



DATA SCIENCE REPORT: U.S. State Prioritization for Covid-19 Resource Allocation

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Report Compiled by:

Marceline Chiedza Manyika

GLOSSARY OF TERMS

COVID-19	Corona Virus Disease of 2019
WHO	World Health Organization
JHU CCSE	Johns Hopkins University Center for Systems Science and Engineering
NHC	National Health Commission of the People's Republic of China
CCDC	China Centre for Disease Control
ECDC	European Centre for Disease Prevention and Control
MOH	Ministry of Health Singapore
CDC	Centre for Disease Control
U.S.A.	United States of America

1 INTRODUCTION

A rapidly spreading global pandemic, COVID-19, has vexed the world from December 2019. According to the World Health Organization (WHO), “Coronavirus disease (COVID-19) is an infectious disease caused by a new virus. The disease causes respiratory illness (like the flu) with symptoms such as a cough, fever, and in more severe cases, difficulty in breathing. Coronavirus disease spreads primarily through contact with an infected person when they cough or sneeze. It also spreads when a person touches a surface or object that has the virus on it, then touches their eyes, nose, or mouth.”

There is currently no vaccine to prevent coronavirus disease (COVID-19). To date more than 3,600,000 people have been affected globally and more than 250,000 have died globally. This study will focus on the period 22 January 2020-30 April 2020. *(data source: John Hopkins).*

Each country now has the mandate to allocate available resources to mitigate effects of the pandemic at different levels which include prevention and treatment measures with the primary objective of saving lives.

When a pandemic hits the world, there are seldom enough resources to minimize the negative effects in affected locations. There is critical need to prioritize resource allocation based on effects emerging in different communities battling the pandemic.

This study aims to produce a list of top 5 US states to be prioritized for each measure of response in dealing with the Covid-19 pandemic in the United States of America. This will enable the U.S. CDC and COVID-19 response teams to focus on and fully support states which are struggling to mitigate effects of the disease and successfully slow down its spread.

Study Objectives

This study was carried out to investigate which U.S. states must be prioritized in the allocation of COVID-19 resources. Specific focus was made to establish the following:

1. What is the extent of COVID-19 cases globally?
2. What is the extent of COVID-19 cases in the U.S?
3. What other factors are contributing to the spreading and death from COVID-19 in the US?
4. What is working elsewhere in mitigating effects of the COVID-19 pandemic?
5. Which U.S. states must be prioritized for COVID-19 resource allocation and why?

2 APPROACH, SCOPE AND METHODOLOGY

2.1 APPROACH

2.1.1 Quantitative data collection and assessment

Desk study. Secondary data collection: Data for this project was scraped from available COVID-19 datasets on the internet. Specifically, data on death, recovered and confirmed cases was sourced from the epidemiological data being compiled by the Johns Hopkins University Center for Systems Science and Engineering (JHU CCSE) from various sources including the World Health Organization (WHO), DXY.cn. Pneumonia. 2020, BNO News, National Health Commission of the People's Republic of China (NHC), China CDC (CCDC), Hong Kong Department of Health, Macau Government, Taiwan CDC, US CDC, Government of Canada, Australia Government Department of Health, European Centre for Disease Prevention and Control (ECDC), Ministry of Health Singapore (MOH). (csv downloaded from <https://data.humdata.org/event/covid-19>)

U.S. Population data was obtained from the United States Census Bureau (<https://www2.census.gov/programs-surveys/popest/datasets/>). The population data is disaggregated by state.

To determine the typical social activities in the state with the highest loss of lives to COVID-19, data for most popular venues in the State with highest deaths, was called from the Foursquare, social location service.

Quantitative methods will be used to summarize data gathered from this study. The focus will be on analyzing secondary data in order to construct pertinent indicators. The assessment will require: -

- i- **Variable Identification** from web scraped datasets (i.e. available variable types and categories) and Variable transformation.
- ii- **Univariate analysis** which will involve gathering summary statistics from individual variables in the datasets i.e. mean, minimum, maximum, quartiles.
- iii- **Bivariate and Multi-variate analysis** which will involve establishing correlation between two or more variables of interest.

2.1.2 Qualitative data collection.

Qualitative methods will be used to gather data on approaches used by countries which have had the highest proportion of recoveries in the first quarter of 2020.

2.2 PLANNING FOR SURVEY QUALITY

Effort will be made to acquire COVID-19 data from a source who has consolidated from many global sources to ensure coverage of as most affected countries as possible.

2.3 INDICATORS AND DATA COLLECTION PLAN

Task Description	Investigating questions	Possible Data Source	Tool/Method	Summary Technique
1) How many were affected globally by COVID-19 and where?	How many COVID-19 cases were confirmed globally (Jan-Apr 2020), disaggregated by location?	- John Hopkins CSSE	-Desk study, Quantitative analysis	Historical maps, Time trend charts, Coverage maps, Bar graphs, Scatter plots bar charts, Line graphs, Flow diagrams
	How many of the confirmed COVID-19 cases have recovered globally Jan-Apr 2020?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
	How many have died globally from COVID-19 Jan-Apr 2020?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
2) How many were affected in the United States by COVID-19 and in which areas?	How many confirmed COVID-19 cases are there in the U.S. for the period Jan-Apr 2020 , disaggregated by State/Territory?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
	Which U.S. States have been most affected by COVID-19 Jan-Apr 2020?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
	How many have died in the U.S. from COVID-19 Jan-Apr 2020?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
	Which U.S. States have lost the greatest proportion of those affected by COVID-19 between Jan-Apr 2020?	- John Hopkins CSSE	-Desk study, Quantitative analysis	
3) What other factors are contributing to the spreading and death from COVID-19 in the US?	Explore which factors may be contributing to the spread of COVID-19 (temperature, population density, state median age, average temperature)?	- Web scrape from various websites	-Desk study, Quantitative analysis	Regression analysis
	What are the most common venues in the State with the highest COVID-19 deaths in the Jan-Apr 2020 period? This may indicate social behaviors which may be contributing to the rapid spread of the disease in this State.	- Foursquare	-Desk study, Quantitative analysis	Word cloud
4) How are other nations dealing with the crisis?	Which countries have recorded the highest proportion of recoveries and lowest deaths?	- Internet search	-Desk study, Qualitative analysis	Case studies, Flow diagram
	Which strategies are they using to minimize negative impact of COVID-19?			
5) US State prioritization	Which 5 US States need the most urgent support in managing the health crisis resulting from the COVID-19 pandemic?	- John Hopkins CSSE	Quantitative analysis	Table

2.4 DATA VISUALIZATION AND RESEARCH TECHNIQUES

Data collected through secondary research will be presented using the following visualization techniques in a specified format:

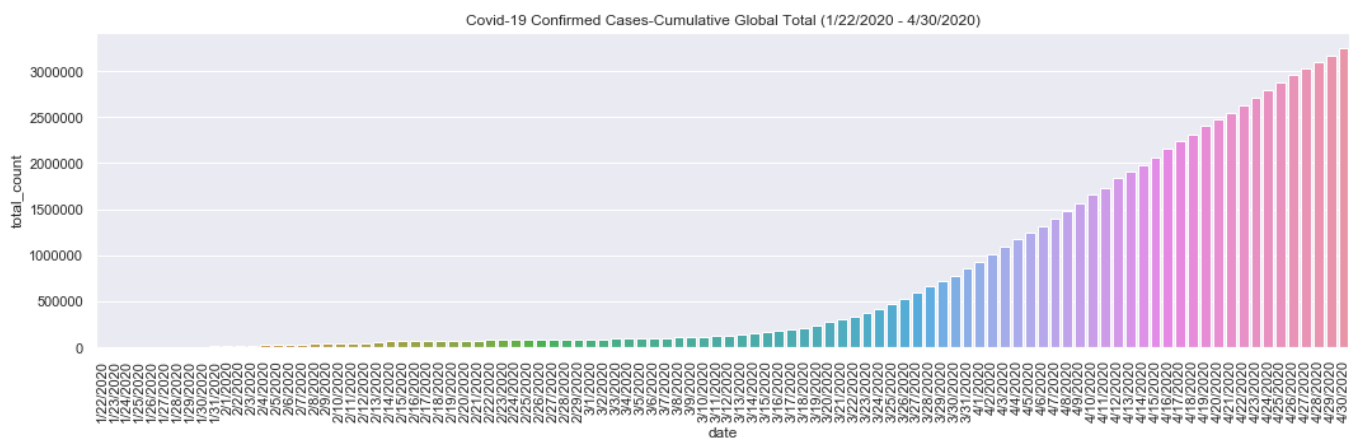
VISUAL TECHNIQUES		
Diagrams	Venn	
	To illustrate which individuals, organizations, projects, or services are interacting with each other or overlap to deal with the COVID-19 crisis.	
Timelines	Time trends charts	
	This tool will be used to visualize changes over time (confirmed, recovered, deaths)	
Mapping	Coverage maps	
	Maps to visualize COVID-19 confirmed, recovery and death cases.	
Charts	Bar graphs	Scatter plots
	Bar graphs to depict case counts by Region	Scatter plots will be used to establish whether there is correlation between deaths vs average temperature, median age, population density
COMPLEMENTARY TECHNIQUES		
Secondary data review	Case study	
This will involve review of Information which is part of a publicly available set of data or other forms of official statistics not generated by the researcher.	This technique will be used to explore approaches implemented by nations whose COVID-19 negative effects are being successfully and significantly reduced since January 2020	

