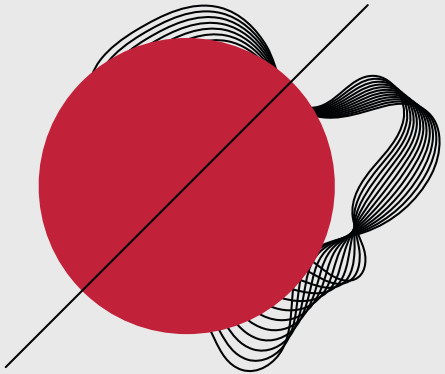
COVID-19 Data Analytics

Lutfi Nur Hakim



01.
EXPLORATORY DATA ANALYSIS

Answering some questions
on the COVID-19 situation

MOST/LEAST CASES?

```
combined_29_5.sort_values(by = "Confirmed").iloc[[-1,-2,-3,-4,-5]]
```

Date	Country/Region	Confirmed	Deaths	Recovered	Active
2021-05-29	US	33251939	594306	0	32657633
	India	27894800	325972	25454320	2114508
	Brazil	16471600	461057	14496224	1514319
	France	5719877	109518	390878	5219481
	Turkey	5235978	47271	5094279	94428

```
combined_29_5.sort_values(by = "Confirmed").iloc[[0, 1,2, 3, 4]]
```

Date	Country/Region	Confirmed	Deaths	Recovered	Active
2021-05-29	Micronesia	1	0	1	0
	Kiribati	2	0	0	2
	Samoa	3	0	3	0
	Vanuatu	4	1	3	0
	Marshall Islands	4	0	4	0

Most

1. US
2. India
3. Brazil
4. France
5. Turkey

Least

1. Micronesia
2. Kiribati
3. Samoa
4. Vanuatu
5. Marshall Islands

MOST/LEAST DEATHS?

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	Brazil	16471600	461057	14496224	1514319
	India	27894800	325972	25454320	2114508
	Mexico	2411503	223455	1924865	263183
	UK	4496823	128037	15481	4353305

```
combined_29_5.sort_values(by = "Deaths").iloc[[0, 1,2, 3, 4]]
```

Date	Country/Region	Confirmed	Deaths	Recovered	Active
2021-05-29	Solomon Islands	20	0	20	0
	Micronesia	1	0	1	0
	Saint Kitts and Nevis	68	0	45	23
	Macau	51	0	49	2
	Samoa	3	0	3	0

Most

1. US
2. Brazil
3. India
4. Mexico
5. UK

Least

1. Solomon Islands
2. Micronesia
3. Saint Kitts & Nevis
4. Macau
5. Samoa

02.

ANALYSIS 1

Investigating success of
lockdowns on infection rate

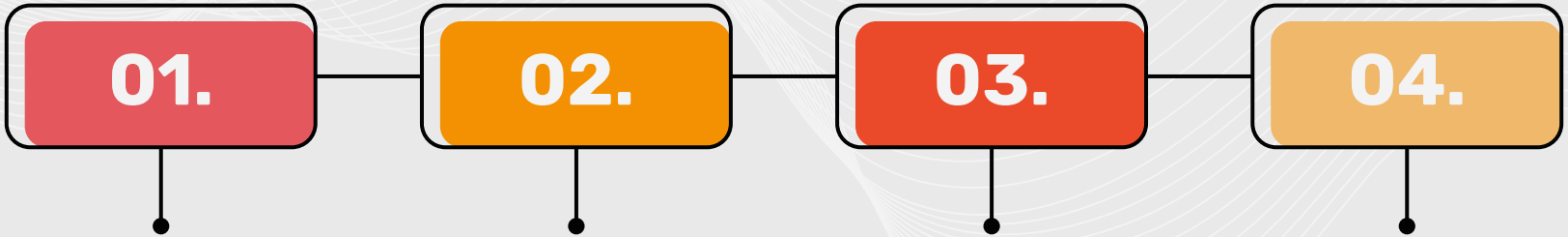
INSPIRATION

- Lockdowns commonly adopted by governments around the world
- Were these lockdowns worth the trouble?

