

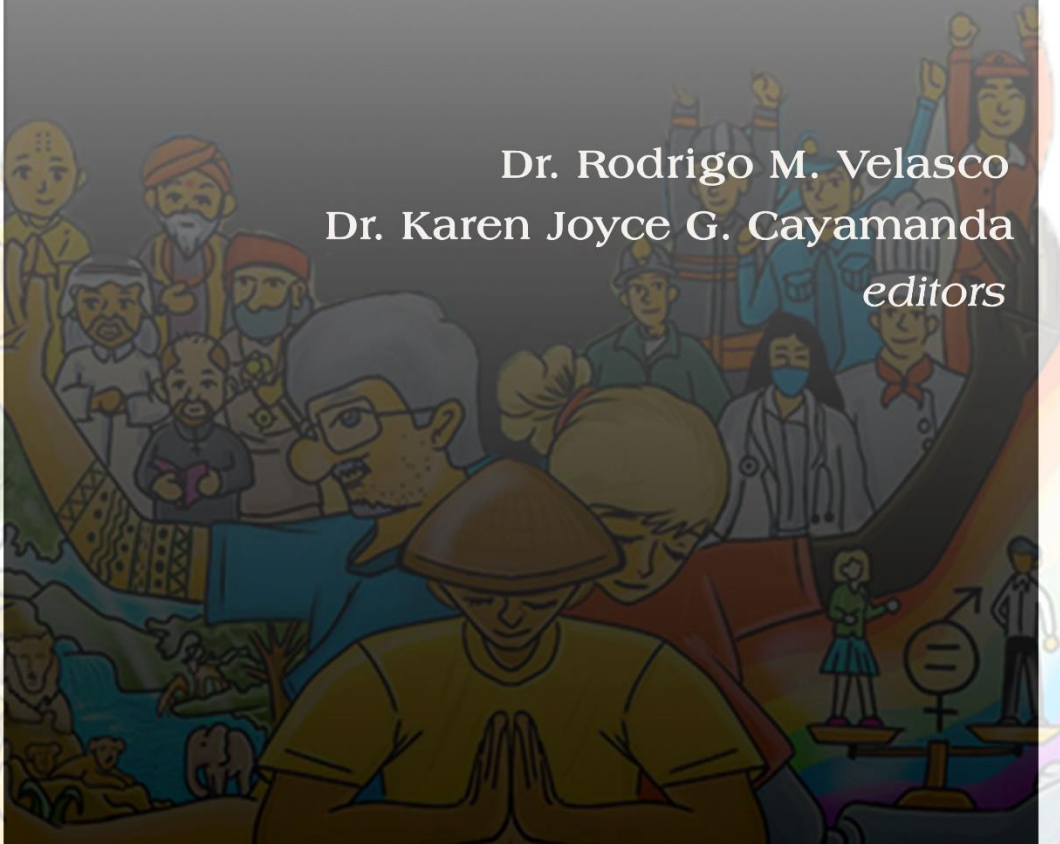
# The WORLD

## in Different PERSPECTIVES: Rebuilding Lessons after a Crisis

Dr. Rodrigo M. Velasco

Dr. Karen Joyce G. Cayamanda

*editors*



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# Preface

The world is in chaos. The emergence of COVID-19 pandemic created the havoc that all parts of the globe had to deal with. In addition, there are still other personal and social crises that everyone endures.

Rebuilding Lessons after a Crisis attempts to present the whys, whats and hows of humanity's risk perception across the world as we embark on this challenging journey and help define the most appropriate and most effective risk-related behaviors for survival.

The current pandemic has brought about the abrupt shift in all sectors of the society in different parts of the world. It has resulted to immediate adjustments and development of coping mechanisms to transcend beyond the challenges of this pandemic. Like any other crisis, the current situation taught us to reflect and manage its overwhelming effects.

This book compiles articles that reflect the different perspectives in varied concerns such as health, economy, education, and social transformations. Its impact to the physical, emotional, psychological and financial conditions of humanity across the world are also presented.

