

Introduction

The Covid-19 pandemic started in late 2019 in or near Wuhan, China, when a virus that was most likely endemic to bats infected one or more humans and subsequently moved from person to person. The lack of hard information prevents assurance, and the knowledge gaps are unlikely to be filled at this time. By the way, The World Health Organization (WHO) was notified of cases of pneumonia in Wuhan, China, with no known cause on December 31, 2019, marking the first official cases of COVID-19. China's authorities identified a novel coronavirus, 2019-nCoV, as the cause of these illnesses on January 7th. On the 30th of January 2020, the World Health Organization (WHO) proclaimed the fast-expanding COVID-19 outbreak a Public Health Emergency of International Concern. The coronavirus disease pandemic of 2019 (COVID-19) is currently regarded as one of the most serious worldwide hazards, posing a threat not only to public health and well-being, but also to global economic and social stability. The first two decades of the third millennium were marked by catastrophe, most notably the global financial crisis of 2008 and the threat of climate change. The public's perception of the disease's risks differed; some saw it simply as "a worse influenza," while others drew comparisons with the catastrophic Spanish Flu pandemic of 1918–1920.

A number of public health and hygiene precautions have been implemented, the most visible of which being the use of face masks. The use of a mask can help in reducing the risk of virus and germ transmission into the human body. In Thailand, the first Covid-19 wave claimed the lives of 759 people in April 2021. The overview of the epidemic, according to information from the Center for Epidemic Situation Administration of Coronavirus Disease 2019 on May 22, 2021, still needs to be actively watched. Following the discovery of 3,052 new cases of COVID-19, divided as 2,447 new cases and 605 cases in prison, Thailand now has a total of 126,118 confirmed cases. It has expanded to the point where you will see individuals wearing masks wherever you go nowadays. Because it is one of the most effective ways to protect yourself. The use of face mask has gradually gained acceptance in the scientific community, if for no other reason than the application of the "precautionary principle" in the face of a critical crisis. The goal of this research is to discuss about the relationship of face masks and COVID-19, the demand and supply of face mask and the use of face masks in their nations and to provide their personal perspectives as well as those of their social context. To stop the spread of the coronavirus disease 2019 (COVID-19) pandemic, face masks are advised as part of personal protective equipment and as a public health intervention. Their use is

intricately linked to social and cultural traditions, and they have taken on a variety of personal and social connotations.

The purpose of this article is to examine the range of sociocultural, ethical, and political connotations ascribed to face masks, as well as how these meanings may influence public health policies. However, in a circumstance where people must protect themselves, masks are in short supply in big retail malls. Stores selling basic mask supplies in Bangkok's central business district are required to post signs on their shelves informing both Thai and foreign tourists that they are now out of supply, even though many nearby stores have just put them on the market. Earlier, the deputy director general of the Department of Internal Trade came out to give an interview about a mask that was missing from the market, insisting that the number of sanitary masks in Thailand is sufficient to meet the needs of the people, regardless of whether they are manufactured in Thailand with sufficient raw materials, at 7 to 8 million units per month, which will increase production by 50%. Importers of sanitary masks are still getting enough supplies from abroad. Despite the fact that China still has an unique coronavirus pneumonia problem, they are able to get sufficient supplies from other nations, including manufacturing and import, at a rate of 30 million units per month, which is enough to meet the people's demand. Despite the fact that the authorities have stated that masks will suit people's demands, there are other issues associated with the strong demand for masks. As a result of the lack of marketplaces, prices have risen drastically. When comparing 2020–2021, the number of searches for sanitary masks increased by up to 690 percent, indicating a high demand for the market that is not being addressed adequately by currently available items. Hand sanitizers, like sanitary masks, are in high demand, resulting in skyrocketing prices. Portable hand sanitizers, which are almost out of the market at the moment, have seen a 6,110 percent increase in searches and costs over the same period last year.

Literature Reviews

This research focuses on the relationship of mobility, mask purchase and infected numbers of COVID-19, which is one of the major concerns of people nowadays. There are many related researches to COVID-19 in Thailand, which can be separated into main 3 categories;

1. Literature related to Infected Covid-19 case in Thailand and other countries
 - Tangcharoensathien, V., Bassett, M., Meng, Q., & Mills, A. (2021) did the study on the international experience about health systems and an inevitable consequence of covid-19. They compared the policy between China, New York, and Thailand,

and it shows the consequent of strict policy in Thailand and China that can cope with Covid-19 well. On the other hand, New York has many infected cases. The lessons learned in these three settings reveal that effective pandemic management requires timely and precise policy decisions, effective and sufficiently funded public health and social measures, and citizen trust and adherence to these policies.

