Name: Jiawei Lu

COVID-19 pandemic

~What measures should countries take to stop it?~

INTRODUCTION

The COVID−19 pandemic, also known as the coronavirus pandemic, is an ongoing global pandemic of coronavirus disease 2019 (COVID−19), caused by severe acute respiratory syndrome coronavirus 2 (SARS−CoV−2).The outbreak was first identified in December 2019 in Wuhan, China.The World Health Organization declared the outbreak a Public Health Emergency of International Concern on 30 January 2020 and a pandemic on 11 March.As of 3 August 2020, more than 18.1 million cases of COVID−19 have been reported in more than 188 countries and territories, resulting in more than 691,000 deaths; more than 10.8 million people have recovered.

The virus is primarily spread between people during close contact, most often via small droplets produced by coughing, sneezing, and talking. The droplets usually fall to the ground or onto surfaces rather than travelling through air over long distances. However, the transmission may also occur through smaller droplets that are able to stay suspended in the air for longer periods of time in enclosed spaces, as typical for airborne diseases. Less commonly, people may become infected by touching a contaminated surface and then touching their face. It is most contagious during the first three days after the onset of symptoms, although spread is possible before symptoms appear, and from people who do not show symptoms.

Common symptoms include fever, cough, fatigue, shortness of breath, and loss of sense of smell. Complications may include pneumonia and acute respiratory distress syndrome. The time from exposure to onset of symptoms is typically around five days but may range from two to fourteen days. There is no known vaccine or specific antiviral treatment. Primary treatment is symptomatic and supportive therapy.

Recommended preventive measures include hand washing, covering one's mouth when coughing, maintaining distance from other people, wearing a face mask in public settings, disinfecting surfaces, increasing ventilation and air filtration indoors, and monitoring and self-isolation for people who suspect they are infected. Authorities worldwide have responded by implementing travel restrictions, lockdowns, workplace

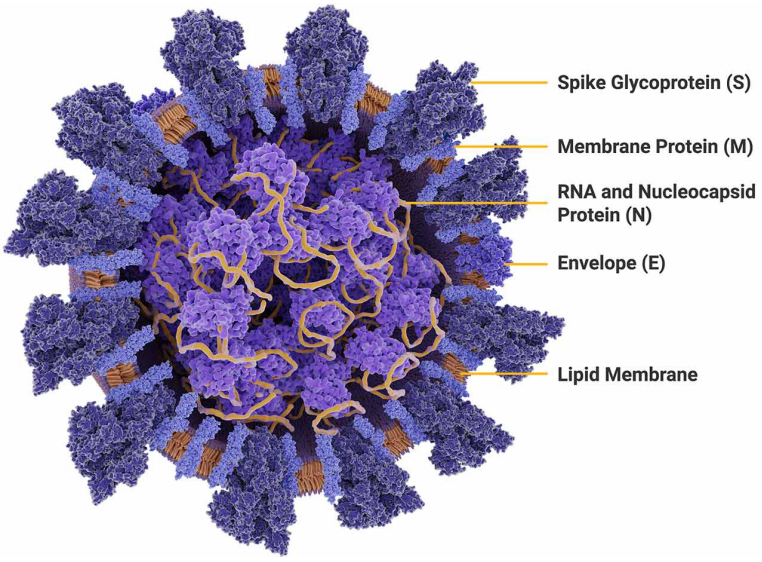
hazard controls, and facility closures in order to slow the spread of the disease. Many places have also worked to increase testing capacity and trace contacts of infected persons.

The pandemic has caused global social and economic disruption, including the largest global recession since the Great Depression and global famines affecting 265 million people. It has led to the postponement or cancellation of sporting, religious, political, and cultural events, widespread supply shortages exacerbated by panic buying, and decreased emissions of pollutants and greenhouse gases. Schools, universities, and colleges have been closed either on a nationwide or local basis in 161 countries, affecting approximately 98.6 percent of the world's student population. Misinformation about the virus has circulated through social media and mass media. There have been incidents of xenophobia and discrimination against Chinese people and against those perceived as being Chinese or as being from areas with high infection rates.

