

Has the 'Go To Travel' Campaign Spread COVID-19 in Japan? Applicability of Analytics in Response to Global Crisis Management During the COVID-19 Pandemic

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Abstract

In the summer of 2020, the Japanese government carried out a new campaign called 'Go To Travel', which some believe has spread COVID-19 in Japan. This study examines the impact of the newly launched governmental campaign on the spread of COVID-19. Data for this study was collected from open data that is published daily by the Ministry of Health, Labour and Welfare, and the 41 days during the campaign period were compared with the 41 days that followed. The results show that the number of deaths due to COVID-19 did not change statistically, and it was determined that the Go To Travel Campaign could not be said to have spread the spread of COVID-19. Next, we propose a model for predicting the number of deaths that is created from the data from the Ministry of Health, Labour and Welfare from February 2020 to the end of February 2021. This model is straightforward, as it uses publicly available data from professional organisations. We believe that it can be used by medical institutions and many organisations like local governments.

Keywords: COVID-19, Go To Travel campaign, modelisation, multi-regression analysis

1. Introduction

To stop the spread of COVID-19, on 7 April, the Japanese government first officially declared a state of emergency with measures like school closures, which have loosened day-to-day since 1 June 2021 (Table 1). Figure 1 demonstrates the trend of deaths of COVID-19 per day since 5 February 2020 to 28 February 2021.

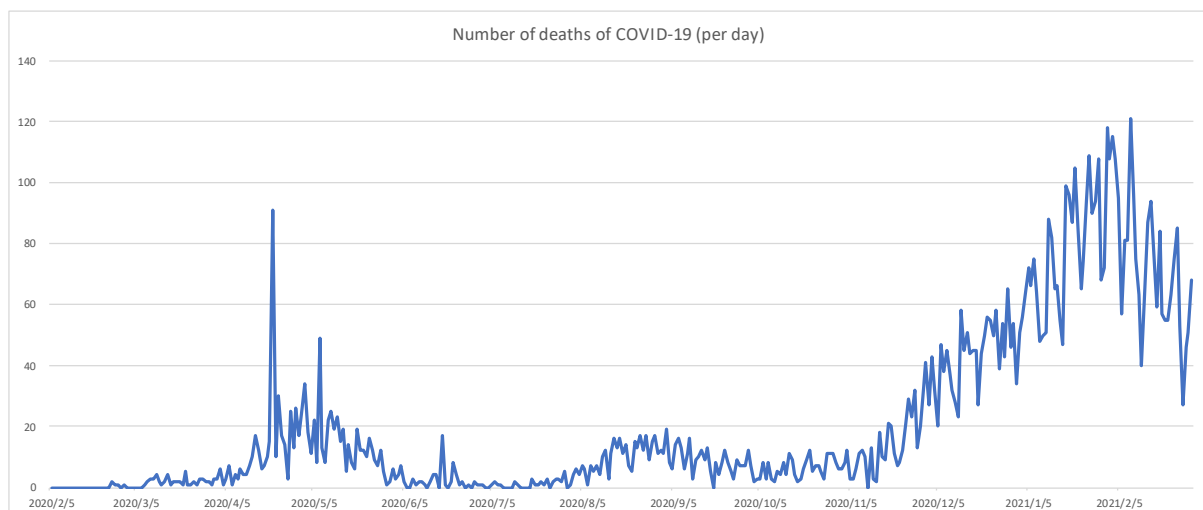


Figure 1 Deaths of COVID-19 per day (arranged by the authors)