3 RESULTS

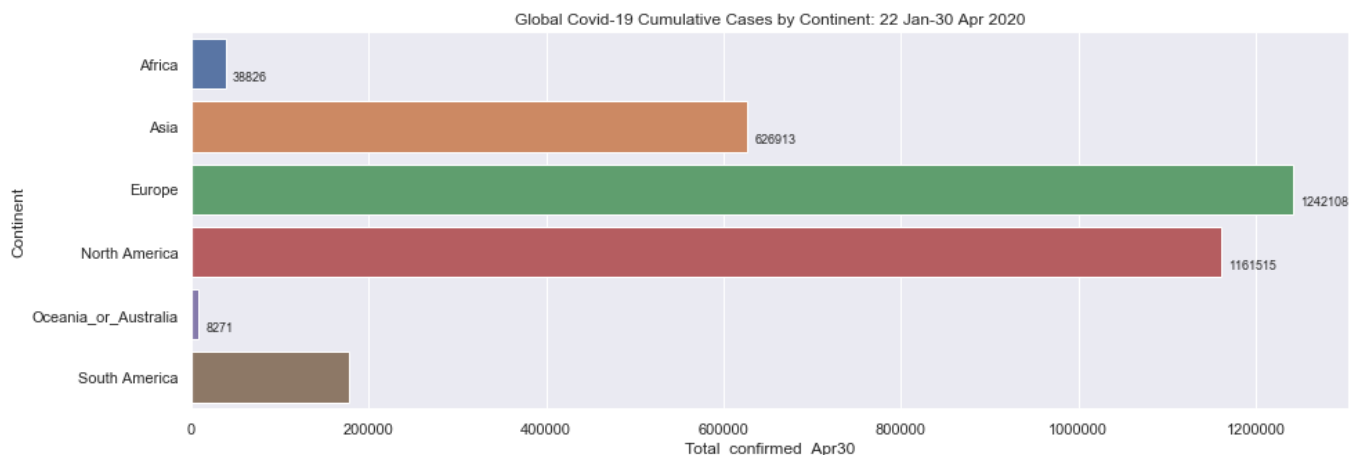
3.1 OVERVIEW – GLOBAL

Covid-19 has affected almost all countries of the World. In most instances, people are recovering from the disease, however, some are dying from this disease. There was a cumulative total of 3,256,853 confirmed COVID-19 cases globally for the Jan – Apr 2020 reporting period, 1,014,775 recoveries and 233,388 deaths. This means, globally, of the confirmed cases, 31.2% recovered from the disease and 7% were lost to COVID-19. However, there is much variation in recovery and death rates at continental or country level because of the varying approaches by different countries in handling the testing, treatment, and containment of the disease.

3.1.1 Confirmed Cases - Global

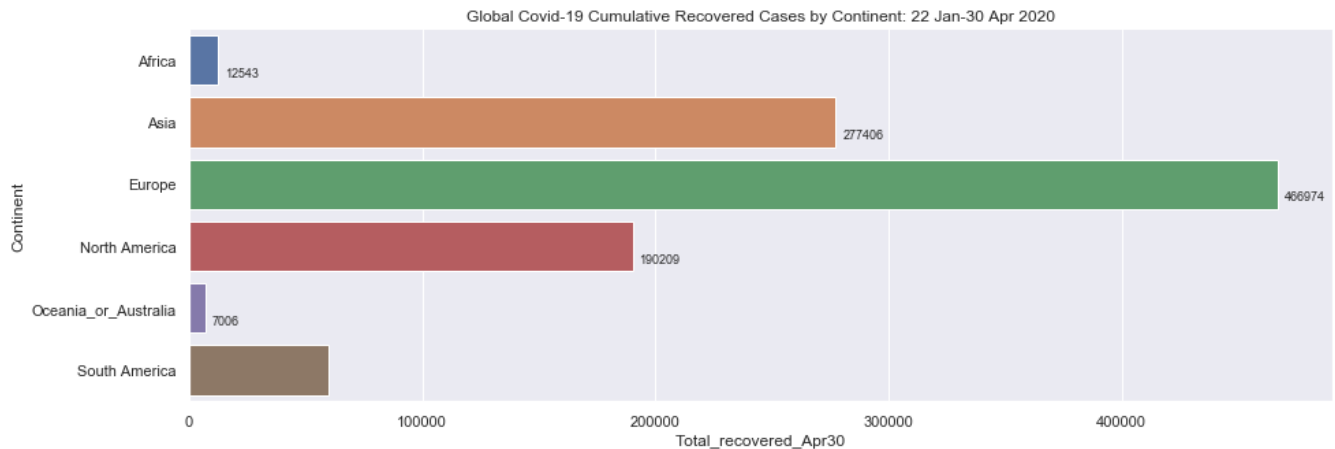


For the January - April reporting period, there has been a cumulative total of 3,256,853 confirmed COVID-19 cases. Countries are making an effort to increase testing kits and testing sites to enable them to determine the extent of spread of the disease.



Disaggregating the confirmed cases up to April 2020 by Continent, reveals that there have been more confirmed cases in Europe (1,242,108) and North America (1,161,515) and the least confirmed cases in Africa (38,826) and Australia (8,721). Differences in numbers of confirmed cases between continents can be attributed to a rapid spread of the disease in some continents compared to others or more testing being done or both.

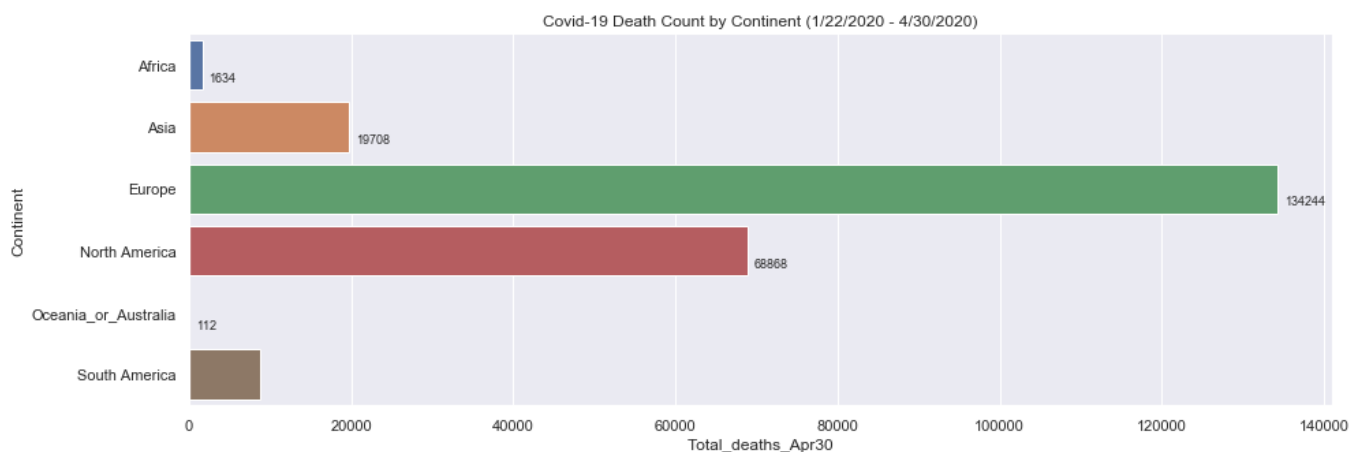
3.1.2 Recovered Cases – Global



Of the +3,000,000 COVID-19 confirmed global cases between January and April 2020, 1,014,775 people recovered. This means overall ~30% of all people with positive COVID-19 cases in the World recovered.