- Nouvellet (2021) considered that while COVID19 develop into a community health disaster the international position in the eternal life in January 2020, many countries have imposed several measures to prevent the infection of Coronavirus. Social-distancing, case isolation, and shielding had been widely used to limit community-degree transmission of COVID-19 and protect weak forms of citizens which include senior citizens or lung troubles patients.
 - Gunawan, J., Aungsuroch, Y., & Marzilli, C. (2020) mentioned about how Covid changes their life. COVID-19 has introduced lots of new features, both positive and negative, or yin and yang in nature. Humans should take note of this situation and use their imagination to come up with creative solutions to adapt to the new reality.
 - Triukose, S., Nitinawarat, S., Satian, P., Somboonsavatdee, A., Chotikarn, P., & Thammasanya, T. et al. (2021) studied about the effects of public health interventions on the first wave of the COVID-19 outbreak in Thailand. And they found that Thailand was one of the first countries outside of China to discover cases of COVID-19. Despite this, Thailand was able to complete the first wave of the COVID-19 outbreak in less than six months, with 3,072 (about 96.15 percent) of the 3,195 infected patients, including stage quarantine cases, being recovered.
2. Literature related to the surgical mask that relate with Covid-19
- Ethisan, P., Kumar, R., Seerani, N., & Somrongthong, R. (2021). According to the research, the elderly who used masks during Covid-19 in Thailand were more influenced by where they lived, their education level, their occupation, and their perceived risk of infection. However, by addressing these variables at the population level, mask use among this demographic could be increased.
 - Tran (2021) indicated about the reduction in overall killings and viruses developed with masks efficacy and accessibility. Strategies to distribute a restrained deliver of mask, which includes (1) random distribution throughout the populace, (2) prioritized distribution to the aged, (3) distribution to each the aged and detected instances, and (4) distribution most effective to detected instances, even as masks resources last. Even restrained distribution of mask presenting most effective 25% safety and containment ought to bring about a substantial reduction; 10 different the population ought to bring about aware deaths.

- Toda (2020) mentioned that before vaccine was invented, people have been recommended and suggested to position on mask on every occasion they went out to public places, avoid traveling, and stay in an unmarred area. Medical advice was generally added that not unusual place mobility of people extended infected charge
 - Shruti, V., Pérez-Guevara, F., Elizalde-Martínez, I., & Kutralam-Muniasamy, G. (2020) considered the impact of reusable masks for COVID-19 to the global health crisis and the level of risk and possible significance of the environmental impact of reusable face masks in filling the knowledge gap during the global health crisis. As a result of the COVID-19 epidemic, face masks are becoming a basic requirement, there is a risk of increased environmental microplastic concentrations, and hence a higher risk of association, ingestion, and hazardous impacts across food webs.
 - Taylor, M., & Taylor, M. (2020) focused on country that tends to have the highest mask-wearing in survey of ASEAN-nation. And the result shows that Thais are most likely to wear face masks in public.
3. Other Literature related methodology
- Khalid, B., & Naumova, E. (2021) did the study about the wake of COVID-19, e-commerce and internet transactions have proven to be more important than ever which means that people tend to interested more in e-commerce or shopping online.
 - Haddawy, P., Lawpoolsri, S., Sa-ngamuang, C., Su Yin, M., Barkowsky, T., & Wiratsudakul, A. et al. (2021) look at the effects of the government's lockdown policy on a region with a low socioeconomic status, limited healthcare resources, and a significant level of cross-border travel. Individual mobility, particularly cross-border movement, was greatly reduced because of the lockdown. Because of the rapid recovery to normal mobility following the lockdown's relaxation, it's important to keep a close eye on the disease to avoid a second wave.

Research Gap

Due to the fact that COVID-19 is a new thing that does not have many research or paper about it yet. And most of research about it are not deep enough to interpret. This study tries to look at the recent data about COVID-19 in Thailand. And when I search, most of them is international data that did not relate to what I want to study. So, the range of this study is strict because the limitation of data availability. I must adapt and combined several aspects to get what I want to study.

Data & Research methods

i) Data

In this paper, I used the dataset that attached in bemoodle including Thailand Infected COVID-19 case and Apple Mobility index. Apart from that I also found the Medical and Personal Care from MOC (Ministry of Commerce) as a conventional indicator.