2020	Japan domestic	2020	Overseas
		Dec 2019	Wuhan City Health and Welfare Committee confirmed 59 unexplained viral pneumonia infections on December 12-29 (Jetro article)
		Dec 2019	WHO recognizes new disease in Wuhan, China
		5-Jan	WHO confirms cluster of pneumonia-causing diseases in Wuhan
		12-Jan	WHO names the new virus 2019-nCoV
		23-Jan	Wuhan, China Lockdown Announcement
		26-Jan	Taiwan bans group travel from China
1-Jan	The first charter flight from Wuhan returns to Japan	28-Jan	WHO Tedorosu Secretary Xi Jinping Jintao held talks in Beijing
	Hotel Mikazuki in Katsura City, Chiba Prefecture accepts 191 returnees	31-Jan	Italian government declares a state of emergency
1-Feb	Diamond Princess enters Yokohama Port and quarantine begins	4-Feb	WHO Secretary-General Tedros announces that it is not a pandemic
18-Feb	Professor Iwata of Kobe University points out inadequate measures against onboard	12-Feb	NY Dow Jones Industrial Average hits a record high of 29,551.42 this year
20-Feb	Diamond Princess infected, 3 first dead		
20-Feb	500 negative passengers disembark on the Diamond Princess		
	PCR-negative people return home by public transport and are controversial	21-Feb	Blockade of Codogno district in Lombardy, Italy
26-Feb	Government announces telework recommendation in new corona countermeasures	29-Feb	WHO announces that it is not yet a pandemic
28-Feb	Governor of Hokkaido Suzuki and Mayor of Sapporo Akimoto make an urgent		
1-Mar	All passengers and crew of the Diamond Princess disembark		
	None of the SDF personnel who entered the support were infected and were		
2-Mar	Government requests closure of elementary, junior high and high schools		
5-Mar	The government postponed the time being the visit to Japan of Xi Jinping Jintao		
5-Mar	Announcement of immigration restrictions from China and South Korea		
10-Mar	Infected people via Europe are found in Japan	11-Mar	WHO Secretary-General Tedros suggests a possible pandemic
17-Mar	Government expert meeting calls for stronger border measures	17-Mar	French government announces strict outing regulations
19-Mar	Shigeru Omi of expert meeting points out the possibility of explosive infection		EU ECDC European Center for Disease Prevention and Control advocates "Stay
	The word cough etiquette is popular	22-Mar	Enter Lockdown, NY, USA
24-Mar	Tokyo Olympics will be postponed	23-Mar	Enter lockdown across the UK
25-Mar	Diamond Princess finishes quarantine and leaves Yokohama Port	23-Mar	The NY Dow Jones Industrial Average recorded a minimum of 18,591.93. \$
29-Mar	Talent Ken Shimura dies		11,000 down in 5 weeks
	Masks and alcohol disappear from the market, high prices trade online		
1-Apr	The government announces that two cloth masks (abenomask) will be distributed		
3-Apr	Strengthening border measures such as inspection	1-Apr	CDC Centers for Disease Control and Prevention announces "Social distancing"
	Decided to cancel Sumo Summer Basho in May		
7-Apr	Government declares a state of emergency in 7 prefectures	5-Apr	British Prime Minister Corona suffers and is hospitalized
	The horizontal words lockdown, overshoot, cluster, and stay home by the governo	8-Apr	Wuhan, China Unlocked
	Home delivery "Uber Sweets" spreads rapidly due to stay home		
10-Apr	The number of newly infected people peaks		
16-Apr	Government expands state of emergency to all prefectures	11-Apr	EU countries blame Sweden for not locking down
20-Apr	The government announces a special fixed amount of 100,000 yen per person	12-Apr	British Prime Minister Johnson discharged
25-Apr	Tokyo will name it Stay Home Week until May 6th		
	Bread making, decluttering, and handmade masks are popular at home during the		
4-May	Government Declares State of Emergency to Extend Until May 31	1-May	The concept of "New Normal" begins to flow in the EU
	The words "three dense" and "social distance" are popular	4-May	Italian government announces gradual relaxation of lockdown
5-May	Governor Yoshimura of Osaka Prefecture announces "Osaka model" to judge		
7-May	PCR test insurance coverage started		
7-May	Ministry of Health, Labor and Welfare approves remdesivir as a treatment		
8-May	Other than cancellation of leave request (specific caution prefectures)	10-May	British government announces mitigation of lockdown
14-May	Decided to cancel the state of emergency in 39 prefectures	11-May	French government announces relaxation of outing restrictions
21-May	Kansai 2 prefectures 1 prefecture cancellation decision		
25-May	Announcement of "gradual mitigation" government policy after full cancellation		
1-Jun	Many elementary, junior high and high schools have been closed		
	Many universities continue to be closed and distance classes are held	3-Jun	Italy lifts entry restrictions from EU
16-Jun	Government announces details of "Go To Campaign"	8-Jun	Partial relaxation of lockdown in New York, USA
18-Jun	Cancellation of self-restraint of movement across prefectures	17-Jun	Taiwan relaxes entry restrictions
19-Jun	Professional baseball unattended game started		
6-Jul	The government announces the concept of "new lifestyle" in government public		
10-Jul	Relaxed restrictions on holding events. Maximum of 5000 people such as		
15-Jul	Rapid increase in positives, Tokyo raises to the most serious level of 4 levels	14-Jul	China lifts ban on group travel across provinces
16-Jul	Government announces "Go To Travel" excluding Tokyo		
19-Jul	The original sumo wrestling Nagoya place is held at Ryogoku Kokugikan without		
22-Jul	Go To Travel travel discount started (other than Tokyo)		
3-Aug	Announcement of shortening business hours of stores offering Tokyo liquor	11-Aug	Russia begins vaccination with vaccine Sputnik V
31-Aug	End of shortened business hours of stores offering Tokyo liquor	27-Aug	Hawaii Oahu Lockdown Reopens
15-Sep	Government announces "Go To Eat" campaign from October	9-Sep	Hawaii Oahu Lockdown Release Postponed
19-Sep	Movie theater all seats sales lifted		
19-Sep	Increased professional baseball and soccer from 5,000 to 50% of capacity	21-Sep	Russia starts selling Corona Building based on Avigan
23-Sep	FUJIFILM Toyama Chemical announces application for approval of Avigan	23-Sep	Hawaii Oahu Unlock Down
	The government announces a policy to allow re-entry and re-entry of residents		
1-Oct	Go To Travel Tokyo is also canceled and targeted	2-Oct	U.S. President Donald Trump suffers from corona and is hospitalized
		5-Oct	US President Donald Trump discharged
Oct.	Go To Travel and Go To Eat Increase people going out	8-Oct	Over 5 million infected people in Brazil
		9-Oct	The NY Dow Jones Industrial Average returns to 28,586.90.
		12-Oct	Twitter restricts President Trump's "immunized" remarks
		14-Oct	State of emergency again declared due to spread of French infection
14-Nov	Tokyo announced that it will reach 374 infected people by the 13th	31-Oct	Announced lockdown in UK, Belgium, Greece and Austria
20-Nov	Tokyo Medical Association calls for cancellation of Go To campaign	10-Nov	Pfizer Inc. of the United States announces that the vaccine is effective
2-Dec	Tokyo officially decides to refrain from Go To Travel in Tokyo		
3-Dec	The government decides to bear the Go To travel cancellation fee	2-Dec	UK approves Pfizer vaccine
28-Dec	The government declares state of emergency until 11-Jan	12-Dec	US FDA urgently grants Pfizer vaccine
11-Jan	The government declares extension of emergency until 7-Feb	Mid. Dec	U.K. and U.S. approved the Pfizer vaccine and began administering
7-Feb	The government declares extension of emergency until 7-Mar		
7-Mar	The government declares extension of emergency until 21-Mar		
26-Feb	Japan approved the Pfizer vaccine and began administering		
29-Feb	The government declares cancellation of emergency except Tokyo, Kanagawa, Saitama, Chiba		
	The authors independently summarizes government announcements, newspaper articles, Net information, etc.		