Structural biology

According to the Wikipedia, each SARS-CoV-2 virion is 50–200 nanometres in diameter. Like other coronaviruses, SARS-CoV-2 has four structural proteins, known as the S (spike), E (envelope), M (membrane), and N (nucleocapsid) proteins; the N protein holds the RNA genome, and the S, E, and M proteins together create the viral envelope. The spike protein, which has been imaged at the atomic level using cryogenic electron microscopy, is the protein responsible for allowing the virus to attach to and fuse with the membrane of a host cell; specifically, its S1 subunit catalyzes attachment, the S2 subunit fusion.

Protein modeling experiments on the spike protein of the virus soon suggested that SARS-CoV-2 has sufficient affinity to the receptor angiotensin converting enzyme 2 (ACE2) on human cells to use them as a mechanism of cell entry. By 22 January 2020, a group in China working with the full virus genome and a group in the United States using reverse genetics methods independently and experimentally demonstrated that ACE2 could act as the receptor for



SARS-CoV-2. Studies have shown that SARS-CoV-2 has a higher affinity to human ACE2 than the original SARS virus strain. SARS-CoV-2 may also use basigin to assist in cell entry.

MEASURES IN DIFFERENT COUNTRIES AGAIN COVID

(1) Coronavirus Travel Restrictions

According to The New York Times, Nations across the world have imposed travel restrictions to curb the spread of the coronavirus.In recent weeks, many countries around the world, including the United States, have imposed travel restrictions to help curb the spread of the coronavirus. Airport closures, the suspension of all incoming and outgoing flights, and nationwide lockdowns are just some of the measures countries are adopting in an effort to help contain the pandemic.On March 19, the State Department issued a Level 4 "do not travel" advisory, recommending that United States citizens avoid any global travel. This is the highest travel advisory the federal agency can issue. During the same week, the European Union instituted a 30-day ban on nonessential travel to at least 26 European countries from the rest of the world.At least 93 percent of the global population now lives in countries with coronavirus-related travel restrictions, with approximately 3 billion people residing in countries enforcing complete border closures to foreigners.

China's foreign ministry announced on March 26 that it was suspending practically all entry to the country by foreigners and was halting almost all international passenger flights as well. Foreign residents of China and foreigners with previously issued visas would no longer be allowed to enter the country as of midnight March 27.

The Civil Aviation Administration of China issued a separate announcement ordering that each domestic or foreign airline only operate a single passenger flight into China each week until further notice. All travelers who enter China will be screened on arrival and are subject to a 14-day quarantine.

On April 1, Japan broadened its ban on foreign travelers who had visited a list of at least 76 countries and regions, including the United States and Canada, during the previous 14 days. The list of countries and additional requirements for quarantine and testing were posted on the Japanese National Tourism Organization's website.

As of March 15, Japan has banned entry to foreign travelers with Chinese passports issued by Hubei and Zhejiang provinces, as well as

those who have visited regions in China that have been affected by the virus, South Korea, Iran or Italy within the last 14 days.

The United Kingdom has not implemented any entry restrictions, but it is "advising against "all but essential travel to some countries, cities and regions," the country's Foreign and Commonwealth Office said. On March 14, President Trump expanded the travel ban on foreign nationals to the United Kingdom.

Officials in the United Kingdom are also monitoring direct flights into the country from certain areas, according to the U.S. Embassy, and informing incoming passengers about how to report any symptoms.

(2) Herd Immunity

Among the developed country, Sweden is the only country which has deliberately chosen a strategy of fostering herd immunity, by not implementing drastic lockdown or social distancing. The death rate of COVID in Sweden, however, is so high compared to the neighboring countries, Norway and Denmark that the criticism is mounting inside the country against the government."