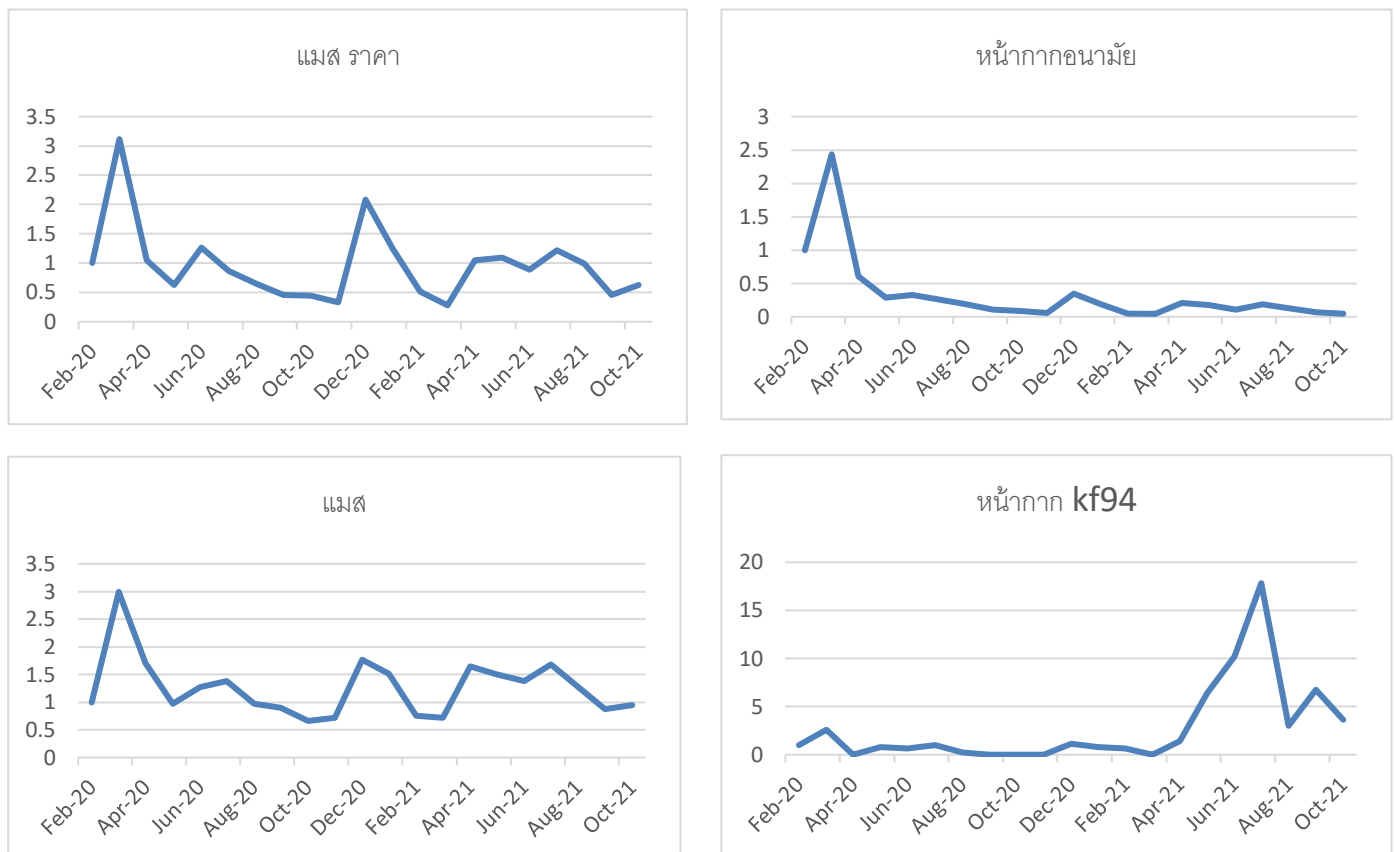
Table 1: General Data of Medical and Personal Care Purchase, Driving and Walking Index of Bangkok Residence during February 2020 to October 2021