3.1.3 Death Cases – Global

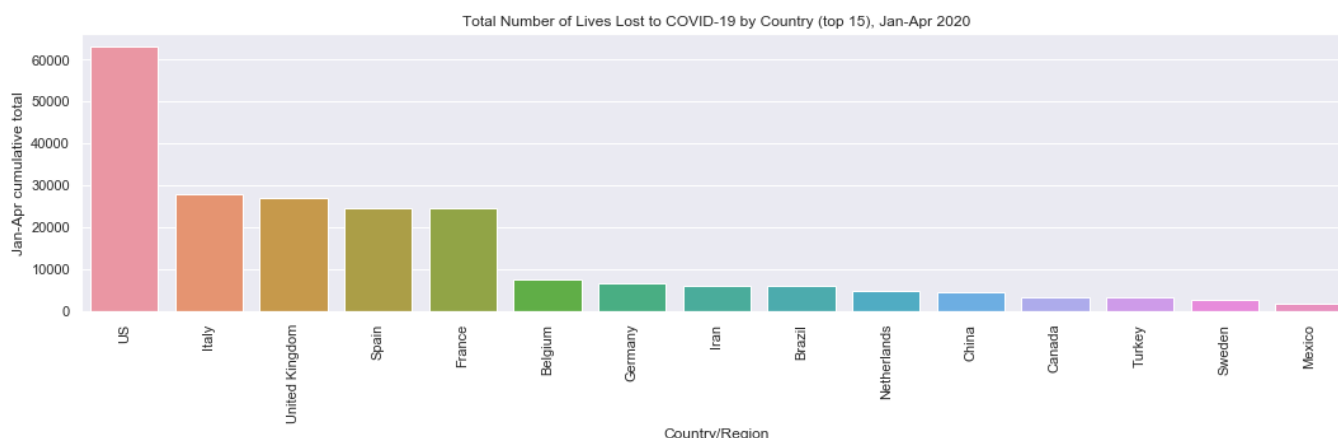
3.1.3.1 Continental Perspective



Humanity lost ~ 233,388 lives to COVID-19 in the January to April 2020 period ~7%, with the highest number of human beings (raw count) lost in Europe (134,244) and North America (68,868).

3.1.3.2 Country Level Perspective

The U.S., Italy, UK, Spain, and France lost more than 20,000 people to COVID-19 between January and April 2020.



3.1.3.3 COVID-19 Global Deaths Descriptive Statistics

Of the 187 Countries affected by COVID-19 in the reporting period Jan-Apr 2020, there are 28 countries which never lost a single person to the disease. From the computed descriptive statistics for COVID-19 deaths in this period, 50% of the 187 Countries with confirmed cases lost 16 people or less, 75% lost 165 people or less and 25% lost more than 165 people up to 62,996 people to the disease. Effort must continue to be made to assist the 25% in managing their cases and saving lives.

Table 1: Global deaths descriptive statistics

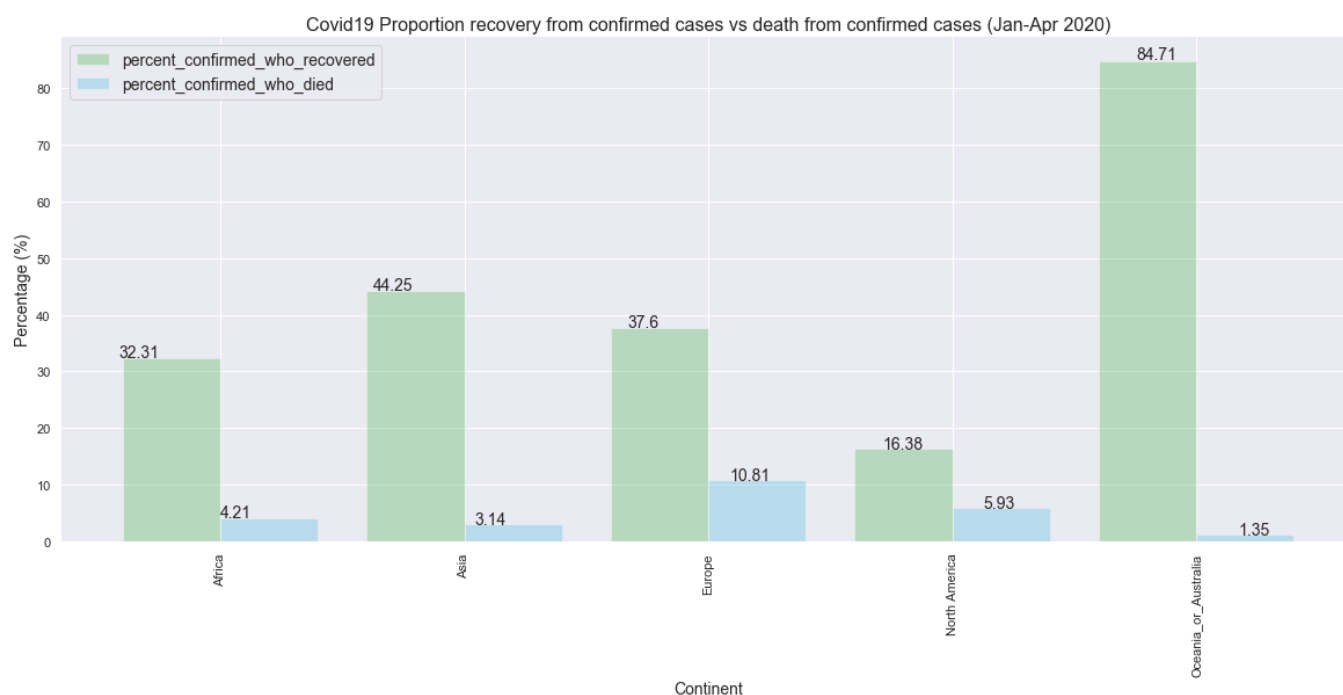
count	187.0
mean	1248.0
std	5976.0
min	0.0
25%	2.0
50%	16.0
75%	165.0
max	62996.0

3.1.4 Proportion recovering vs Proportion dying

3.1.4.1 Continental Perspective

There is wider variability in recovery and death rates when exploring continental and country levels of COVID-19 progression. The chart below analyses the proportion of confirmed cases who recovered vs confirmed cases who died by **Continent**. According to this assessment, Oceania/Australia Continent has the highest number of confirmed cases recovering, 84.71% of confirmed COVID-19 cases in Oceania/Australia recovered. North America has the lowest proportion of confirmed cases recovering in the January to April 2020 period.

The Continent of Europe has the highest proportion of confirmed COVID-19 cases who died, 10.81% of the confirmed cases lost their lives to the disease. The Continent of Oceania/Australia has the lowest proportion of COVID-19 confirmed cases who died, 1.35% of confirmed COVID-19 cases in Oceania/Australia lost their lives to the disease. There is need to further investigate what measures have been used to deal with the COVID-19 crisis in Australia which may be resulting in the evidently high recoveries and low death rate.



3.1.4.2 Country-level Perspective

The table below is sorted to present the top 10 Countries/Regions with the highest recoveries of the confirmed January – April 2020 COVID-19 cases. All these top 10 listed had more than 84% recovery rate from COVID-19 in the January-April reporting period.

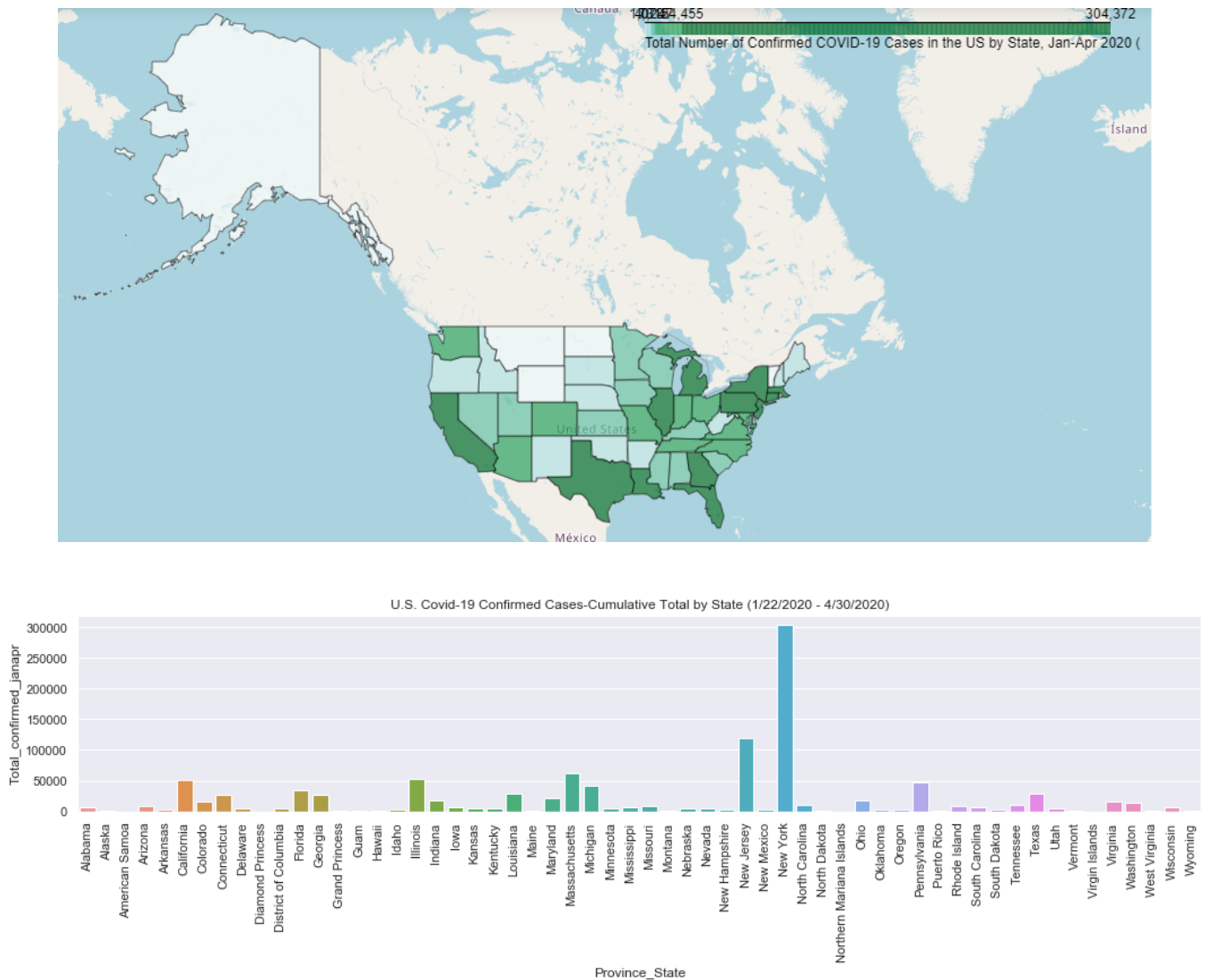
Table 2: Country level confirmed, recovery and death summaries