Sweden believe that For ordinary epidemics like seasonal influenza, acquiring herd immunity is normally the most effective way to contain and eradicate the disease. The spread of an epidemic will end only when enough percentage of population acquire immunity.

Also, United Kingdom is a secondary country that acquired herd immunity until Mar 23.We can observe the high increasing rate after Mar 23 in Table3 and caused highest dead on 30 April.

(3)Lockdowns

According to DW News, the British government ordered a lockdown on March 23, limiting people to trips outside the home solely for grocery shopping, medical needs and traveling to work if working from home is not an option.

Social gatherings and meeting up in crowds have been banned. One form of solitary exercise is permitted such as running or riding a bicycle. Police will be enforcing the lockdown measures, but people are not required to bring papers with them when they go outside to justify their reason for leaving the house.

The French government announced a strict nationwide lockdown on March 17, banning all public gatherings and telling residents to stay inside except for grocery shopping and other essential tasks.

Along with closing all non-essential shops, open-air markets have been ordered to shut. People in France are also required to fill out a form stating their reason for leaving the house.

Outdoor exercise is only permitted once a day and must be done alone and not exceed one hour. Families are allowed to take walks, but must remain within 1 kilometer (0.6 miles) of their homes. Walking the dog is allowed, although owners must now write down what time they left to make sure it's within the hour-limit.Those breaching lockdown rules could face fines between €135 to €3,700 as well as up to six months in prison for multiple violations.

Unlike other European countries, Germany has so far stopped short of ordering its over 80 million population to remain at home — instead opting for strict social distancing measures which were issued on March 22.

Public gatherings of more than two people are banned, except for families and those who live together. Restaurants have been told to close unless they offer food delivery and pick-up. Hair salons and tattoo parlors have joined the list of non-essential shops that have been told to shut. Exercising alone outside is still allowed, albeit with at least a 1.5-meter distance between others.

The federal government of the United States imposed guidelines and recommendations regarding the closure of schools and public meeting places, lockdowns, and other restrictions intended to slow the progression of the virus, which state, territorial, tribal, and local governments have followed.

On 23 January 2020, the central government of China imposed a lockdown in Wuhan and other cities in Hubei in an effort to quarantine the center of an outbreak of coronavirus disease 2019 (COVID-19); this action is commonly referred to as the "Wuhan lockdown".

On 7 April, the Japanese government proclaimed a one-month state of emergency for Tokyo and the prefectures of Kanagawa, Saitama, Chiba, Osaka, Hyogo, and Fukuoka. On 16 April, the declaration was extended to the rest of the country for an indefinite period. The state of emergency was lifted in an increasing number of prefectures during May, extending to the whole country by 25 May.

Discussion

First of all, Deaths per 1 million population statistics in countries is an important data to know the impact of COVID-19 in different countries.

According to Table 1 UK has high ranking in Deaths per 1 million population and Deaths.

The reason that herd immunity was failed in UK is the approximately 23 times population density and 6 times population in United Kingdom compared to the Sweden.Same as other countries, which have high population density or population should not acquire herd immunity, because the number of new cases and deaths will grow very fast and hard to control.

So, some argued that “there is a major problem in leaving the entire population exposed to the virus unhindered because a catastrophic outbreak may happen, necessitating hospitalization of such a high number of people that the hospital system will be overwhelmed.”

But I think that it is important if herd immunity can also prevent second wave, because in fact, the Second Wave of the 1918 Spanish Flu was much more deadly than the first wave.

There were two waves of infection in 1918 and the second wave was much more deadly. Apparently, the virus experienced a mutation in the course of transmission from America to Europe and then back to America from Europe. Whereas the theater of the great war was limited in the continental Europe, only small parts of the world were spared from the devastation caused by the Great Influenza Pandemic.