HYPOTHESIS

Lockdowns would be effective in reversing upward trend on new cases as forecasted from pre-lockdown phase

THE PLAN



Research

Identify countries that went through lockdowns

Observe

Observe pre-lockdown phase with upward trend on new cases

Forecast

Project new cases during lockdown period

Compare

Compare forecast with actual new cases during lockdown

DATA PREPARATION

1. Subset country data by conditioning on “Country/Region” column
2. Group by “Date” column (if necessary) and sum case counts
3. Create “New” case column based on current and previous day
4. Subset lockdown and pre-lockdown data by conditioning on “Date” column
5. Create forecasting dataframe to export and manipulate in Excel
6. Utilize obtained equation to forecast “New” cases during lockdown period
7. Create visualizations to identify success/failure of lockdown

RESEARCH

	Lockdown 1 Start	Lockdown 1 End	Lockdown 2 Start	Lockdown 2 End
Singapore	07/04/2020	01/06/2020	16/05/2021	13/06/2021
Austria	16/03/2020	13/04/2020	03/11/2020	30/11/2020

Source: https://en.wikipedia.org/wiki/COVID-19_lockdowns#Table_of_pandemic_lockdowns

RESEARCH

	Lockdown 1 Start	Lockdown 1 End	Lockdown 2 Start	Lockdown 2 End
Singapore	07/04/2020	01/06/2020	16/05/2021	13/06/2021
Austria	16/03/2020	13/04/2020	03/11/2020	30/11/2020

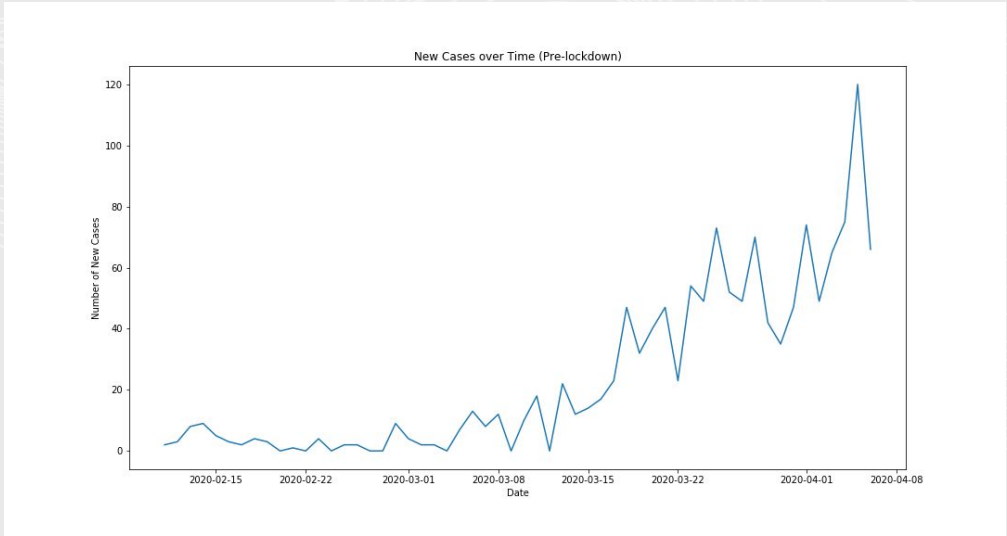
Source: https://en.wikipedia.org/wiki/COVID-19_lockdowns#Table_of_pandemic_lockdowns