Table 1. COVID-19 Timeline (assorted by the authors)

However, from a legal perspective, Japan cannot enforce extreme policies like urban lockdowns, as was the case in other countries. However, most shops and the tourism industry cooperated in refraining from business – except for pharmacies and grocery stores – due to the peculiar qualities of Japanese people to willingly cooperate with the government. Likewise, the lockdown has particularly affected the travel industry, hotels and eateries. The government tried to increase demand for travel. The government aided travellers’ transportation costs with an upper limit of 50% or 20,000 JPY (Japan Tourism Agency, 2020a).

The first ‘Go To Travel’ campaign (after this, ‘Go To Travel’) was held for 41 days from 22 July to 31 August 2020, which coincided with students’ summer vacation period. According to the survey on travel accommodations that was released by the Japan Tourism Agency on 30 September 2020, the total number of overnight guests in August 2020 (the first preliminary report) was 26.28 million, which was a decrease of 58.4% from the same month in the previous year. Japanese tourists decreased by 51.5% (26.05 million people), and the number of foreign tourists decreased by 97.6% (230,000 people).

While international travel to Japan was almost completely cut off, domestic travel decreased by 47.9% in July (second bulletin), which was an improvement of 3.6 points from 21.35 million bookings, and the number of nights increased by 4.7 million. While international travel to Japan was almost completely cut off, domestic travel decreased Okinawa, which had the worst drops in May and June, decreased by 66.7% (1,089,410 people). In terms of people per night, Hokkaido dropped to 1,475,290 people per night, which was down 59.4%. Next, Osaka decreased by 75% (1,047,330 people), and Shizuoka decreased by 53.4% (959,560 people). Resort trips to Hokkaido and Okinawa were allowed in the Go To Travel campaign, and as such, people sought to travel to hot springs inns more, and it was even suggested that travellers should bring their children with them (Tourism Agency, 2020b).