Part I as the opening chapter attempts to describe the situation in terms of how a crisis has been evaluated in different lenses as to the risk perception and the risk related behaviors as to how various sectors have adapted to the situation.

Part II describes the varied effects of the pandemic and the adjustments and coping responses manifested by the different sectors.

Part III offers the strategic actions and coping mechanisms that can help recover and sustain ways of life in these challenging times.

## About the editors

**Dr. Rodrigo M. Velasco** has a multi-cultural perspective of education and research having worked as a professor and administrator in the Philippines, CNMI, USA and Sultanate of Oman. His orientation on multiculturalism and diversity trained him to cope with different cultural and geographical settings. He is currently an assistant professor of business management and accounting at Gulf College, Sultanate of Oman. As an academician, he has professional qualifications such as Doctor of Business Administration, Diploma in Strategic Management and Leadership from School of Business London, and Certified Human Resource Professional and Certified Marketing Professional from Qualifi, United Kingdom. As a researcher, he is the founding president of the Institute of Industry and Academic Research Incorporated as a platform for open access publications.



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# Table of Contents

## Part 1 – The Nature and Extent of Crisis

Classification of the Transition Patterns of the Number of COVID-19 Patients <i>Hiroko Kanoh</i> .....	2
Mental Health in Diverse Population <i>Surbbi Chandra, Vooturi Lasya, Megha Garg &amp; Kavya Abuja</i> .....	17
Resilience in community urbanization <i>Pauline B. Malabanan &amp; Emilia S. Visco, PhD</i> .....	30
Mental health and the teaching profession <i>Marco R. Publico</i> .....	40
The social amplification of risk, risk perception, and risk-related behavior <i>Ged Xavier A. Fruto</i> .....	53

## Part 2 – The Varying Effects of Crisis

The Socialization and Self-acceptance of the Extrajudicial Killings' Left behind Families <i>Jherwin P. Hermosa</i> .....	85
Cyber Bullying Tendency among Young Generation <i>Md. Alamgir Hossain</i> .....	100
Cognitive Vulnerabilities and Depression of Children with Single Parents <i>Portia R. Marasigan, Ph.D.</i> .....	111
Elderly Parent Caring for an Adult with Down syndrome <i>Thessalonica M. Sinobin</i> .....	124

**Part 3 – The Strategies to Overcome a Crisis**

Theoretical Perspective on Covid-19 Related  
Social Problems  
*Farhana Yasmin*.....141

Personalities Characteristics and  
Entrepreneurial Success  
*Saijullahi Adam Bayero & Adams Adeiza*.....156

Brief cognitive restructuring and cognitive  
defusion techniques  
*Portia R. Marasigan, Ph.D.*.....174

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# Classification of the Transition Patterns of the Number of COVID-19 Patients