Date	Infected COVID-19 case	Medical and Personal Care Purchase	Driving	Walking
Feb-20	13.00	100.01	102.90	105.60
Mar-20	953.00	100.12	66.91	89.03
Apr-20	545.00	99.95	38.74	20.66
May-20	29.00	100.26	60.88	32.28
Jun-20	44.00	99.94	86.42	47.92
Jul-20	45.00	100.15	104.31	57.05
Aug-20	31.00	99.99	103.34	59.49
Sep-20	96.00	100.01	96.81	58.22
Oct-20	104.00	100.07	87.95	59.26
Nov-20	98.00	100.29	87.38	62.45
Dec-20	340.00	100.26	77.94	54.69
Jan-21	806.00	100.73	47.61	36.39
Feb-21	363.00	100.57	71.79	45.54
Mar-21	1075.00	100.44	59.70	40.96
Apr-21	11243.00	100.85	65.75	43.25
May-21	41150.00	100.67	40.14	29.77
Jun-21	33331.00	101.11	49.72	36.55
Jul-21	72606.00	101.16	35.73	26.71
Aug-21	125540.00	100.89	33.07	23.68
Sep-21	84086.00	101.03	48.53	33.26
Oct-21	27819.00	100.97	87.94	40.60

Source: http://www.indexpr.moc.go.th/price_present/cpi/data/index_47_e.asp?list_mnth=01&list_year=2563&list_region=country

The findings show that there is a growing trend of infected COVID-19 cases from February 2020 to August 2021, then the rate starts to shrink while the medical and personal care purchase rate is rather stable in the range of 100-101. For mobility rate of walking and driving is fluctuated along the period.

Next, I used Google Trends data to see the relationship of face masks and COVID-19, which we picked four alternative indicators: “หน้ากากอนามัย”, “แมส”, “แมส ราคา”, and “แมส kf94”. I normalized alternative indicators to see the pattern or trend of each keyword.



Source: Google Trend

I notice the significant peak point of people searching for “หน้ากากอนามัย”, “แมส”, and “แมสราคา” in March 2020. This is related to the first wave of Covid-19 infection in Thailand that peaked on 22 March 2020 at 188 newly confirmed cases per day. So, people tend to purchase and search for face masks more to prevent the spread of Covid-19.

Apart from that, there is also a significant peak point for “เมส kf94” due to the low price and they are sell at many places which is easy for customer to buy. The line chart shows the rapidly increase around the spread of second wave (August 2021).

ii) Methodology

Excel and STATA are used to investigate the relationship between conventional and alternative indicators from google trends. Moreover, I used the regression analysis to find the relationship between conventional and alternative indicators. And to get graphs, r-squared, and p-value of all data, I ran all X and Y variables in STATA program.

Results analysis and discussion

i) Relationships between conventional and alternative indicators

Figure 1 : Relationship of Medical & Personal Care Purchase and Google Trends key words “หน้ากากอนามัย”, “เมส”, “เมสราคา”, and “เมส kf94”

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. reg medicalandpersonalcarepurchase หน้ากากkf94 เมส หน้ากากอนามัย เมสราคา
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Source	SS	df	MS	Number of obs	=	21
Model	.000219366	4	.000054842	F(4, 16)	=	6.28
Residual	.000139698	16	8.7311e-06	Prob > F	=	0.0031
Total	.000359064	20	.000017953	R-squared	=	0.6109
				Adj R-squared	=	0.5137
				Root MSE	=	.00295

medicaland~e	Coefficient	Std. err.	t	P> t	[95% conf. interval]
หน้ากากkf94	.0005927	.0001714	3.46	0.003	.0002294 .000956
เมส	.0025306	.0037701	0.67	0.512	-.0054617 .0105228
หน้ากากอนามัย	-.0035908	.0022107	-1.62	0.124	-.0082773 .0010956
เมสราคา	-.0007997	.0032587	-0.25	0.809	-.0077079 .0061085
_cons	1.001513	.0023325	429.36	0.000	.9965685 1.006458

From regression and coefficient analysis, it shows that there is relationship between Medical & Personal Care Purchase for all 4 keywords. However, the relationship between Medical & Personal Care Purchase and “เมสkf94” has shown significant level (P value <0.05) while the relationship between Medical & Personal Care Purchase and “เมส”, “หน้ากากอนามัย”, and “เมสราคา” has shown no significant level (P value >.05). It means that

Moreover, all four alternative indicators are some of the examples of people search clicks that looking to purchase or search for information of medical face masks which directly affect Medical & Personal Care Purchase. The relationship between conventional and all alternative indicators is quite high correlated (R-squared $\approx$ 60%).