I find that the Sweden have successfully control the new infection case of COVID-19 by the policy of Herd Immunity, in Table 1-4. Although the data has a high volatility , the new case increasing have fallen into the lowest since the beginning of decease, dispute ranking at 7 on Deaths per 1 million population.

Table1-6 is the Compartmental models in epidemiology known as SIR model, in this prospect, Table 1-4 and Table 1-5 show that the Covid-19 is coming into the ending stage in Sweden, if the policy of herd immunity can prevent second wave of infection in sure.

A persuasive reason that caused the high Deaths per 1 million population in developed countries is the paper, Robert J. Barro (2020) “Another force—apparently only partly offsetting—is that more advanced economies are likely to have greater mobility and interactions, which foster spread of contagious disease”.Europe countries have higher mobilities than other developed counties from the beginning to the lockdown , because of the property of the Federation of different European countries.

Even though The first human cases of COVID- 19 were identified in Wuhan, China, because of the high ethnic stereotype and lockdown policies, successfully preventing the infection.

Same as China, Japan have low infection too, the high ethnic stereotype and complying with lockdown policies, successfully preventing the infection too.

Table 1(up-to-date)

Country	Number of Cases	Deaths	Deaths per 1 million population
San Marino	699	42	1238
Belgium	66662	9833	848
UK	301455	45961	677
Andorra	918	52	673
Spain	329721	28441	608
Italy	246776	35129	581
Sweden	79782	5730	567
Peru	395005	18612	564
Chile	351575	9278	485

Table3 UK Daily confirmed case up-tp-date

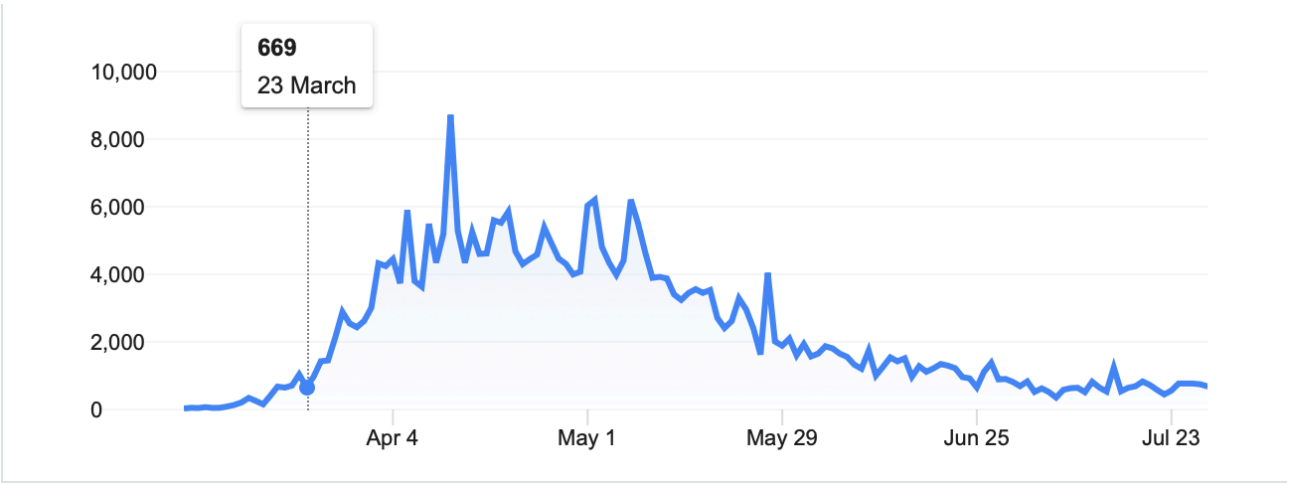


Table 1-1

France	183804	30223	463
USA	4524515	152862	462
Brazil	2498668	88792	418
Netherlands	53621	6147	359
Ireland	25942	1764	357
Sint Maarten	114	15	350
Mexico	402697	44876	348
Ecuador	83193	5623	318
Panama	62223	1349	312
Isle of Man	336	24	282
Channel Islands	587	47	270
Armenia	37937	723	244
Canada	115246	8913	236
Bolivia	72327	2720	233
Switzerland	34802	1979	229
North Macedonia	10503	476	228
Kyrgyzstan	34592	1347	206
Montserrat	12	1	200