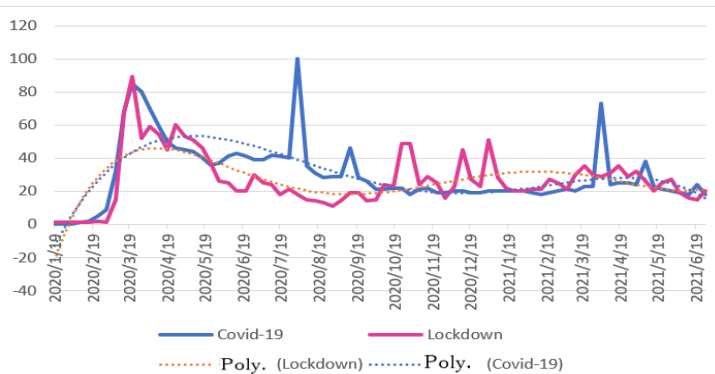
*Hiroko Kanoh*

## Introduction

The presence of COVID-19 was discovered at the end of 2019, causing a global pandemic starting in early 2020 with the crisis on-going for over a year. The unpredictable nature of the spread of this virus has brought great uncertainty within societies as our knowledge develops about the nature of this virus and its interplay with societal responses (Atchison et al. 2020; Verity et al. 2020). As a result of the COVID-19 pandemic, many school districts have closed for the remainder of the academic year (Phelps & Sperry, 2020). Suspension of face-to-face instruction in schools during the COVID-19 pandemic has led to concerns about sequences for students' learning (Engzell, et al., 2021). All over the world, the terms 'COVID-19' and 'LOCKDOWN' have been thrown about. Figure 1 shows the percentage of searches for both terms on Google between January 2020 and June 2021. The data was extracted using Google Trends and processed in Excel :  $(\text{number of searches}) \div (\text{standard value})$  was used as the relative value, namely, the data with the highest number of searches in the data was set as 100% with the rest having  $(\text{data}) \div (\text{data with the highest number of searches})$  represented and graphed as the percentage. Consequently, the unit of the vertical axis of the graph is the percentage. The correlation coefficient between the two terms is  $r=0.6$ , indicating a correlation. In particular, the large spikes around March 2020 almost overlap. 'LOCKDOWN' is probably because it was thought to be a reasonable countermeasure that could be taken immediately against a virus of which nothing was known yet.

**Figure 1**

*Spread status of the terms 'COVID-19' and 'LOCKDOWN'*



The measures taken varied from countries with strict lockdown policies to countries with more relaxed policies. A strict kind of lockdown was imposed in Wuhan, Hubei province of China. During home confinement due to lockdown, people face multidimensional issues (Sang et al., 2021). Veria et.al.(2020) analyzed data on Covid-19 cases of eight majorly affected countries, including China, Italy, Iran, Germany, France, Spain, South Korea, and Japan (Khosrawipour et al., 2020). In England, it is estimated that around 9 in 10 adults, or 91.9% of the adult population (95% credible interval: 90.5% to 93.0%) would have tested positive for antibodies against coronavirus (COVID-19) - SARS-CoV-2 - on a blood test in the week beginning 28 June 2021, suggesting they had the infection in the past or have been vaccinated (Steal et al.,2021).

Even in countries where vaccination has become widespread, re-infection has occurred. The final decision on which policy was the best will be made by people 10 to 50 years from now. However, after more than a year of the COVID-19 crisis, the results are slowly beginning to emerge, with some countries

showing no signs of stopping infection and others showing signs of convergence. In this paper, the transition patterns of the number of people infected was classified and infer the factors that caused these pattern differences in relation to human movement data among other factors.

### **Data and procedures**

From WHO's open data from Jan 2020 to July 2021, a comparison among the number of people infected and deaths for 12 countries with consideration to the balance between Asia, Europe, and the United States was conducted. Since the parameters of PCR tests varies from country to country, the study focused on the change in the number of deaths rather than the number of people infected, drew an approximate curve with an R2 value of 0.3 or higher, and determined whether the trend was upward or downward. To determine the approximation curve, a linear approximation was initially utilized, then increased to the second and third degree and selected the lowest degree possible. However, if an approximation curve with an R2 value of 0.3 or higher could not be found even after raising the order to the sixth degree, the country was classified as one that is currently difficult to judge.

### ***Classification***

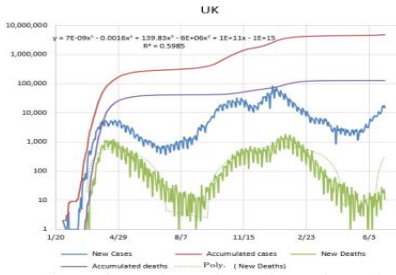
Based on the approximate curve of the number of deaths and the overall trend of new and cumulative people infected /dead, the countries were classified into four categories: *countries that have converged but are headed for a resurgence* (UK and Israel) *countries with a converging trend* (Germany, Italy, Spain, France, and the USA; *countries with a trend of infection* (Japan, Russia, Indonesia, India, and Brazil; and, *countries that are currently uncategorized* (China and Korea).