02.1

SINGAPORE

07/04/2020 - 01/06/2020

PRE-LOCKDOWN DATA



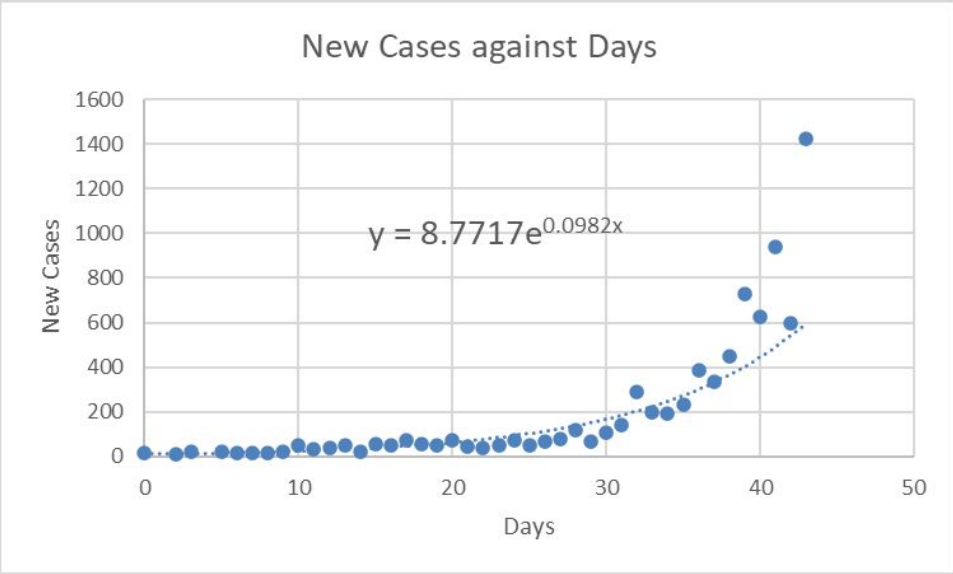
Trend

Increasing at an increasing rate

Formulation

Exponential function

EXPONENTIAL EQUATION



Days

Days after “07/03/2020” (first day used in forecast calculations)

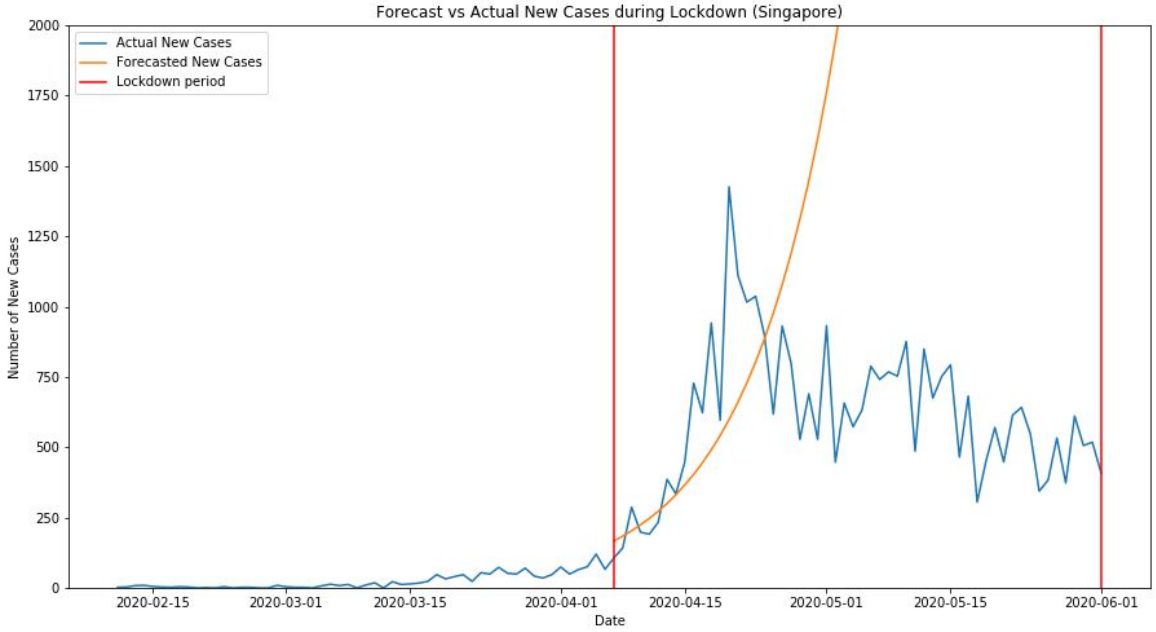
Formula

$N = 8.7717e^{0.0982t}$

N = number of new cases

t = days after “07/03/2020”