Figure 2 : Relationship of Infected COVID-19 Case, and Google Trends key words “หน้ากากอนามัย”, “แมส”, “แมสราคา”, and “แมส kf94”

. reg infectedcovid19case หน้ากากkf94 แมส หน้ากากอนามัย แมสราคา

Source	SS	df	MS	Number of obs	=	21
Model	57193637.5	4	14298409.4	F(4, 16)	=	2.66
Residual	85878093.4	16	5367380.84	Prob > F	=	0.0707
				R-squared	=	0.3998
				Adj R-squared	=	0.2497
Total	143071731	20	7153586.55	Root MSE	=	2316.8

infectedcovid19case	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
หน้ากากkf94	363.5761	134.3801	2.71	0.016	78.70289	648.4492
แมส	-148.4013	2955.972	-0.05	0.961	-6414.783	6117.98
หน้ากากอนามัย	-948.0599	1733.286	-0.55	0.592	-4622.463	2726.343
แมสราคา	216.0194	2555.016	0.08	0.934	-5200.372	5632.411
_cons	749.9175	1828.846	0.41	0.687	-3127.062	4626.897

In figure 2, it shows that there is relationship between infected COVID-19 rate for all 4 keywords. There is only one variables that are statistically significant which is “แมส kf94” that has shown significant level (P value <0.05) while the relationship between infected COVID-19 and “แมส”, “หน้ากากอนามัย”, and “แมสราคา” has shown no significant level (P value >.05).

Moreover, all four alternative indicators are some of the examples of people search clicks that looking to purchase or search for information of medical face masks which directly affect infected COVID-19 case. The relationship between conventional and all alternative indicators is quite low correlated (R-squared $\approx$ 40%). It can be concluded that even though the number of infected cases is increase, but the click of face masks key word did not go in the same way as it should be. It shows that people awareness about wearing mask might not rely on the number of infected cases. Apart from that we can also say that the government policy about wearing face masks might not be impact enough.

Figure 3 : Relationship of Mobility Rate(driving) and Google Trends key words “หน้ากากอนามัย”, “แมส”, “แมสราคา”, and “แมส kf94”

. reg driving หน้ากากkf94 แมส หน้ากากอนามัย แมสราคา

Source	SS	df	MS	Number of obs	=	21
Model	.461449579	4	.115362395	F(4, 16)	=	3.02
Residual	.611092396	16	.038193275	Prob > F	=	0.0493
				R-squared	=	0.4302
				Adj R-squared	=	0.2878
Total	1.07254198	20	.053627099	Root MSE	=	.19543

driving	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
หน้ากากkf94	-.016849	.0113357	-1.49	0.157	-.0408795	.0071816
แมส	-.462198	.2493518	-1.85	0.082	-.9908003	.0664043
หน้ากากอนามัย	.1506034	.1462119	1.03	0.318	-.1593519	.4605586
แมสราคา	.2193751	.2155291	1.02	0.324	-.2375261	.6762763
_cons	1.043565	.1542728	6.76	0.000	.7165217	1.370609

Next, we will focus about the apple mobility (driving rate), none of the variable are significant (P value >.05), so it means that Google Trends might not give any predict or describe anything between Mobility Rate(driving) and Google Trends key words “หน้ากากอนามัย”, “แมส”, “แมสราคา”, and “แมส kf94”.

Apart from that the relationship between conventional and all alternative indicators is quite low correlated (R-squared $\approx$ 43%).

Figure 4 : Relationship of Mobility Rate(walking) and Google Trends key words “หน้ากากอนามัย”, “แมส”, “แมสราคา”, and “แมส kf94”

. reg walking หน้ากากkf94 แมส หน้ากากอนามัย แมสราคา

Source	SS	df	MS	Number of obs	=	21
Model	.528042044	4	.132010511	F(4, 16)	=	8.42
Residual	.250936533	16	.015683533	Prob > F	=	0.0007
				R-squared	=	0.6779
				Adj R-squared	=	0.5973
Total	.778978577	20	.038948929	Root MSE	=	.12523