$$y = 1E-08x^4 - 0.0019x^3 + 128.08x^2 - 4E+06x + 4E+10$$

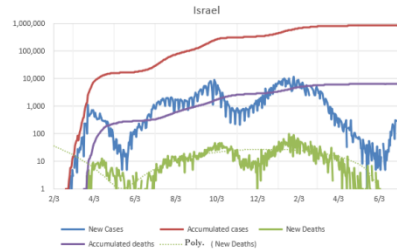
$$R^2 = 0.4226$$

Classification 1: Countries that have converged but are headed for resurgence

**Figure 2**  
*United Kingdom*

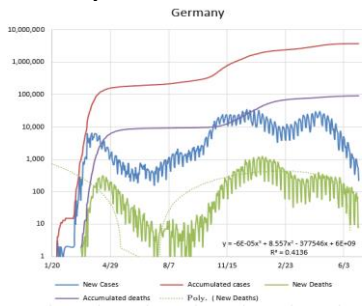


**Figure 3**  
*Israel*

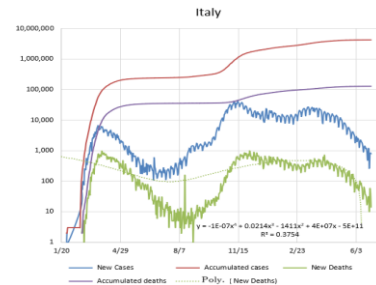


Classification 2: Countries with a converging trend

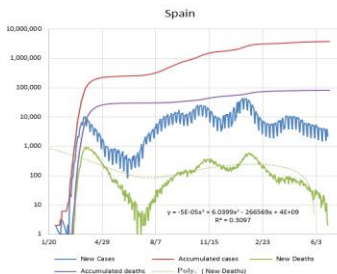
**Figure 4**  
*Germany*



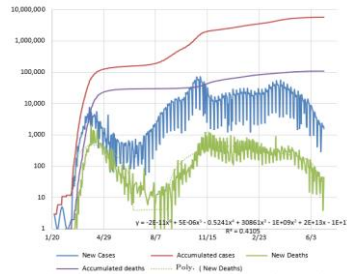
**Figure 5**  
*Italy*



**Figure 6**  
*Spain*

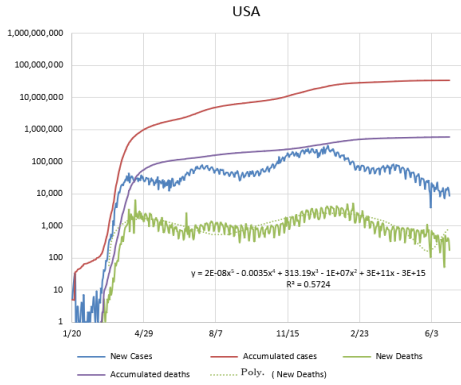


**Figure 7**  
*France*



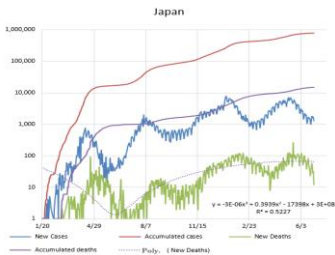
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**Figure 8**  
*United States of America*