EVALUATE LOCKDOWN

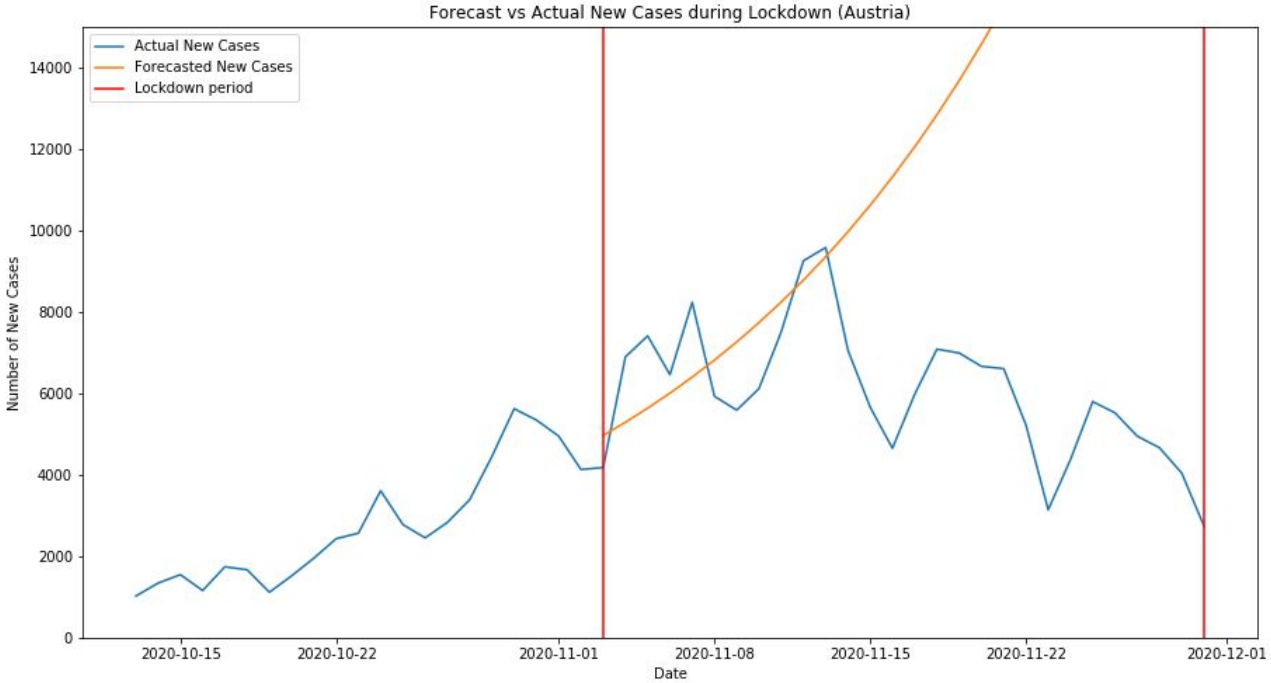


02.2

AUSTRIA

03/11/2020 - 30/11/2020

EVALUATE LOCKDOWN



CONCLUSION

Lockdown Success

Lockdowns appear to be effective in combating a rise in COVID-19 cases

Rationale

Limit social interaction

⇩

Limit virus spreading opportunities

⇩

Prevent actual spread within community

03.

ANALYSIS 2

Investigating impact of selected factors on COVID-19 mortality rate

INSPIRATION

- COVID-19 is an illness affecting the respiratory tract
- Do countries with high prevalence of asthma have higher COVID-19 mortality rates?
- Do countries with poor air quality have higher COVID-19 mortality rates?