However, as Figure 1 shows, although it has somewhat recovered in comparison to the catastrophic downturn in April and May, the effect seems limited.

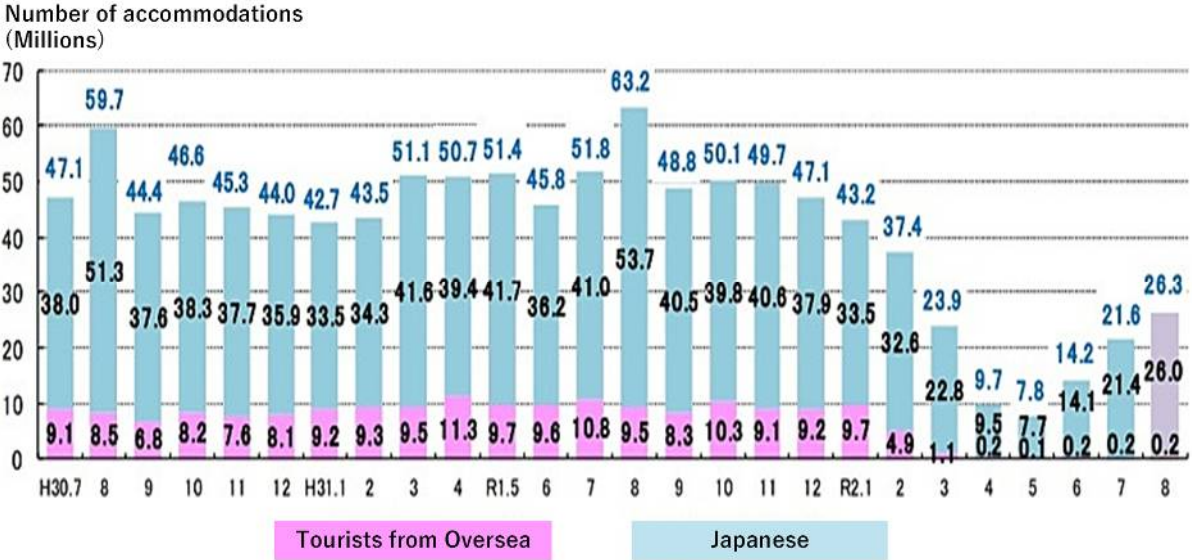


Figure 1. Changes in the total number of inbound and domestic tourists in Japan (adapted from Japan Tourism Agency, 2020b)¹

Based on the preliminary discussion as above, this study examines the impact of the ‘Go To Travel’

¹ H30 indicates the year of Heisei 30, which is the year 2018. R1 indicates the year of Reiwa 1, which is the year 2019. Figure 1 demonstrates the statistic data of inbound tourists and domestic tourists from July 2018 to August 2020.

campaign on the spread of COVID-19, which Anzai and Nishiura (2021) discussed and confirmed in their study. However, our research indicates a different result that implies that this campaign has not significantly affected the spread of COVID-19 nor has it increased death rates.

2. Methodology

We will compare 41 days from 22 July to 31 August 2020 when ‘Go To Travel’ was implemented and 41 days from 1 September to 11 October. Five types of data will be used for comparison: 1) the number of PCR tests that were performed (single day), 2) the positive case numbers from the PCR tests (single day), 3) the number of hospitalisations (cumulative), 4) discharges number (cumulative) and 5) the number of deaths (cumulative): We used the exact number of deaths that was reported by each local government to the Ministry of Health, Labour and Welfare for statistical processing. Additionally, we used the data of temperature in Tokyo as potential indicators for Covid-19 influence (Goo weather, 2021). IBM SPSS Version 26 was used for statistical analysis.

3. Findings and Analysis

3.1 Scope of the Descriptive Analysis

Table 2 shows the data profile that was used for this analysis. Period 1 covers 41 days from 22 July to 31 August, and Period 2 covers 41 days from 1 September to 11 October. The number of positive cases from PCR tests was 41,814 and 20,800, respectively. Also, the total number of deaths was 306 and 322, respectively. The number of deaths per day in Period 1 and Period 2 were 7.46 and 7.85, respectively.

Periods	Days	Number of PCR positive	Total number of deaths	Number of deaths per day	Std. Dev.	Std. Error Mean
Period 1: 22 July to 31 August during Go To Travel	41	41,814	306	7.46	5.445	0.850
Period 2: 1 September to 11 October after Go To Travel	41	20,800	322	7.85	4.373	0.633

Table 2. Data in the Target Period

Next, we will test the data for these two periods using a t-test and discuss the impact of ‘Go To Travel’.