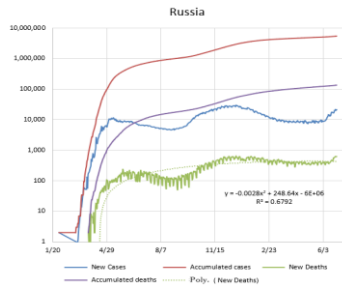


**Classification 3: Countries with a trend of infection**

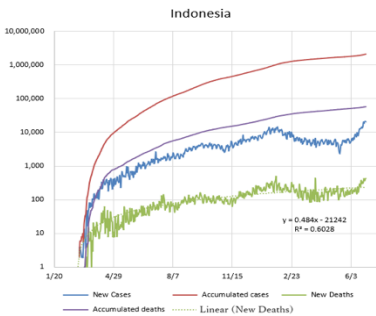
**Figure 9**  
*Japan*



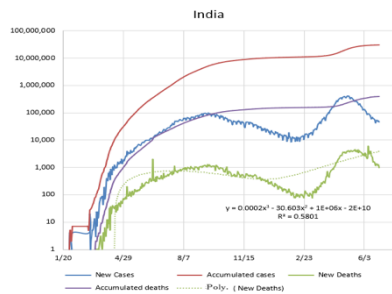
**Figure 10**  
*Russia*



**Figure 11**  
*Indonesia*

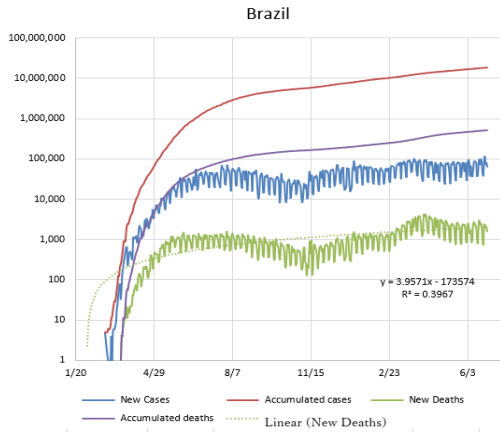


**Figure 12**  
*India*



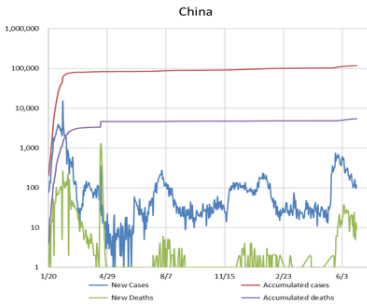


**Figure 13**  
*Brazil*

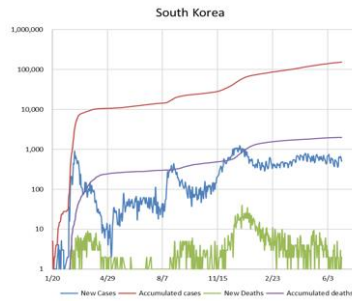


**Classification 4: Currently Uncategorized Countries**

**Figure 14**  
*China*



**Figure 15**  
*South Korea*



**Analysis of Data**

**Data and procedures**

The relationship between movement data and three of the four categories was examined: countries that have converged but are headed for a resurgence, countries with a trend of infection, and countries with a converging trend. Apple's open data on human movement and WHO's data on the number of infected people,

deaths, and vaccinations are integrated by date and used in the analysis. The data is based on the movement of iPhone users, where “Driving” is for car movement, “Transit” is for public transportation, and “Walking” is for movement by foot. Furthermore, “people vaccinated” is the number of people who have been vaccinated at least once, and “people\_fully\_vaccinated” is the number of people who are fully vaccinated (i.e., have received two doses of the required vaccine).

### *Association with Movement Data*

For the UK, which has converged but is headed for resurgence, we correlated movement data with data on the number of infected people, etc. As of July 2021, 49% of people in the UK had received two doses of vaccine, and 66% had received at least one dose. As shown in the previous section, as vaccination progressed, the number of infections and deaths in the UK continued to decline for six months after January 2021, but the infection began to spread after mid-to-late June. Looking at the correlation with movement data, there was a high positive correlation between movement data and vaccination, and a negative correlation with new deaths and positive rates [Table1, Table2].

The chart of UK [Figure 16] deaths and movement data shows that deaths tended to increase after movement increased until January 2021 and decrease when movement decreased. However, from February 2021 until now, there has been no increase in the number of deaths even as human movement has increased. Although the number of infected people is beginning to increase again, the reason why the number of deaths has not increased may be due to the vaccine preventing serious illness.