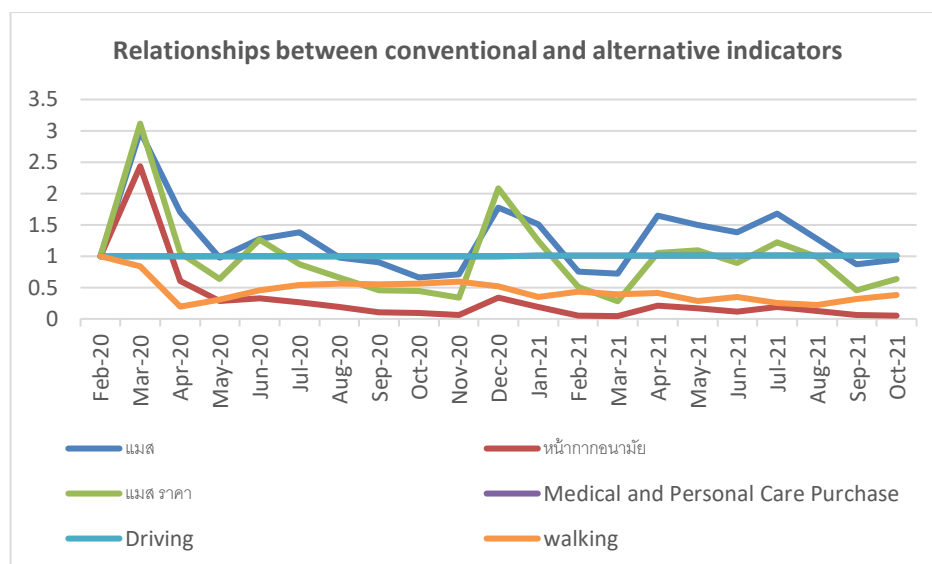
walking	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
หน้ากากkf94	-.0026255	.007264	-0.36	0.723	-.0180244	.0127735
แมส	-.4821208	.1597869	-3.02	0.008	-.8208538	-.1433878
หน้ากากอนามัย	.3620772	.0936938	3.86	0.001	.1634551	.5606993
แมสราคา	.229107	.1381129	1.66	0.117	-.0636793	.5218934
_cons	.7302532	.0988594	7.39	0.000	.5206807	.9398257

Lastly, figure 4, there is 2 variables that are statistically significant which is “แมส” and “หน้ากากอนามัย” that has shown significant level (P value <0.05) while the relationship between

Mobility Rate(walking) and, “แมส kf94” and “แมสราคา” has shown no significant level (P value >.05). This can be concluded that Google Trend has shown the relationship with Mobility Rate (walking).

Moreover, all four alternative indicators are some of the examples of people search clicks that looking to purchase or search for information of medical face masks which directly affect Mobility Rate(walking). The relationship between conventional and all alternative indicators is quite high correlated (R-squared $\approx$ 67%). So, people who walk tend to search for face mask more than people who drive.

ii) Key findings from these relationships



For the Key finding, since the result of this stata tend to be highly correlated at R square = 0.67/67%, I assume that I can use this search term in google trends to help predicted the number of face masks or the demand of the face mask. For example, it shows that people tends to search for face mask more on the situation that they think the number of products will be insufficient like first wave of Covid-19. However, in the second wave, face mask in the market is enough or we can say that demand and supply is go in the same direction. People do not have to afraid about face mask out of stock anymore, so the search trend is not as peaked as the first wave.

iii) Limitations of using these data/ methods

This study only observes the data of Bangkok residence in the past 21 months. It may not represent the overview picture of Thailand measure and situation.

Conclusion and Policy Recommendation

i) Policy Recommendation

COVID-19 pandemic is recovering in Bangkok and in Thailand after the vaccinated rate reaches 50%. Government releases a mild measure for COVID-19 protection so business and life styles of people are resuming to what it is before the pandemic. However, the personal protection measure such as face masks should be remained because it shows that it is the effective way to protect communicable disease. In addition, to achieve the better protection, mobility of people should be in cautious manner as it is also proved that social distancing and low mobility of people can prevent the communicable disease. It is confirmed that COVID-19 can be diverted into many sub-disease, until the world reaches the curable pill, then everybody may be safe from this communicable disease. So, government should support in:

Provide free face mask in the public or tourist spot since the poverty problem in Thailand is still occur more and more, so there are many people who can't afford face mask. Moreover, the fake face masks are also one of the problems that might cause an increased number of COVID-19 case. Government should provide proper face masks in several spot for people who can't afford it. If they concerned about cheating, I would recommend them to set the limitation of each people and have staffs check in each spot.

In the future if we have good vaccination that can protect the spread of the COVID-19 in the highly efficient rate, I think we should follow developed country like USA that allow people to wear mask only in the closed area if you are fully vaccinated. However, to do this policy, government must make sure that the vaccine that they use are efficient enough. This policy can reduce the waste that might come from old face masks.

iv) Conclusions

This study exhibits the relationship of infected COVID-19 people and other preventive measures and manners to avoid being infected. From literature review, other than vaccination, there are two effective measure to prevent this pandemic spread; they are wearing protective tool such as surgical mask or face mask and keeping distance from other people. The data analysis of this study proves that medical and personal care purchase soars when the infected rate increases at significant level. However, the mobility rate also has a divert relationship with infected rate but in this study, they are not significantly related.