Table 1-2

China	84060	4634	3

Table 1-3

Japan	30961	998	8

Table 1-4(Daily confirmed case in Sweden up-to-date)

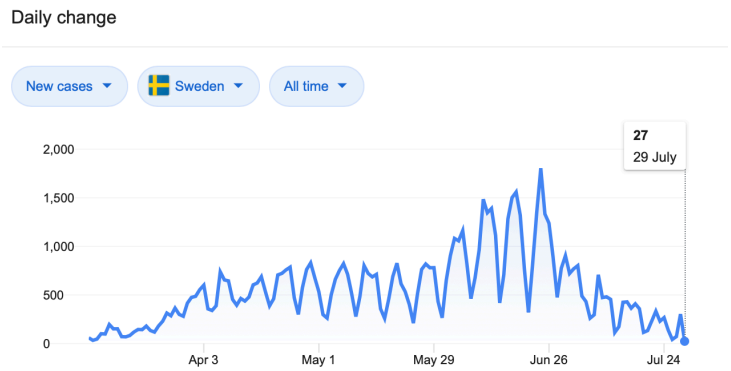


Table 1-5(Total confirmed case in Sweden)

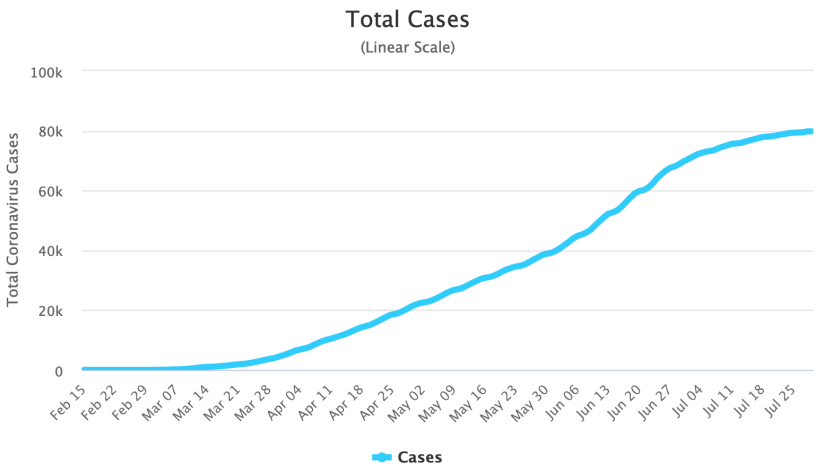
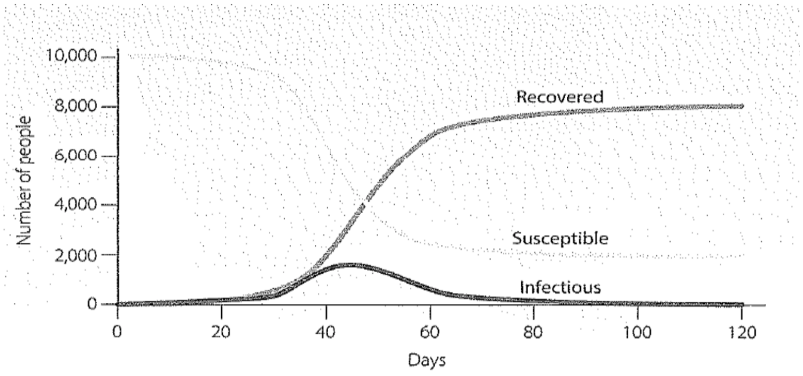


Table1-6 SIR model



Simulated influenza outbreak using the SIR model

Second, Deaths are important statistic in countries to show the impact that world the how many lives are gone during COVID-19.