**Table 1**  
UK, Correlation coefficient

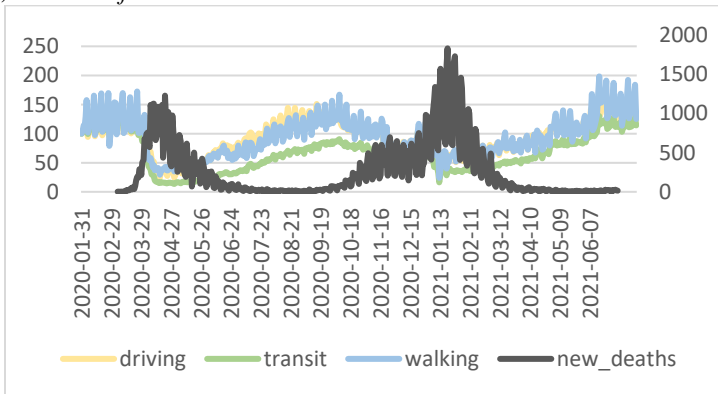
	driving	transit	walking	new_cases	new_deaths	positive_rate	people_vaccinated	people_fully_vaccinated
driving	1							
transit	.858**	1						
walking	.916**	.923**	1					
new_cases	-.100*	-.07	-.055	1				
new_deaths	-.587**	-.465**	-.486**	.569**	1			
positive_rate	-.456**	-.337**	-.361**	.391**	.639**	1		
people_vaccinated	.837**	.852**	.775**	-.683**	-.797**	-.805**	1	.853**
people_fully_vaccinated	.916**	.972**	.876**	-.265**	-.543**	-.417**	.853**	1

\*\* Correlation coefficient significant at the 1% level (double-sided)

**Table2**  
UK, Mean and standard deviation

	M	SD	N
driving	93.16	28.66	536
transit	65.00	30.71	536
walking	93.81	32.89	536
new_cases	9443.70	12732.25	521
new_deaths	264.37	358.55	486
positive_rate	0.04	0.05	450
people_vaccinated	27106819.28	12892293.29	178
people_fully_vaccinated	11361915.07	11661911.08	174

**Figure 16**  
UK, Number of deaths and movement



Germany is one of the countries with a converging trend. As of July 2021, 38% of people in Germany had completed two doses of vaccine, and 60% had taken at least one dose. Looking at the correlation with movement data, there was a high positive correlation between movement data and vaccination, and a negative correlation with new deaths and positive rates. Similar to the UK, there was a trend of increased deaths after increased movement until January 2021, with a trend of decreased deaths once movement decreased. However, between February 2021 until now, no increase in deaths has occurred even when human movement increases. Other countries with converging trends besides Germany showed the exact same trend. In other words, the lifting of restrictions since February 2021 has not led to an increase in the number of deaths [Table3, Table4, Figure 17].

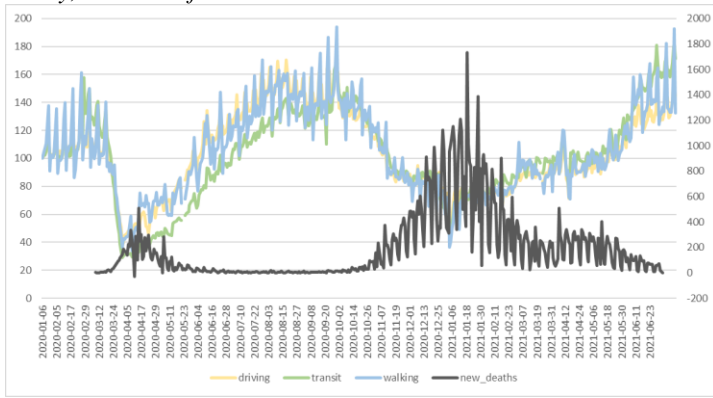
**Table 3**  
*Germany, Correlation coefficient*

	driving	transit	walking	new_cases	new_deaths	positive_rate	people_vaccinated	people_fully_vaccinated
driving	1							
transit	.864**	1						
walking	.942**	.890**	1					
new_cases	-.384**	-.208**	-.353**	1				
new_deaths	-.542**	-.407**	-.525**	.614**	1			
positive_rate	-.687**	-.419**	-.627**	.649**	.701**	1		
people_vaccinated	.909**	.898**	.862**	-.416**	-.575**	-.616**	1	
people_fully_vaccinated	.926**	.947**	.898**	-.486**	-.525**	-.734**	.937**	1

**Table 4**  
*Germany, Mean and standard deviation*

	M	SD	N
driving	104.12	29.40	536
transit	101.35	32.49	536
walking	104.72	30.92	536
new_cases	7120.90	8975.63	525
new_deaths	188.49	261.45	483
positive_rate	0.06	0.04	68
people_vaccinated	16180047.01	15230519.87	187
people_fully_vaccinated_p	8.66	10.02	187

**Figure 17**  
Germany, Number of deaths and movement



For Japan, which shows seasonal variation but no convergence, the correlation between movement data and data such as the number of infected people was also examined. As of July 2021, 12.65% of people in Japan had completed two doses of vaccine and 35% had taken at least one dose.