Country/ Region	confirmed_janapr	recoveries _janapr	deaths _janapr	percent_confirmed_who_recovered (%)	percent_confirmed_who_died (%)
Cambodia	122	119	0	97.5	0.0
China	83,956	78,523	4,637	93.5	5.5
Mauritius	332	310	10	93.4	3.0
Iceland	1,797	1,670	10	92.9	0.6
Thailand	2,954	2,684	54	90.9	1.8
Brunei	138	124	1	89.9	0.7
Saint Lucia	17	15	0	88.2	0.0
Luxembourg	3,784	3,213	90	84.9	2.4
Australia	6,766	5,742	93	84.9	1.4
New Zealand	1,479	1,252	19	84.7	1.3

3.2 OVERVIEW - UNITED STATES

3.2.1 Confirmed Cases - United States

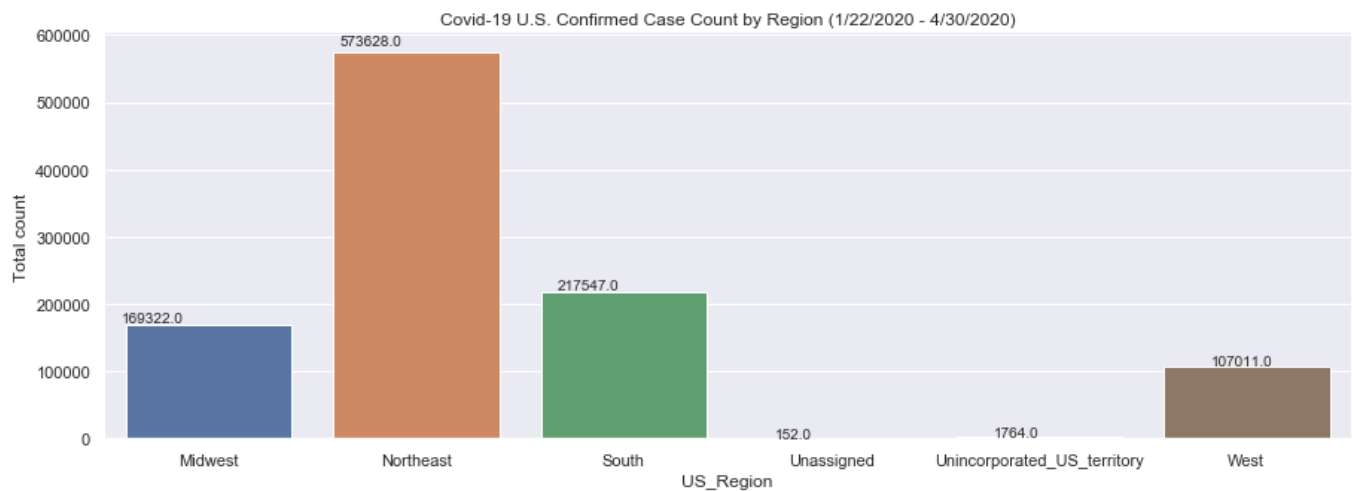
3.2.1.1 Perspective by State



The following U.S. States recorded more than 50,000 confirmed COVID-19 cases between January and April 2020:

New York (304,372), New Jersey (118,652), Massachusetts (62,205), Illinois (52,918) and California (50,130).

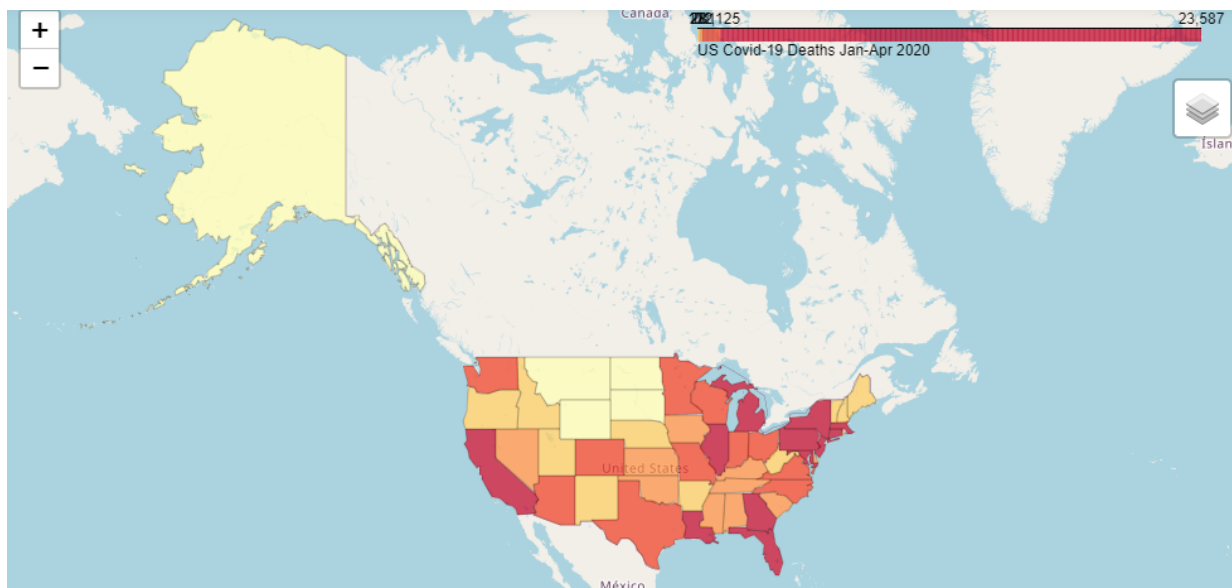
3.2.1.2 Perspective by Region

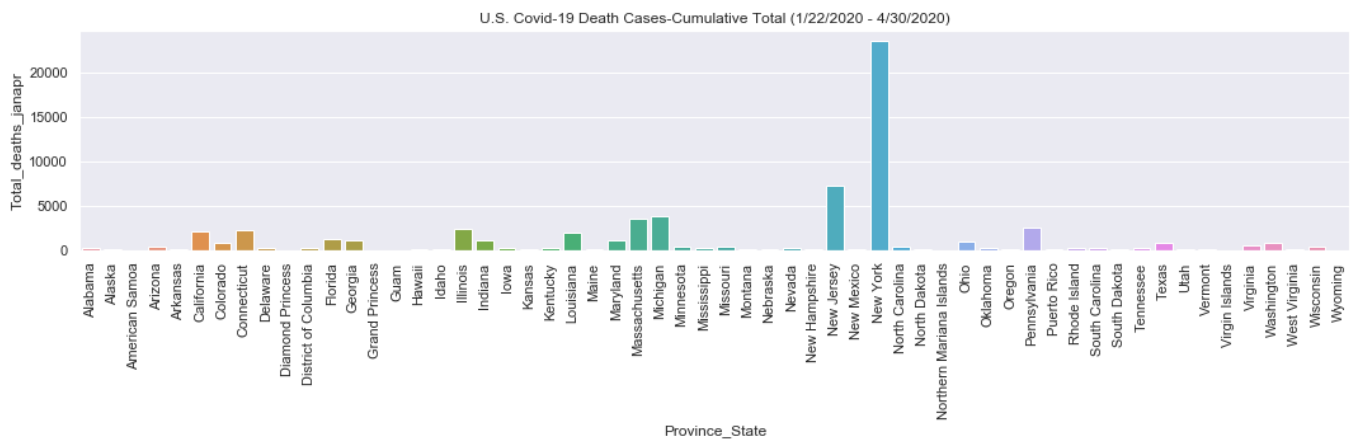


There were more confirmed case counts in the Northeast Region (537,628). Unassigned Region is referring to confirmed cases on inbound cruise ships: Diamond Princess and MS Zaandam.

