**Learning from Others in the Connected World**
**Work Together for the Better World**

# Understanding COVID-19 through the Lens of Data Analytics II: Developing Countries

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**ARIC appreciates the medical staff, street bureaucrat, and citizen who never give up to COVID-19 but demonstrate the power of our community.**

✓ Are the developing countries more affected than the rich by COVID-19?

✓ Do the developing countries have higher fatality rate?

✓ Do the developing countries take more time to reach at the peak of COVID-19?

✓ Do the developing countries with more doctors show faster recovery trend?

Need to check the <u>**fact**</u> and <u>**details**</u> with data
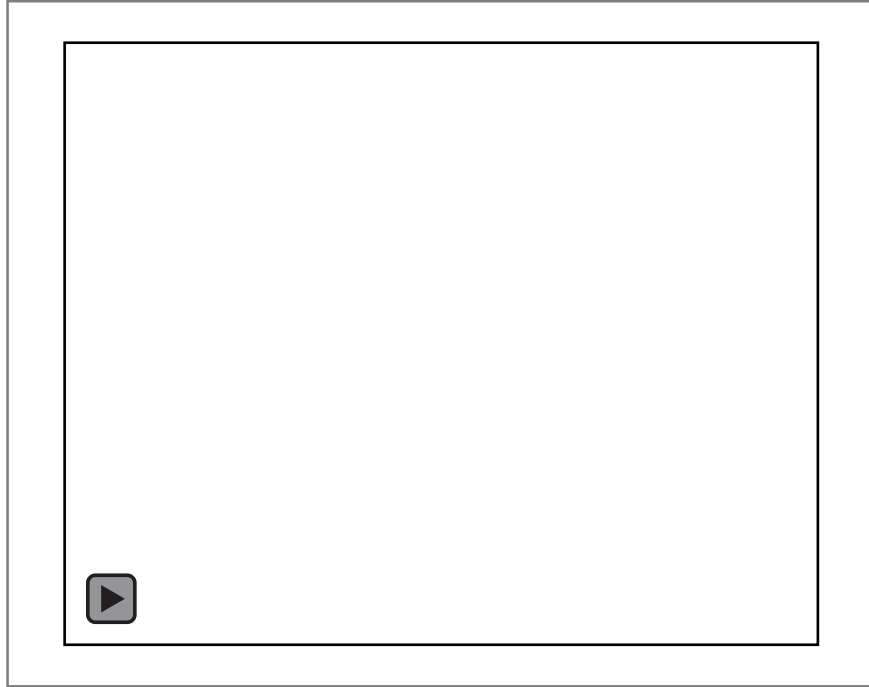
International Travel bans 20200123

Domestic Travel bans 20200123
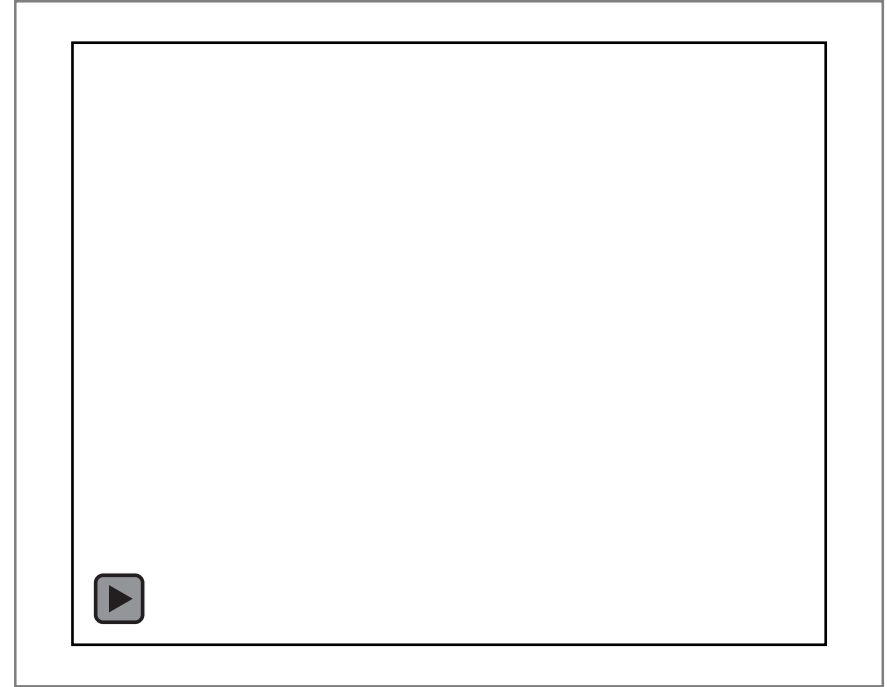
nan - 0.00
0.00 - 10.00
10.00 - 11.00
11.00 - 20.00
20.00 - 21.00