	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Number of deaths per day	5.307	0.024	-0.224	76.440	0.824	-0.244	1.091	-2.416	1.928

Table 3. Target Period T-Test Results

As Table 3 demonstrates, the two-tailed significance value is 0.824, which means that there is not a significant difference between the two periods in terms of the number of deaths per day.

3.2 Regression Analysis

Although professional models for forecasting this pandemic like the SEIR model (Hokkaido University, 2020) may be accurate, the underlying data is only available to specialised institutions and cannot be cross-

examined by non-medical statisticians. Therefore, we will try to create a regression equation using open data that anyone can obtain and determine whether analysing feasible data in the pandemic era is useful for predicting the number of COVID-19 deaths. We propose a model for predicting the number of deaths that is created from the data from February 2020 to the end of February 2021, which was a period of 390 days and was disclosed by the Ministry of Health, Labour and Welfare. We use three variables: the daily number of positive cases using PCR tests, the cumulative number of patients and the lowest temperature in Tokyo. If the minimum temperature increases, the number of deaths is reduced, which leads to negative results.

Furthermore, the R square of the estimation formula here is remarkably high (adjusted R² = 0.770), and the explanatory power of the data is sufficient. Also, ANOVA shows that the logic is robust (Table 5). Table 6 gives us the requisite data for predicting the model. From the analysis, the formula below is attained:

$$\text{Number of deaths per day} = 11.290 - 0.010 (\text{Number of PCR positive}) + 0.002 (\text{Number of patients}) - 0.588 (\text{the lowest temperature})$$

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.878a	0.770	0.768	13.340

a. Predictors: (Constant), Lowest temperature, Number of PCR positive, Number of patients

b. Dependent Variable: Number of deaths per day

Table 4. Regression Model Summary

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	230164.063	3	76721.354	431.103	.000b
Residual	68694.614	386	177.965		
Total	298858.677	389			

a. Dependent Variable: Number of deaths per day

b. Predictors: (Constant), Lowest temperature, Number of PCR positive, Number of patients

Table 5. ANOVA

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	11.290	1.689		6.685	0.000
Number of PCR positive	-0.010	0.001	-0.524	-8.360	0.000
Number of patients	0.002	0.000	1.237	19.371	0.000
Lowest temperature	-0.588	0.092	-0.178	-6.367	0.000

a. Dependent Variable: Number of deaths per day

Table 6. Coefficients

4. Conclusion

4.1 Overall discussion

The results of this study imply that the 'Go To Travel' campaign has not significantly influenced, has not significantly influenced or even increased the number of COVID-19 deaths. It also demonstrates that it is possible to estimate the number COVID-19 deaths using the raw data that is available the raw data that is made available from official sources with a regression model. In fact, at the citizen level, it is important for

people to heed warnings so that they can protect themselves in this brutal pandemic. Increased awareness of these issues is critical in the post-pandemic period as well. This research has discussed and presented on application analytics in response to global crisis management during the pandemic. As Oe et al. (2020) suggested, increasing awareness and preparedness of the crisis of pandemic especially for the public sectors in supporting vulnerable citizens is a critical topic. The outcome of this pilot study could be a useful reference for those stakeholders and researchers who are sustaining the safety net for the society in the era with COVID-19.

4.2 4.2 Limitation and further research opportunities

With respect to the influence of the Go To Travel campaign, we acknowledge that we need to enhance our analytical scope focusing on the fact that the number of deaths during two consecutive periods (during the Go To Travel campaign and after the campaign, each period spanning 41 days) should be re-examined and the dataset should be rearranged. In fact, given the time that passes between infection and death, some of the deaths registered during the second period (no campaign) might very well be the result of infections during (and hence possibly due to) the campaign. This should be accounted for in the future research.

Regarding the predictor for the number of deaths per day which was used in a regression analysis, it would be required for the researchers to examine if the predictor meant to predict the number of deaths on a given day, or if it predicts a mean over a given time span. From our preliminary analysis demonstrated in this paper, the number of deaths (a given day or in a given period) is correlated to the number of PCR positives in that same period, but we also need to analyse if the deaths would amount to infections that have occurred (and tested/diagnosed) well before that date. It is needed for the researchers to investigate into the facts and data so that we can produce a more robust implications with practical analysis framework for further discussion.

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