According to table 2,United state received the highest dead in the world, followed by Brazil and UK. The total confirmed deaths up to date worldwide are 670,202 and USA have shared 22.8% in total.

Why United State records the most death in the world?I come up with the follow reason.

(1)the US government loosening social distance causing second wave new case increasing.

When we focused on Table 2-1, Every counties have only 20% Less than 25% decrease or increase in Average Mobility (Based on Distance Traveled), <55% decrease or increase in Percent Change in Non-essential Visitation and <40% Decrease in Human Encounters (Compared to National Baseline) almost as usual.Only less number of counties acquired non-strict policies.

According to the Jonathan Dingel(2020), "How Many Jobs Can be Done at Home?", 37 percent of US jobs can plausibly be performed at home. Our classification uses job characteristics that clearly rule out the possibility of working entirely from home and neglects many characteristics that would merely make working from home difficult. It is, therefore, an upper bound on what might be feasible and greatly exceeds the share of jobs that in fact have been performed entirely at home in recent years. According to the 2018 American Time Use Survey, less than a quarter of all full-time workers work at all from home on an average day, and even those workers typically spend well less than half of their working hours at home.".

But even though, in fact most US people chose to commute to work as usual.

(2)United State people wouldn't comply with the policies of using masks and they not don't want to wear masks.

According to Why Some Americans Resist Wearing Face Masks, "Another customer, Joshua Wright, wasn't concerned, saying, "I don't know anybody who has gotten sick with the virus. If I get it, I get it."Wright, 28, said he only started wearing a face covering after the state of Virginia on Friday began mandating that people must wear masks inside public buildings and businesses.The problem with "'I'm young, I'm healthy, I don't care if I get infected,' is that even with mild or no

symptoms, young, healthy people can be a very important part of the chain of transmission to other people of all different ages," Dr. David Aronoff, director of infectious diseases at Vanderbilt Medical Center in Nashville, Tennessee, said. Aronoff said some people still haven't gotten the message that "my breath can be lethal to another person" and that wearing a mask makes a difference in helping to stop the transmission of the disease." According to BBC "In the midst of the pandemic, a small piece of cloth has incited a nationwide feud about public health, civil liberties and personal freedom. Some Americans refuse to wear a facial covering out of principle. Others in this country are enraged by the way that people flout the mask mandates."

(3)**United State have Internet Access inequality which related to people's ability to self-isolate.**

According to L Chiou (2020) in Table 2-2, "Social Distancing, Internet Access and Inequality Lesley Chiou and Catherine Tucker NBER Working Paper No. 26982 April 2020", "This paper measures the role of the diffusion of high-speed Internet on an individual's ability to self-isolate during a global pandemic. We use data that tracks 20 million mobile devices and their movements across physical locations, and whether the mobile devices leave their homes that day. We show that while income is correlated with differences in the ability to stay at home, the unequal diffusion of high-speed Internet in homes across regions drives much of this observed income effect. We examine compliance with state-level directives to avoid leaving your home. Devices in regions with either high-income or high-speed Internet are less likely to leave their homes after such a directive. However, the combination of having both high income and high speed Internet appears to be the biggest driver of propensity to stay at home. Our results suggest that the digital divide---or the fact that income and home Internet access are correlated---appears to explain much inequality we observe in people's ability to self-isolate.".This mean the inequality to access internet will cause the unequal ability to remain at home or work at home.