School closing 20200123

nan - 0.00
0.00 - 10.00
10.00 - 11.00
11.00 - 20.00
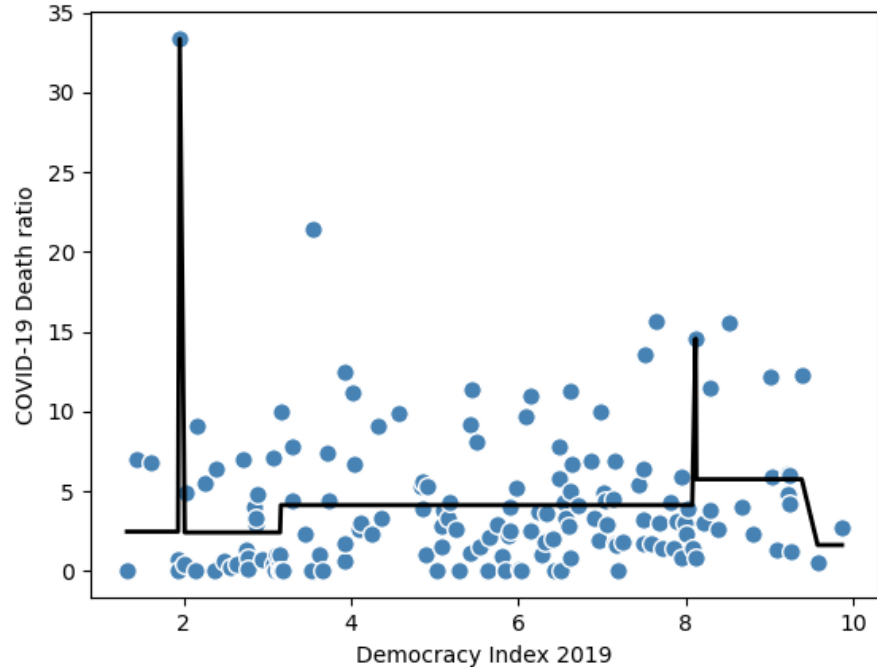20.00 - 21.00

[ Social Distancing : Low ]
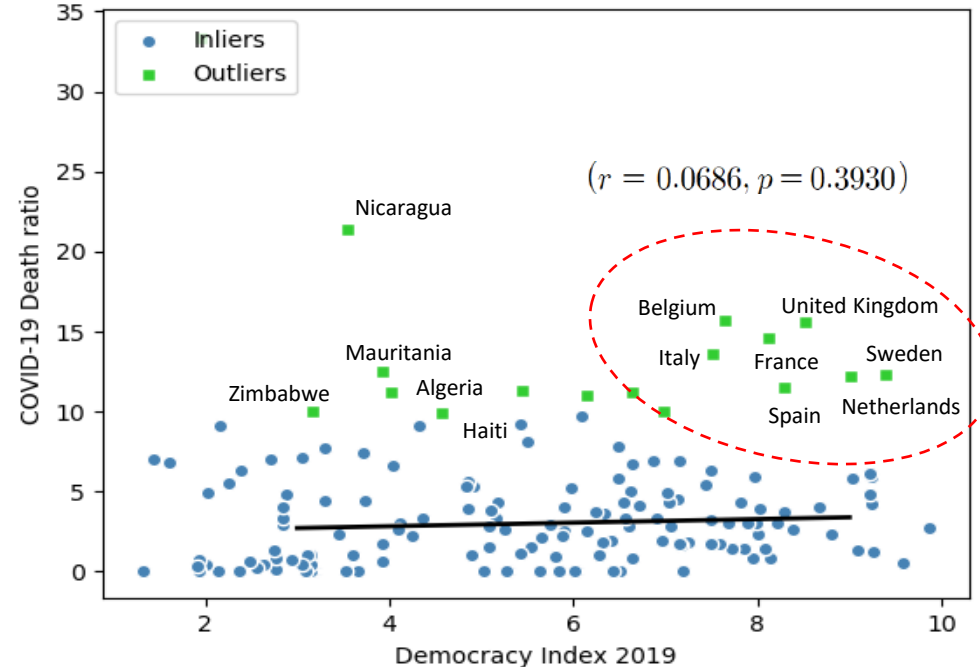
[ Social Distancing : High ]