3.2.2 Death Cases - United States

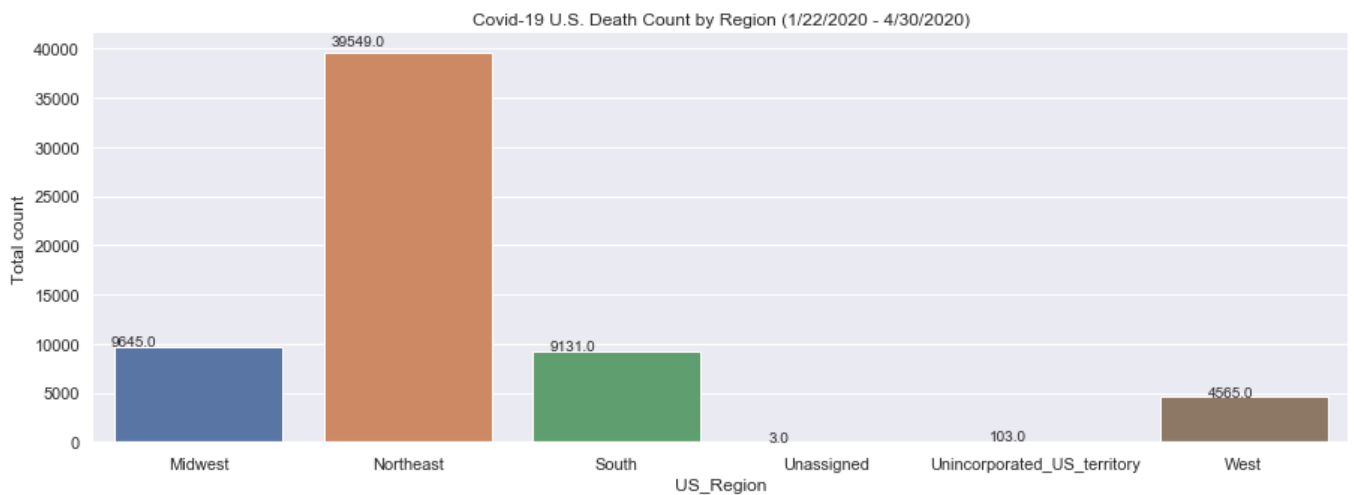
3.2.2.1 Perspective by State



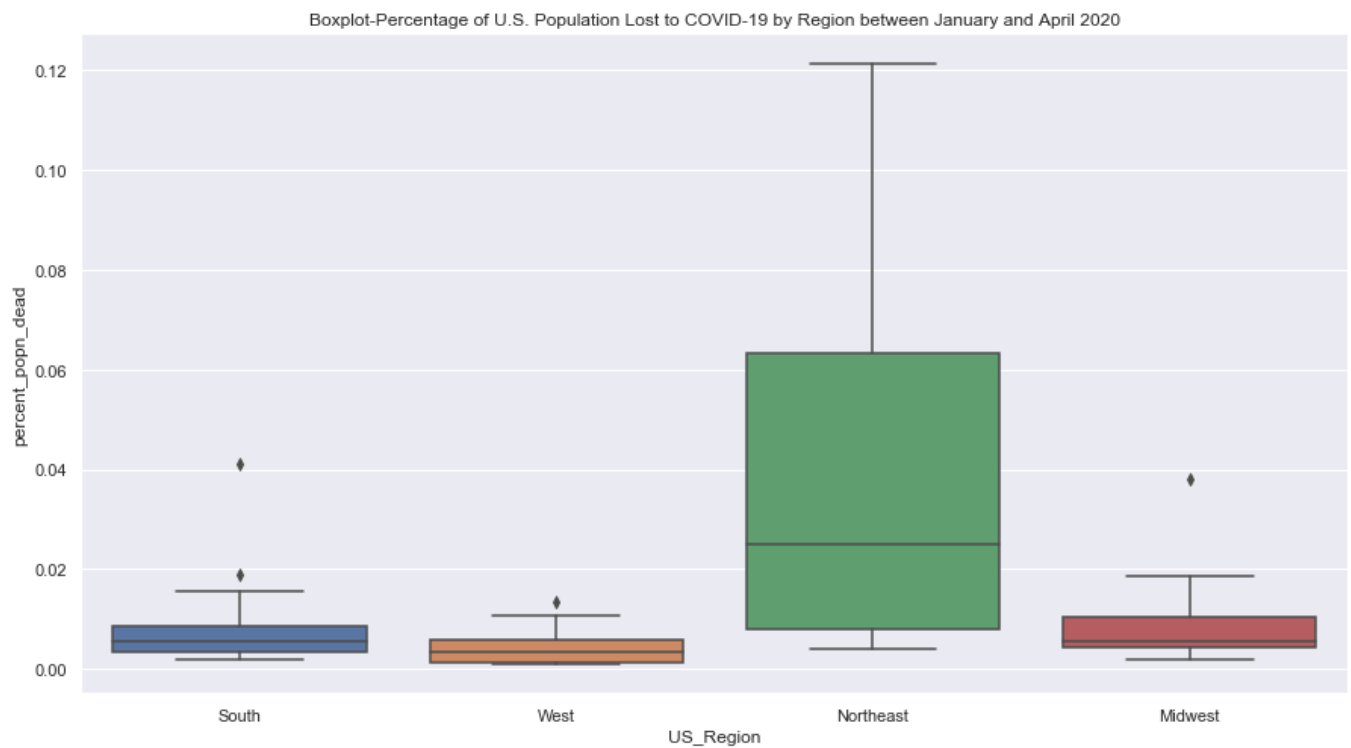


The following states have lost more than 2,000 people (raw count) to COVID-19 in the January-April 2020 reporting period: New York (23,587), New Jersey (7,228), Michigan (3,789), Massachusetts (3,562), Pennsylvania (2,475), Illinois (2,355), Connecticut (2,257), California (2,031).

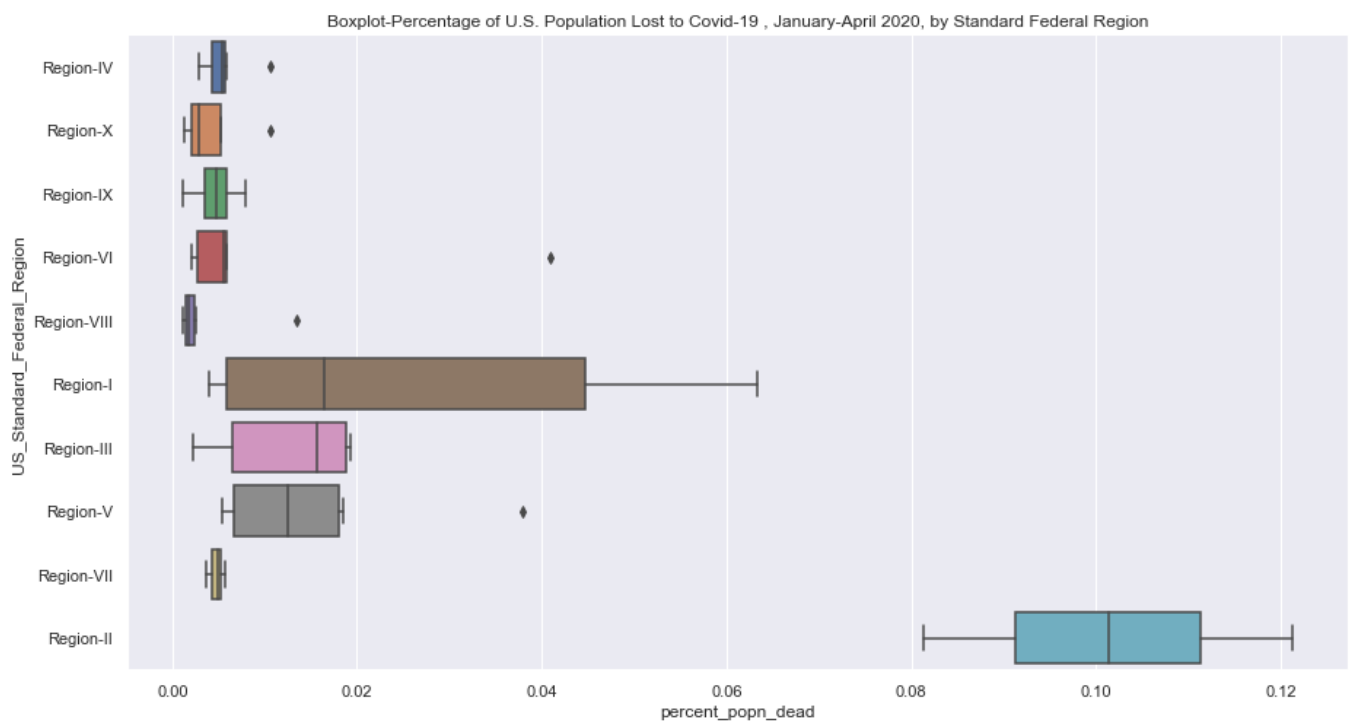
3.2.2.2 Perspective by Region



The highest number of deaths were recorded in the Northeast Region (39,549).



