any vaccine passport policy? In some Western countries, people need to get two doses of vaccine and to get the card or record to go into restaurants or bars or something?

(Prof. Maruyama) As far as I understand, it is not mandatory yet. When you show your green code on your smartphone to enter a building or whatever, there is a small section, lower part of the screen, it shows your recent test and your vaccination status. That is how it is used but for most of your daily life activities, it is not mandatory. I do not think there is a strong incentive policy because basically people follow it and I think the vaccination rate is very high. I do not know the statistics from the top of my head but it is very high. That is the situation.

When I talk to other academics, of course, they are wondering about the effectiveness of Chinese vaccination. It is not messenger RNA vaccine. It is a very old-school vaccination. I read that many developments of new kinds of vaccines are currently going on. It will take another 12 months at least before it is available, I think, that is what I read. In general, it seems people are happy with the policy and then following the government's suggestion.

(Dr. Liang) Thank you.

(Shiko Maruyama) Even preschool children are taking vaccines here.

(Prof. Noguchi) They already started to do the vaccine to children under six?

(Prof. Maruyama) Even for age of three or four, yes.

(Prof. Lu) Is the vaccine domestically made in China, right?

(Prof. Maruyama) I do not know where the factory is but yes, it is a China vaccine.

(Rachel Lu) Did your kids get vaccinated in China or in Australia?

(Prof. Maruyama) Australia does not start the vaccination for children yet. Currently, under 12 is still not covered. Our kids did not get vaccine in Australia and we came here and we are offered to get a vaccination. I am wondering if we should take it. Many people are saying that the Chinese vaccine is very safe and very ineffective. It is old-school vaccines. Maybe it is okay to take it or should we wait? That is what I am debating in my family.

(4) Wrap up

(Prof. Hashimoto) Thanks for exciting discussion, time flies so fast, and we are running out of time allowed. As I mentioned, this is the first trial to extend the invitation beyond the three-country frame. This is the first opportunity to make how the Asian interest in the health economics can be addressed using the common issue like this pandemic of the COVID-19.

I think this may open the next opportunity to make a further conference like this with some discussion on how to make the Asian alliance of the health economics visible and active in the health economics issue and policy discussion.

For this, I miss Dr. Shanker Prinja from India, who lose the connection already, and missed our participation by Professor Hasbullah Thabrany from Indonesia, but still, we want to make this opportunity and continue endeavor to ask your efforts to make this discussion keep going on.

Thank you for today's speaker again, Juhwan from Seoul National and Li-Lin from Taiwan, and Joanne from Singapore and other delegates, other colleagues from the TaiSHE and the Korean Health Economics Association. Thank you for chairing, Haruko, for this session. Thanks to all the participants and their supporters from the IHEP office.

Thank you very much. Now that I have to ask Haruko to close.

(Prof. Noguchi) We really, really, really thank you for everybody for coming to this workshop while everybody is also quite busy. Hopefully, see you next year in Korea in June? Thank you very much.

[03:48:32] [END OF AUDIO]