Table 2 Deaths up-to-date

Country	Number of Cases	Deaths
USA	4524515	152862
Brazil	2498668	88792
UK	301455	45961
Mexico	402697	44876
Italy	246776	35129
India	1584219	35000
France	183804	30223
Spain	329721	28441
Peru	395005	18612
Iran	298909	16343
Russia	828990	13673
Belgium	66662	9833
Chile	351575	9278
Germany	208666	9211
Colombia	267385	9074

Canada	115246	8913
South Africa	459761	7257
Netherlands	53621	6147
Pakistan	276288	5892
Sweden	79782	5730
Turkey	228924	5659
Ecuador	83193	5623
Indonesia	104432	4975
Egypt	92947	4691
China	84060	4634

Table 2-1

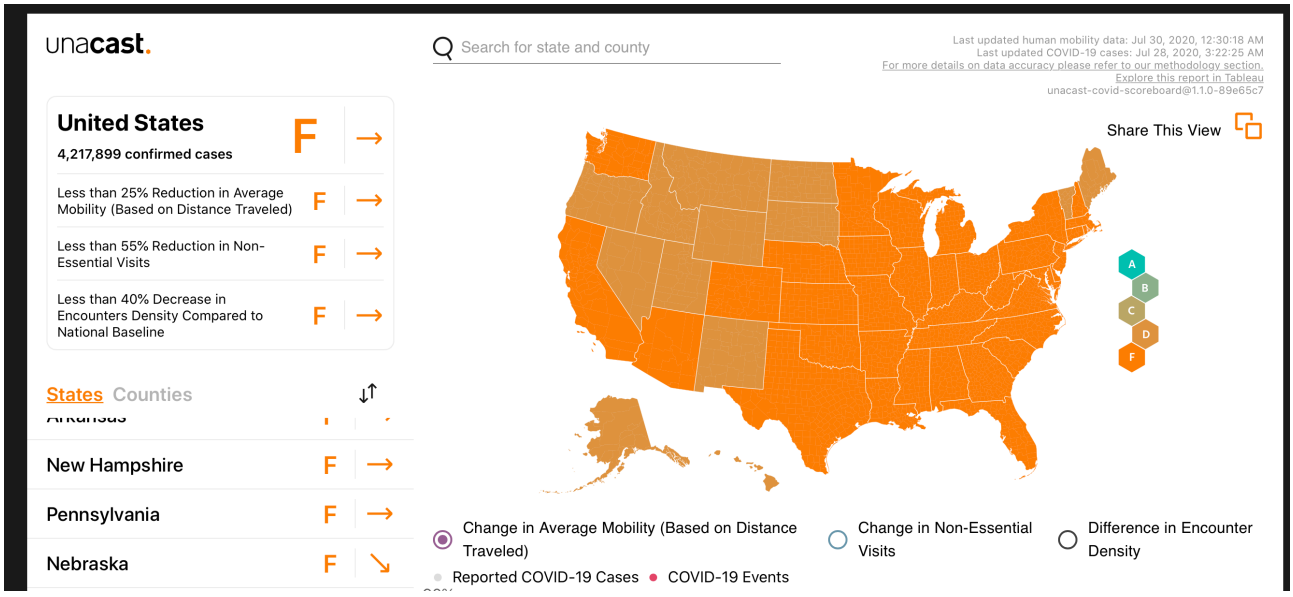


Table 2-2

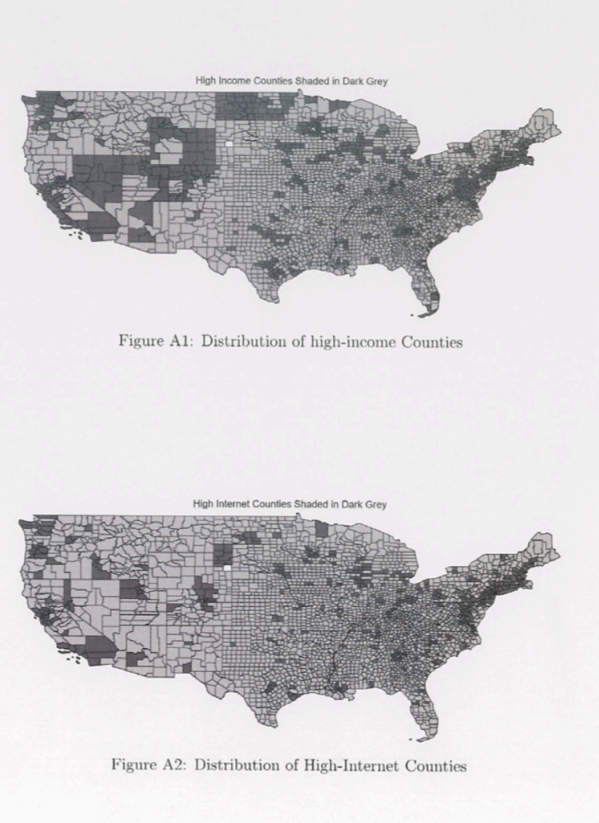
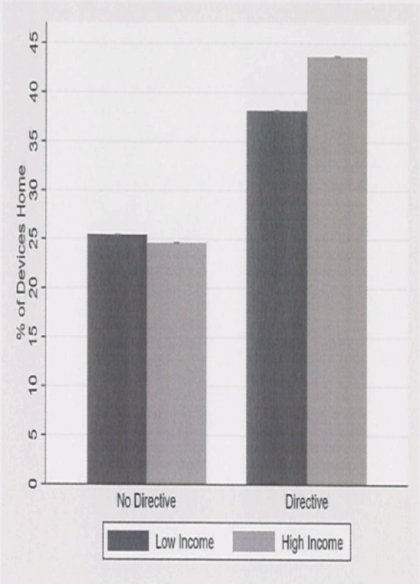


Figure A1: Distribution of high-income Counties

Figure A2: Distribution of High-Internet Counties

Figure 1: High-Income Areas are More Likely to Stay at Home Following a State Directive



Notes: February and March 2020 data. High income is defined by whether that PUMA region has above-median household income.

Conclusion

When coming to the conclusion, it's obvious to say that United State seem to be the most vulnerable one to COVID-19 in global community .United State have highest death counted because of the loosening social distance, lockdowns and musk wearing policies. United State's local governments should acquire more strict policies in social distance and musk wearing like Fines, Prison and so on.Also the local governments should continue lockdowns policies.

United Kingdom were once very vulnerable to COVID -19, although they come out of the highest death rate and bring out the lockdown policies.United Kingdom should impose more strict travel restrictions on foreign travelers.