The Northeast Region lost the greatest proportion of its population to the disease compared to all 4 U.S. Regions. Where all other US Regions lost less than 0.06% of their population, the Northeast Region is the only one which lost more than 0.06% of its population. The most affected State in this Region lost 0.12% of its population.



Assessing percentage of population lost, disaggregated by Standard Federal Region, reveals that Region II and Region I were most affected by this disease compared to the rest of the Regions which lost less than 0.02% of their population.

3.2.2.3 Death as a proportion of State Population vs Death as a proportion of confirmed cases in State

Table 3: COVID-19 Deaths as a proportion of State Population vs as a proportion of confirmed cases (highest 10)

Loss of life as a proportion of State Population		Loss of life as a proportion of total confirmed cases in State	
State	Percent of Population Lost to COVID-19	State	Percent Confirmed who died
New York	0.1212	Michigan	9.1568
New Jersey	0.0813	Connecticut	8.1480
Connecticut	0.0633	New York	7.7494
Massachusetts	0.0513	Louisiana	6.8033
Louisiana	0.0410	Minnesota	6.6783
Michigan	0.0379	Indiana	6.2461
Rhode Island	0.0251	Oklahoma	6.1360
Pennsylvania	0.0193	New Jersey	6.0918
Maryland	0.0189	Massachusetts	5.7262
Illinois	0.0186	Washington	5.6816

Of all the U.S.A States, New York lost the greatest proportion of its population to COVID-19 in the January -April 2020 period, that is, 0.12%. All other U.S.A. States lost less than 0.1% of their population to COVID-19 in this reporting period. Michigan, Connecticut, and New York lost more than 7% of confirmed cases.

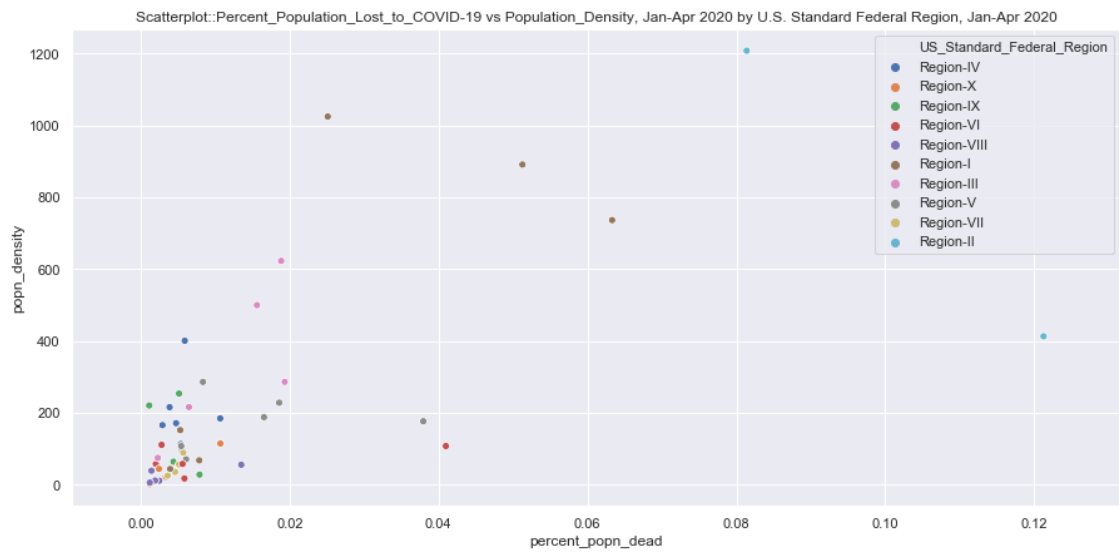
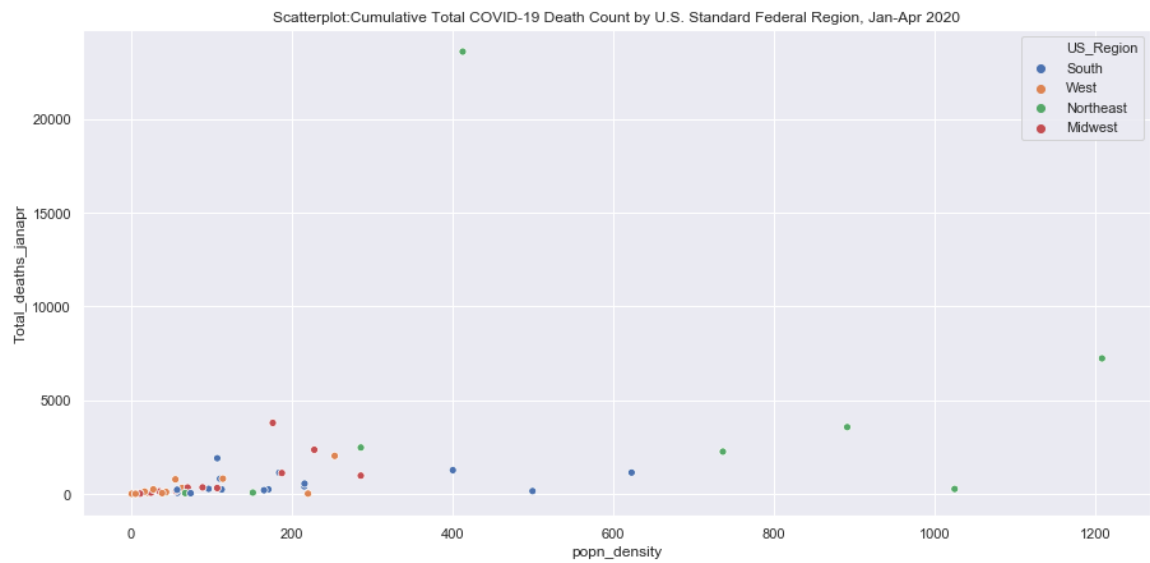
3.2.2.4 Correlation to investigate factors contributing to the spread of and deaths from the disease

Table 4: Correlation between Percent population confirmed vs State Average temperature, Population: hospital ratio, Median Age, Population density

Factor	Pearson's Coefficient against Percent Confirmed Cases in State
State_average_temperature	-0.053
State_population_hospital_ratio	0.297
State_median_age	0.140
State_population_density	0.761

There is a strong, positive correlation between percent population confirmed against State population density (0.76). There is negligible correlation between other State factors which were investigated (i.e. State average temperature, State population:hospital ratio, State median age).

Scatterplots and regression plot below are also portraying the relationship between deaths vs population density as well as percentage of population lost vs population density. Results from the correlation table and scatter plots indicate that the more densely populated a State is, the more likely it is that confirmed cases and loss of life to COVID-19 will be relatively higher when compared to less densely populated States.



3.2.2.5 New York Popular Venues

The highest number of COVID-19 deaths was recorded in the State of New York. New York is also the State which lost the greatest proportion of its population to the disease, compared to any other State in the January-April 2020 reporting period. Most popular venues in New York were pulled using Foursquare API to explore what social activities which can contribute to rapid disease spread in a densely populated space. Below is a cross-tabulation of popular venues in Neighborhoods which recorded the top ten highest number of deaths in New York.