Moreover, these results of this study can be beneficial for government, masks seller, and wholesaler to predict the behavior of their customers. The main key finding of the relationship between conventional data and alternative data shown that Google Trend can use to predict the trend and many situations. I found that the clicks of search for face masks key words are correlated to the situation that happened in that time and the activity they do each day such as walking and driving. Lastly, we found that even the number of COVID-19 infected has risen, but the number of click for face mask is go opposite way. It might happen because of the government policy is not strict enough to make people intend to wear it.

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Appendix1: Figures

Figure1: The number of searches for the word “หน้ากากอนามัย” on priceza.com



Figure2: The figure show that Thais are most likely to wear facemasks in ASEAN-nation

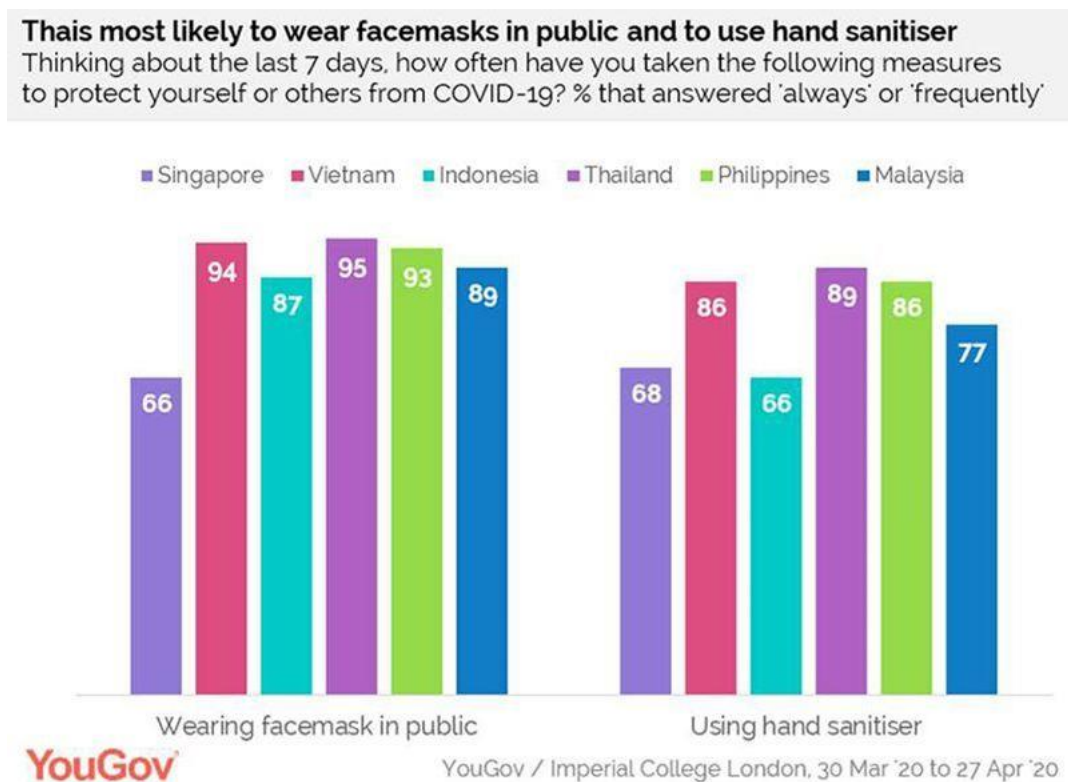


Figure3: The number of actual cases versus the number of cases in the model

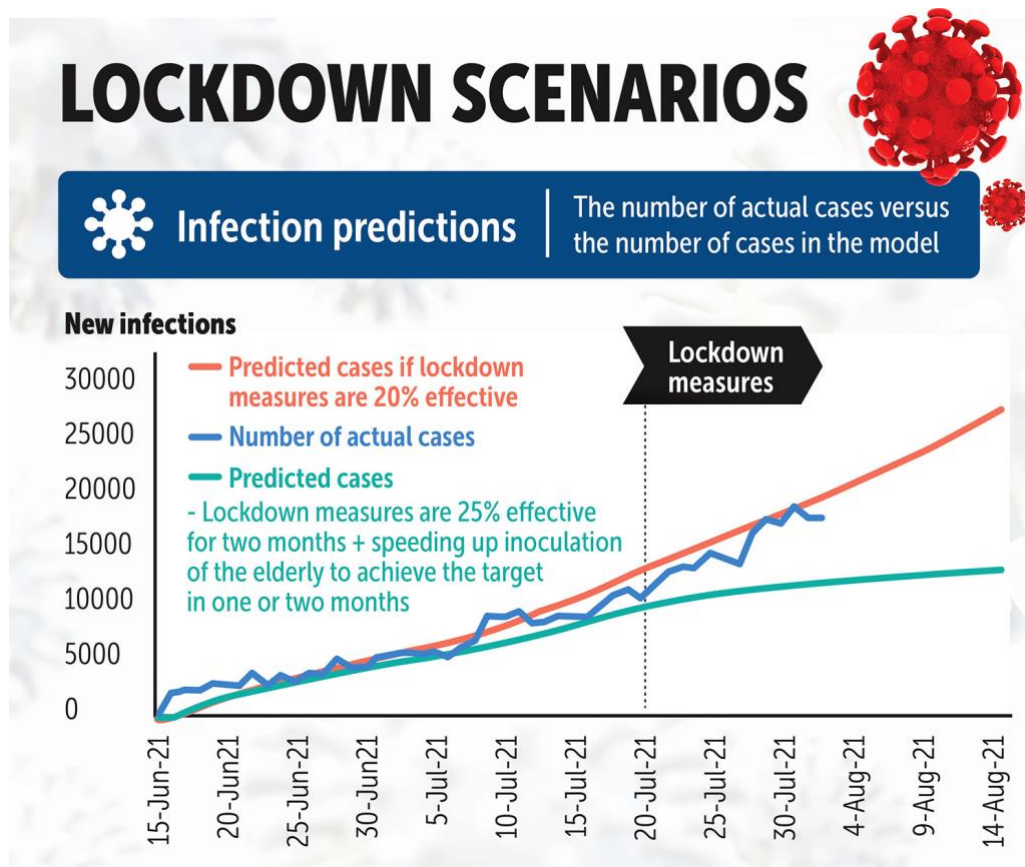
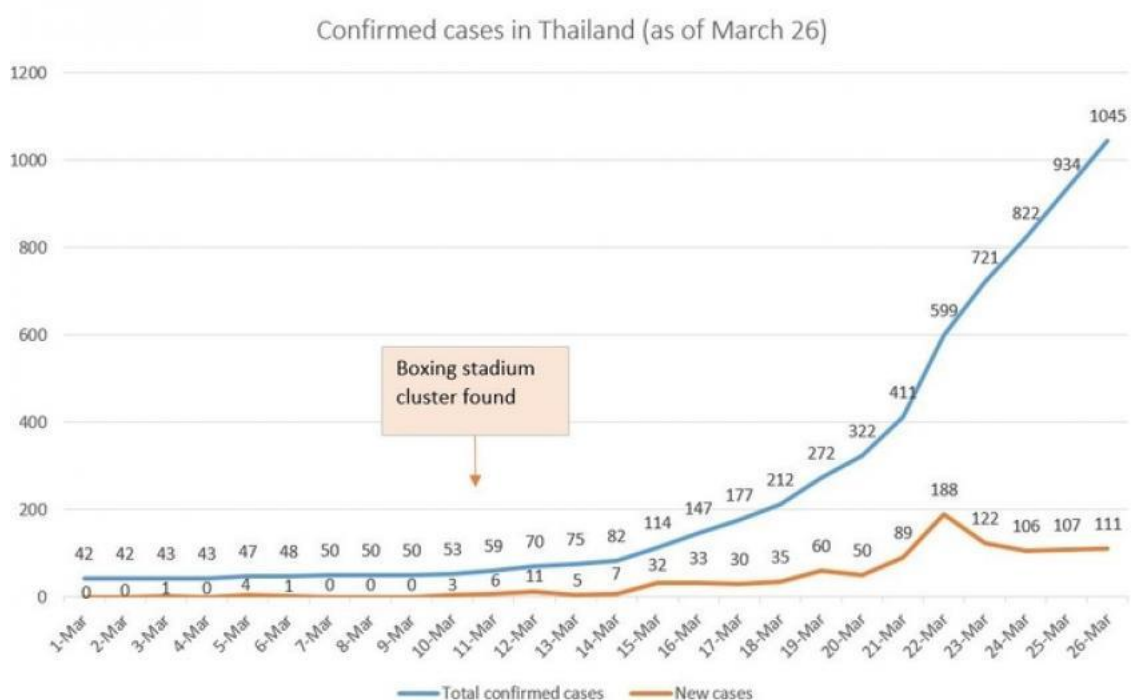


Figure4: The number of confirmed cases of COVID-19 in Thailand



Source: Ministry of Public Health