In contrasting Sweden is the most strong counties to COVID-19 acquiring the successful herd immunity policy, might eventually and successfully avoid the second wave of infection although these policies are only effective in small countries with low density of population.

Other countries like China and Japan, because of their ethnic stereotype and lockdown policies, successfully preventing the infection.

(3611words)

Reference

(1)Robert J. Barro (2020) The Coronavirus and the Great Influenza Pandemic: Lessons from the "Spanish Flu" for the Coronavirus's Potential Effects on Mortality and Economic Activity

(2)Coronavirus: UK economy could be among worst hit of leading nations, says OECD https://www.bbc.com/news/business-52991913

(3)Why Some Americans Resist Wearing Face Masks https://www.voanews.com/covid-19-pandemic/why-some-americans-resist-wearing-face-masks

(4)BBC Coronavirus: Why are Americans so angry about masks? https://www.bbc.com/news/world-us-canada-53477121

(5)Social Distancing, Internet Access and Inequality Lesley Chiou and Catherine Tucker NBER Working Paper No. 26982 April 2020

(6)The New York Times https://www.nytimes.com/article/coronavirus-travel-restrictions.html

(7)How Many Jobs Can be Done at Home? https://www.nber.org/papers/w26948

(8)Coronavirus: What are the lockdown measures across Europe? https://www.dw.com/en/coronavirus-what-are-the-lockdown-measures-across-europe/a-52905137

(9)Wikipedia, Severe acute respiratory syndrome coronavirus 2