Table 5: Global deaths descriptive statistics

Neighborhood	Total deaths (Jan-Apr)	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
New York	18069	Hotel	French Restaurant	Spa	Jewelry Store	Women's Store
Nassau	1700	American Restaurant	Hotel	Furniture / Home Store	Tex-Mex Restaurant	Office
Suffolk	1177	Construction & Landscaping	Discount Store	Fast Food Restaurant	Farm	Event Space
Westchester	1031	American Restaurant	Asian Restaurant	Pizza Place	Bank	Pharmacy
Rockland	511	Chinese Restaurant	Intersection	Deli / Bodega	Diner	Liquor Store
Orange	320	Park	Baseball Field	Zoo Exhibit	Donut Shop	Fast Food Restaurant
Erie	266	Waterfront	Zoo Exhibit	Discount Store	Fast Food Restaurant	Farm
Monroe	115	Comic Shop	Automotive Shop	Cosmetics Shop	Business Service	Dry Cleaner
Dutchess	37	Garden	Zoo Exhibit	Food	Fast Food Restaurant	Farm
Onondaga	30	Pizza Place	College Arts Building	Coffee Shop	Gym	Diner



- The New York common venues word cloud indicates that the most common venue for the New Yorkers are highly populated places i.e. Restaurant, Store, Hotel, Pizza place, Coffee shop. If social distancing and sanitizing measures are not being optimally implemented, the people are at risk of continuing to spread the disease in their already relatively highly populated state through proximity and surface contamination.

4 CASE STUDY – APPROACHES IN HANDLING COVID-19

From the consolidated information the following countries are of interest because the countries have achieved both high recovery rates from the confirmed cases (>80% recovery) as well as a comparatively low % of deaths from confirmed cases (<4% confirmed cases lost). Below is a narration of key strategies which were utilized by Cambodia, Mauritius, Thailand, New Zealand, Australia, South Korea, Vietnam which likely contributed to their remarkable results: -

CAMBODIA	97.5% confirmed patients who recovered; 0% confirmed patients who died
<ul style="list-style-type: none"> - quickly banning entry from COVID-19 epicenters (United States, Italy, Spain, Germany, Iran, and France). - quarantine of patient and close contacts, 2 weeks treatment and observation. - school closure and cancellation of public gathering celebrations such as Songkran in the city. - closure of high traffic public venues (clubs, cinemas, casinos, massage parlors and health spas). - a one-week act was issued on 8 April to prohibit travels across provinces and between districts outside the capital with exceptions for goods transporters, armed forces and civil servants starting midnight. - suspension of all border crossings with Vietnam for a month-long period, and with Thailand for 2 weeks. - government established a national committee for combating the COVID-19, it had duties to set national policy and strategy related to the fight against the COVID-19 and control the impact of the virus on politics, economy, and society at national and international levels. <p>[source: https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Cambodia]</p>	
MAURITIUS	93.4% confirmed patients who recovered; 3.01% confirmed patients who died
<ul style="list-style-type: none"> - quarantine of visitors from high risk countries, from February, even though there were no local cases detected - the Ministry of Information and Communication Technology developed a mobile app called 'beSafeMoris', which gives official up-to-date information and useful tips, and can be downloaded and used free of charge. - regular updates from Prime Minister who established a communication cell in his office. press conferences by health, commerce and police officials updating population on measures being taken. - after first seven cases, closure of schools, allowing only essential services to operate, border closures to international travelers with the exception for repatriated nationals, limited public transport, private vehicle checks on major routes and only allowing people with work access permits to move around otherwise penalties. quick decision to impose the sanitary curfew early upon observing crowding in supermarkets. This helped reduce the number of new infections which resulted in maintaining COVID-19 deaths under control. Reducing deaths allows healthcare practitioners to provide the best care possible. - contact tracing prioritization to identify who to test (people who physically contacted confirmed patients, testing of people in quarantine exhibiting symptoms.) - patient separation. Establishment of fever clinics at public hospitals to separate potentially infected and symptomatic patients from other patients. - quarantine of all healthcare professionals who had cared for COVID-19 patients in different facilities such as hotels and youth centers. - minimizing citizen's stress by programs such as providing continuous teaching and learning via the Internet and television and regulating the prices of masks, gloves, and sanitizers. - persistent media campaign to raise awareness on how to prevent transmission of the disease. <p>[source: https://voxeu.org/article/mauritian-response-covid-19]</p>	
THAILAND	90.8% confirmed patients who recovered; 1.83% confirmed patients who died
<ul style="list-style-type: none"> - after several transmission clusters observed in March, public venues and businesses were ordered to close in Bangkok and several other provinces. Prime Minister declared a state of emergency, announced curfew. - initially government's response based on surveillance and contact tracing, in accordance with the Department of Disease Control's three-stage response model. - temperature and symptom screening for coronavirus testing was implemented at international airports, as well as at hospitals for patients with travel or contact history. - investigations were performed in response to outbreak clusters. - public education focused on self-monitoring for at-risk groups, practicing hygiene (especially hand washing), and avoiding crowds (or wearing masks if avoidance was not possible) 	

- residents returning from high-risk countries were encouraged to self-quarantine, travel restrictions were not announced until 5 March, when four countries were designated as "disease-infected zones" and travelers subject to quarantine, while those arriving from other high-risk countries are placed under observation. further restrictions were announced on 19 March, requiring medical certification for international arrivals, as well as health insurance for foreigners.

- the government issued price controls and intervened in the distribution of masks.

[source: https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Thailand]

NEW ZEALAND

84.9% confirmed patients who recovered; 1.28% confirmed patients who died

- New Zealand committed to an elimination strategy as opposed to the popular mitigation model (delay virus arrival+measures to flatten curve of cases and deaths) used in historical pandemic planning.

- Prime Minister announced a strict national month long lockdown when it only had 102 cases and zero deaths included closure of schools and non-essential workplaces, a ban on social gatherings, and severe travel restrictions which enabled the country to consider elimination.

- full lockdown allowed the country to get key systems up and running to effectively manage borders, and do contact tracing, testing, and surveillance.

- testing was focused on people with symptoms, with tracing of both close contacts and casual contacts. However, more widespread testing is now being introduced.

- language was a crucial part of the response. The official response was guided by the principle that you do not stigmatize and that the people must unite against COVID-19, as opposed to communications being done by other countries which puts people in a negative and fearful frame of mind

- quarantine of travelers from abroad as part of efforts to prevent transmission in New Zealand.

[source: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31097-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31097-7/fulltext)]

AUSTRALIA

84.9% confirmed patients who recovered; 1.37% confirmed patients who died

- Political unity in decision making with one goal of saving Australian lives. Decision makers from Federal, state, and local governments, from opposing parties, with different political, social and economic priorities, and leading constituents with different health needs, and health systems with different capacities came together to swiftly make and implement joint decisions to manage the looming crisis. They established a national cabinet to coordinate and deliver a consistent response to COVID-19. They meet regularly (sometimes daily) via secure videoconferencing to make decisions about health, education, public safety, social services, and infrastructure. They are working together to facilitate access to treatment and minimize the social and economic impact.

- The national cabinet shares data and information about the spread of COVID-19 and agrees on policy, such as testing criteria, limits on indoor and outdoor gatherings, visitor restrictions to aged care facilities, suspension of elective surgeries, mandatory quarantine for international travelers, and self-quarantine obligations for people with COVID-19, and the conditions under which any state can adopt additional measures.

- There is regular reviewing of the response with resources moved into activities that are working well, scaling back activities that are not working. Measures being taken include school closures, screening travelers who arrive in Australia and ensuring they quarantine on arrival, continuing with border surveillance, providing \$669 million to expand Medicare-subsidized telehealth services for all Australians so everyone has access to quality healthcare while at home, delivering a \$2.4 billion health package to protect all Australians, tracing coronavirus cases, providing information on the response being implemented and personal protection measures in English and other languages

- State and territory health authorities are: testing people suspected of having the virus, monitoring close contacts of confirmed cases every day, imposing travel restrictions between states, opening fever clinics

[source: <https://www.milbank.org/2020/04/what-the-us-could-learn-from-australias-covid-19-response/> ,

<https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/government-response-to-the-covid-19-outbreak>]

SOUTH KOREA

84.2% confirmed patients who recovered; 2.3% confirmed patients who died

- Instead of announcing an official lockdown, the government has opted to keep more of its economy open, organized mass testing, including in novel 'drive-through' testing stations. They even use a mobile application for alerting people that they were within 100 meters of a confirmed case, updating them on number of confirmed cases for the day as well as enabling citizens to check routes of the confirmed cases of the day, on the district website.

- 'Test, trace, and isolate' is the ethos of South Korean public-health policy. South Korea's covid-19 response strategy sits atop three pillars: fast and free testing, expansive tracing technology, and mandatory isolation of the most severe cases. From previous SARS and influenza these epidemics, South Korean public-health officials recognized the necessity of early testing and the importance of isolating new patients to prevent secondary infections. an accelerated plan for designing, manufacturing, and distributing accurate tests. just one week after the country's first case was diagnosed, government officials urged medical companies to develop coronavirus test kits and told manufacturers to prepare for mass production. By March 5, South Korea had tested 145,000 people—more than the U.S., the U.K., France, Italy, and Japan combined.