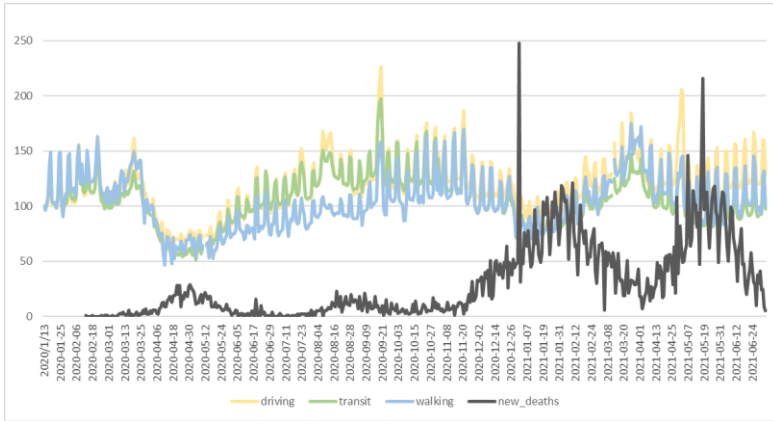
**Table 5**  
Japan, Correlation coefficient

	driving	transit	walking	new_cases	new_deaths	positive_rate	people_vaccinated	people_fully_vaccinated
driving	1							
transit	.878**	1						
walking	.848**	.767**	1					
new_cases	.124**	-.151**	0.055	1				
new_deaths	-0.037	-.326**	-0.056	.687**	1			
positive_rate	-.191**	-.224**	-0.056	.204**	0.024	1		
people_vaccinated	-0.071	-.314**	-.298**	-.283**	-0.029	-.361**	1	
people_fully_vaccinated	-0.115	-.313**	-.329**	-.434**	-0.093	-.512**	.977**	1

**Table 6**  
Japan, Mean and standard deviation

	M	SD	N
driving	118.60	25.14	536
transit	106.53	23.60	536
walking	104.13	24.66	536
new_cases	1525.86	1754.41	529
new_deaths	29.12	33.98	508
positive_rate	0.05	0.03	506
people_vaccinated	7778712.51	9321795.45	118
people_fully_vaccinated	3500027.96	4280531.84	104

**Figure 18**  
*Japan, Number of deaths and movement*



Looking at the chart of deaths and movement data, Japan, like the UK and Germany, shows an increase in deaths after increased movement, and a decrease in deaths once movement decreases. The difference between Japan and the converging countries is that the cycle repeats itself even after January 2021, with deaths increasing as human movement increases [Table3, Table4, Figure 17].

### PCR Tests and Vaccines

Countries that have not experienced an increase in deaths since February 2021, including countries with resurgence, may have a high number of PCR tests and a high vaccination rate. In the UK and Israel, vaccination started in December 2020, and in the UK, 0.5% of the population (1 in 200) had received two doses of vaccine as of January 10, 2021. In July 2021, 7 months have passed since vaccination with the effects possibly having decreased. Vaccines have two effects: prevention of infection and of serious illness. Although the effect of preventing infection

has been decreasing, there has been no significant increase in the number of deaths, possibly due to serious illness being prevented.

As with vaccination, the prevalence of PCR testing also varied among countries. In countries such as the U.K., Israel, and the U.S., PCR testing was available free of charge with as many times as needed, but in some countries such as Japan, public free PCR testing was not widespread, and testing did not become popular due to the high cost of taking it at one's own expense.