HYPOTHESIS

Countries with higher prevalence of asthma/poor air quality would have higher COVID-19 mortality rates

THE PLAN

Research

Identify countries with high asthma prevalence/poor air quality

Calculate

Calculate respective countries' mortality rates

Compare

Create visualization of mortality rate with respect to each country

DATA PREPARATION

1. Subset dataframe based on respective countries
2. If countries have multiple "Provinces", groupby "Date" and sum values for "Confirmed", "Deaths", "Recovered", "Active" cases
3. Calculate different mortality rates
4. Create labelled bar charts to compare different countries with different proportion of population with asthma

RESEARCH

	Proportion of Population with Asthma (%)
Australia	21.5
Sweden	20.2
UK	18.2
Turkey	2.06
Bosnia and Herzegovina	1.4
China	1.4

Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3353191/

RESEARCH

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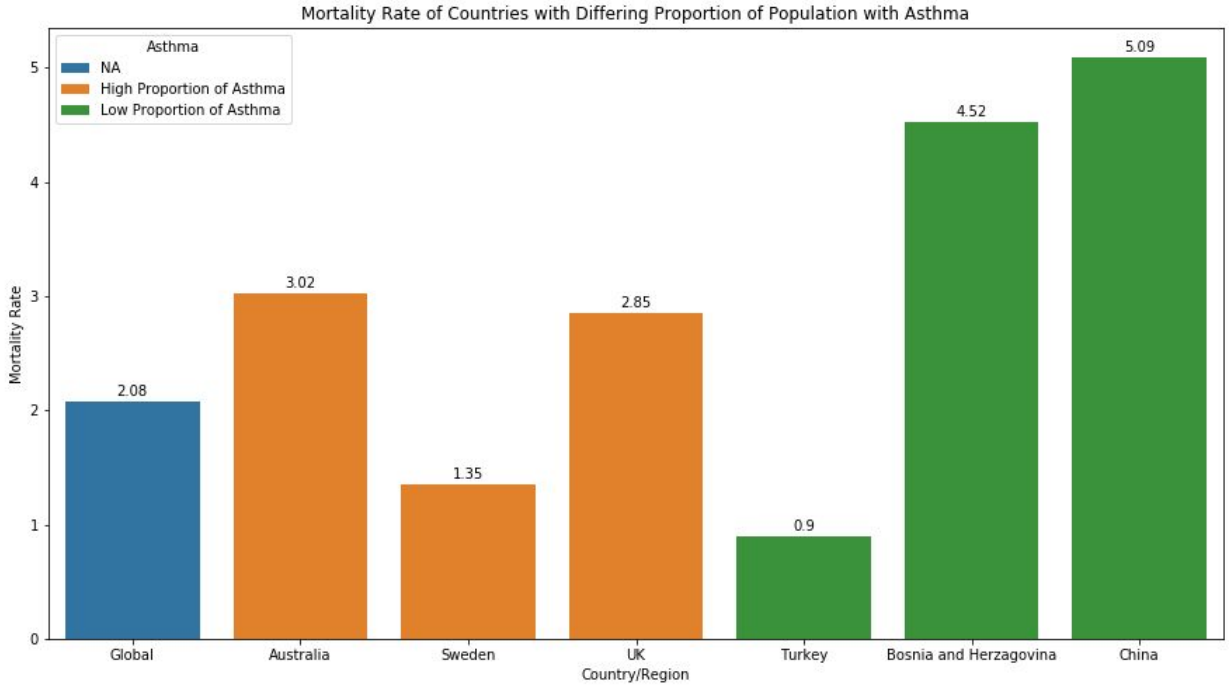
MORTALITY RATE & ASTHMA



RESEARCH

	Air Quality (PM2.5)
India	173
Bangladesh	94
Mongolia	92
Poland	27
Italy	27
South Korea	27

Source: https://en.wikipedia.org/wiki/List_of_most-polluted_cities_by_particulate_matter_concentration