- expansive high-tech tracing. In most countries, contact tracing refers to the practice of interviewing recent patients to learn where, when, and to whom they might have passed along the disease. South Korea combines that approach with high-tech surveillance made possible by the post-MERS legislation. To expand contact tracing, government it gave health authorities warrantless access to CCTV footage and the geolocation data from the new patients' phones. To increase transparency, the new laws required local governments to send prompt alerts, such as emergency texts, to disclose the recent whereabouts of new patients.

- installation of temperature cameras in office building lobbies

- to spare hospitals from being overrun with patients, as they were in another epidemic in 2015, Korean officials opened 600 testing centers and pioneered the use of drive-through testing stations to reduce face-to-face contact indoors.
- separation of the sick from the healthy—and the somewhat sick from the extremely sick. Patients are divided into several groups. The elderly and those with serious illnesses go straight to hospitals. Moderately sick people are sent to isolation dorms, where they are monitored. And the asymptomatic “contacts” of recently diagnosed cases are asked to self-quarantine at home and use separate bathrooms, dishes, and towels from their cohabitants. Health-service officials check in twice daily to monitor their symptoms.
- foreign arrivals self-isolate for two weeks.
- Koreans arriving from overseas are required to download an app that registers their symptoms in the days after their arrival. The app notes if reported symptoms require hospitalization or mandatory quarantine.
- South Korea’s Ministry of Health has for months held daily briefings to update the public and convey best practices, such as social distancing and handwashing. These briefings are held by scientists, not politicians.

[source: <https://www.theatlantic.com/ideas/archive/2020/05/whats-south-koreas-secret/611215/>]

VIETNAM

81.1% confirmed patients who recovered; 0% confirmed patients who died

- Even though Vietnam is one of the poorest nations in Southeast Asia, with GDP per capita of barely \$2,500, shares a 1,444 km border with China, they effectively managed spread of the disease. when the number of Covid-19 cases in China sharply increased in the last week of January, Vietnam decided to seal its northern border. By February 26, Vietnam had limited the number of coronavirus cases to 16 and all of those affected had recovered.
- reinfection by tourists and returning nationals in March resulted in second wave of infections. On March 21 authorities began imposing a 14-day quarantine on all foreign arrivals, as well as on the establishments they visited. Local administration meticulously traced each single person who may have been affected, and quarantined entire streets as well as villages out of the fear of epidemic outbreak.
- at the end of March, Vietnam decided to impose a quasi-quarantine. Restaurants, cafes, shops, and businesses catering to the public were shut down and street vendors were told to stay home.
- Vietnamese scientists develop their own test for Covid-19 as early as January and managed to improve it to provide results within 80 minutes with a 90% accuracy. In March, Vietnamese tests began being produced at scale and was marketed abroad at a cost ranging from 16 to 24 euros.
- early restrictive measures and partial lockdown. It hit hardest the travel and hospitality sectors. Most of the hotels in the country are closed and domestic flights have been halted.
- Local authorities provide free face masks and rice to these people from the so-called “rice ATMs” located in main cities. Moreover, the government began paying out monthly benefits to those who have no unemployment insurance.
- on April 23 the quasi-lockdown came to an end and the country reopened for business.
- in the 21-day sequence between April 16 and May 7, 2020, it reported zero new infections.

[source: <https://theconversation.com/vietnams-prudent-low-cost-approach-to-combating-covid-19-136332>]

5 DISCUSSION-STATE PRIORITIZATION AND POSSIBLE SOLUTION

5.1 STATE PRIORITIZATION

After creating Level rating variables (1-5) for death count, percentage population lost and percentage confirmed who died, all States with a Level rating 3-5 were selected as priority States to be supported and resourced since they have lost the most number of people and losing more from confirmed cases when compared to other states

Table 6: State Prioritization

State	Total deaths (count)	Death count Level	State	Percent population dead	Population loss Level	State	Percent confirmed who died	Confirmed loss Level
New York	23,587	5	New York	0.1212	5	Michigan	9.164	5
New Jersey	7,228	4	New Jersey	0.08146	4	Connecticut	8.286	4
Michigan	3,789	2	Connecticut	0.0633	3	New York	7.749	3
Massachusetts	3,562	2	Massachusetts	0.0512	3	Louisiana	6.818	2
Pennsylvania	2,475	1	Louisiana	0.0410	2	Minnesota	6.690	2
Illinois	2,355	1	Michigan	0.0380	2	Indiana	6.246	2
Connecticut	2,257	1	Rhode Island	0.0251	1	Oklahoma	6.136	2
California	2,031	1	Pennsylvania	0.0193	1	New Jersey	6.116	2
Louisiana	1,905	1	Maryland	0.0189	1	Massachusetts	5.767	1
Florida	1,268	1	Illinois	0.0186	1	Washington	5.705	1

Sub-setting all Levels 3-5 results in the following State Prioritization list: -

State	Total deaths	Percent population dead	Percent confirmed dead
New York	23,587	0.1212	7.749
New Jersey	7,228	0.0814	6.116
Michigan	3,789	0.0379	9.164
Massachusetts	3,562	0.0513	5.767
Connecticut	2,257	0.0633	8.286

5.2 PROPOSED ACTIONS

From measures rolled out by countries which successfully achieved high recovery and low deaths, maximizing resources for the following measures is recommended to help manage the situation in these 5 most affected states:

- **Review, Reflection and Resource Re-allocation.** Bi-weekly review of what is working, what is not working and moving resources to more effective measures.
- **Full lockdown.** Full 21-day lockdown in these 5 States. Geospatial analysis, case mapping + frequent monitoring of patients.
- **Close borders.** Temporarily close borders of these 5 States for these 21 days.
- **Testing, Tracing, Surveillance systems.** During this full lockdown each of these 5 States must get new key systems up and running to effectively manage borders, and do contact tracing, testing, and surveillance as well as installation of temperature cameras in the most frequented venues in these 5 States.
- **Remote monitoring.** Increase remote patient monitoring to decongest health facilities which minimizes disease spread at health facilities as well as leaving manageable levels of patients which improves service delivery.
- **Telehealth subsidy.** Provision of subsidized telehealth services for all
- **Healthcare staff quarantine.** Quarantine of all healthcare professionals who cared for COVID-19 patients in different facilities such as hotels so that they do not also contribute to disease spread in their neighborhoods.
- **Mobile app.** Development of a mobile application for alerting people of proximity of a confirmed case, also providing relevant information to the people i.e. mitigation measures being implemented, rationale, daily confirmed cases, as well as enabling them to do route mapping of confirmed cases to avoid mingling with affected further spreading the disease
- **Surface disinfection.** More frequent disinfection of surfaces at identified popular venues in each of these 5 States.
- **Patient separation.** Separation of the healthy from the moderately sick, from the extremely sick and close contacts of confirmed cases
- **Free masks.** Provide free masks to low income groups
- **Protective wear.** Fine tune protective wear supply chain to ensure health workers are adequately provided for.

6 CONCLUSION

- ▶ **Every life matters.** Targeted actions must be mixed to achieve Prevention, Testing, Treatment, Tracing, Containment, and Information dissemination. The chosen actions must help in preventing or slowing down infections, rapidly testing to detect new cases and take swift action, providing support to and monitoring of sick patients to prevent loss of life, informing confirmed patients enough to minimize further spread, protecting responders and care givers.
- ▶ **Monitoring, Review, Evaluation and Adjustment** are required to ensure resource prioritization of measures which are effectively contributing to reduced loss of life and minimizing disease spread.
- ▶ **Unity of purpose.** All political and administrative barriers to rapid decision making which can save more lives must be lowered; political differences must be set aside to focus on the core objective during this crisis-Saving Lives
- ▶ **Healthcare facility capacity.** Overwhelming current health centers will be detrimental as such a congregation exposes everyone in that facility to other health risks. There should be strict monitoring of health center capacity in hard hit States like New York. If capacity has been exceeded, buildings with large interior open areas must be quickly converted to emergency bays to enable them to cater for the critically ill without exposing them to more risks from overcrowding.
- ▶ **Information.** Without knowledge, people perish. Information must be packaged to reach different audience in the U.S. i.e. the unexposed, the exposed and the confirmed patients. Information dissemination is critical to keep the public well informed of how to minimize risk of exposure, how to protect oneself if in a high exposure environment and how to take care of oneself and those around you if you test positive. This will also minimize panic and fear, people are afraid of what they do not know.
- ▶ **Hope.** Sharing information on how others have recovered will also restore hope in the nation.

7 ANNEX

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