Table 7 shows the vaccination rate and the number of PCR tests per 1000 people. There was a correlation between the vaccination rate and the number of PCR tests ( $R=0.68$ ), one between the number of deaths per million people and the vaccination rate ( $R=0.52$ ), and another between the number of deaths per million people and the number of PCR tests ( $R=0.73$ ). The table shows that more than 50% of the population has been vaccinated in both countries that have converged but are headed for resurgence and countries with converging trends, and more than 1,000 times per 1,000 people, or every citizen, has received more than one PCR test except for Germany. In the UK, there were 3374 PCR tests per 1000 people, or more than three per person.

On the other hand, the vaccination rate in countries with a surging trend is approaching 50%, with Brazil at 45% and other countries such as Japan and India having low progress in vaccination. Furthermore, Russia has reached the level of once per person for PCR testing, while Japan, Brazil, and Indonesia have not even reached the level of once per five people. Assuming that people infected receive multiple PCR tests before they are cured, it means that the majority of people, other than those with symptoms, did not receive the test.

**Table 7**

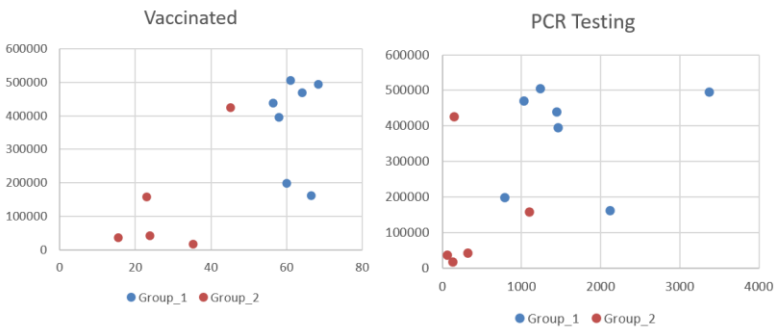
*The vaccination rate and the number of PCR tests (per 1000 people), Total death (per million people)*

location	Vaccinated(%)	PCR Testing	Total_deaths per million
United Kingdom	68	3374	494136
Israel	66	2121	162407
Spain	64	1027	469774
Italy	61	1238	505676
Germany	60	785	198204
France	58	1462	395255
United States	56	1445	438777
Brazil	45	149	425330
Japan	35	132	16530
India	24	323	41966
Russia	23	1096	156997
Indonesia	16	58	35561

To visualize, figure 19 shows a scatter plot was created with Group1 representing countries with a converging trend including resurgence and Group2 representing countries with a surging trend. The scatter plot shows that countries in Group1 have frequent PCR tests and a high vaccination rate, while countries in Group2 have fewer PCR tests and a low vaccination rate.

**Figure 19**

*The vaccination and the number of PCR tests*





## Conclusion

From the trends of people infected, the systematized data into four categories was according to the trend of convergence and surges. Analysis of movement data (car/public transport/walking) and COVID-19 deaths showed that all countries repeated the cycle of increasing deaths as human movement increased until January 2021. The UK and Israel, where the number of infected people has re-emerged, were included in the converging countries because they did not experience a significant increase in the number of deaths, and the differences between converging and surging countries were examined. We found that the difference between converging and non-converging countries is whether or not the cycle repeats itself after February 2021. Converging countries did not experience a significant increase in deaths after February 2021, even though human movement increased. Surging countries continued the cycle of increased deaths with increased movement. It was inferred that vaccination and PCR testing contributed significantly to this.

Coronaviruses mutate repeatedly in a short period of time. Even in the UK and Israel, where vaccination progressed at an early stage, the spread of vaccination alone was insufficient as a countermeasure since the increased movement of people without masks resulted in the reemergence of infected people due to the effects of the highly infectious Delta variant. While high numbers of infected people were observed around 2020 in France, Italy, Germany, and other countries, thorough PCR testing and vaccination have prevented a significant increase in the number of people infected and deaths since February 2021.

Based on these facts, it was assumed that the COVID-19 crisis will be brought under control even if human movement increases by continuing to wear masks and maintain social distance as before on top of thorough PCR testing and vaccination.

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