RESEARCH

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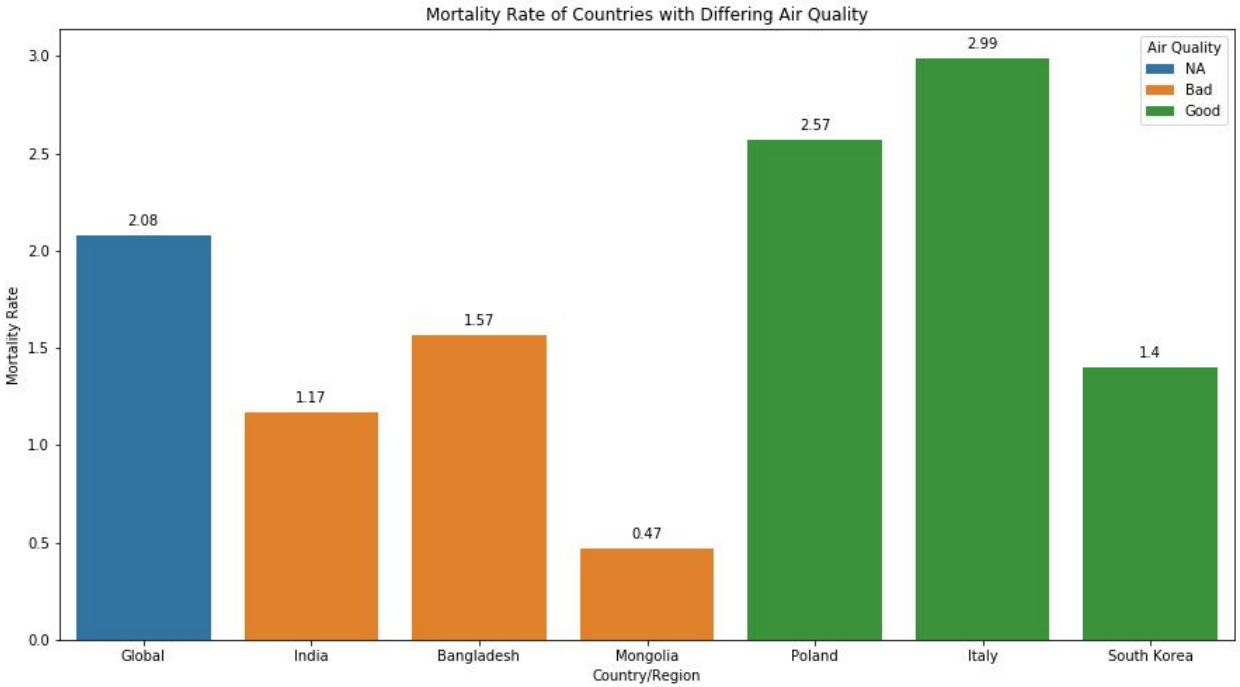
MORTALITY RATE & AIR QUALITY



CONCLUSION

Asthma Prevalence

Inconclusive as to whether countries with high asthma prevalence have higher COVID-19 mortality rates

Air Quality

Inconclusive as to whether countries with poor air quality have higher COVID-19 mortality rates

POSSIBLE IMPROVEMENTS

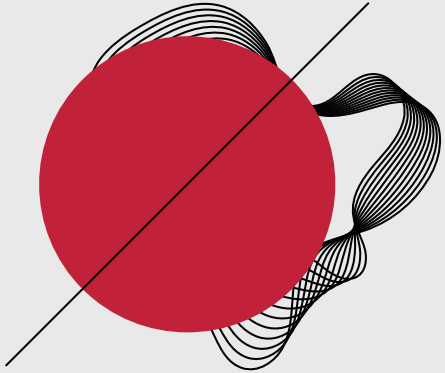
Asthma Analysis

Lack of data on COVID-19 case's asthma condition

Air Quality Analysis

Online resource supported initial hypothesis
Joint analysis of countries ineffective

Source: https://www.lung.org/blog/covid-19-mortality-and-air-pollution



THANKS!

Do you have any questions?

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