# • Correlation between Democracy Index 2019 and COVID-19 mortality rate

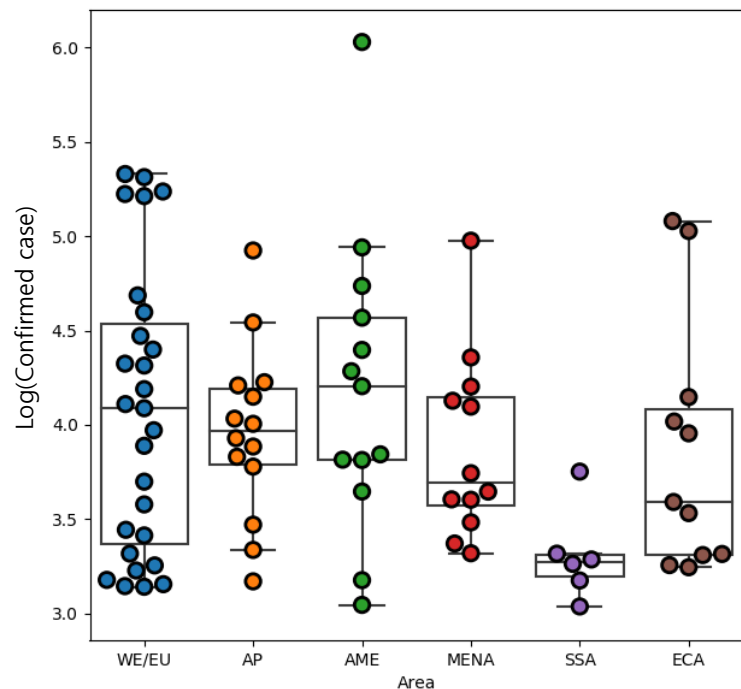[ Scikit-learn : Decision Tree Regressor ]

[Scikit-learn : Random sample consensus – Outlier ]



There was no significant correlation between the Democracy index 2019 and COVID-19 mortality. but In cross-country comparisons, European countries appeared as outliers, unlike the general case.

## • COVID-19 Confirmed case by World Region (2020.04.30)



| | Analysis of Variance | | | | | | R-Square | 0.4835 |
|---|---|---|---|---|---|---|---|---|
| Source | | DF | Sum of Squares | Mean Square | F Value | Pr > F | Adj R-Sq | 0.4199 |
| Model | | 9 | 17.47155 | 1.94128 | 7.59 | <.0001 | | |
| Error | | 73 | 18.66193 | 0.25564 | | | | |
| Corrected Total | | 82 | 36.13348 | | | | | |

| Parameter Estimates | | | | | | |
|---|---|---|---|---|---|---|
| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > |t| |
| Intercept | Intercept | 1 | 3.75447 | 0.24652 | 15.23 | <.0001 |
| old | old | 1 | -0.00812 | 0.01577 | -0.51 | 0.6083 |
| CPI | CPI | 1 | 0.00387 | 0.00418 | 0.93 | 0.3573 |
| POPD | POPD | 1 | 0.00002692 | 0.00006755 | 0.40 | 0.6914 |
| Trade | Trade | 1 | 0.00000107 | 1.58034E-7 | 6.78 | <.0001 |
| WE | WE | 1 | -0.05176 | 0.22638 | -0.23 | 0.8198 |
| AP | AP | 1 | -0.34533 | 0.22575 | -1.53 | 0.1304 |
| AME | AME | 1 | 0.05772 | 0.21727 | 0.27 | 0.7912 |
| SSA | SSA | 1 | -0.58012 | 0.29045 | -2.00 | 0.0495 |
| MENA | MENA | 1 | -0.11200 | 0.25519 | -0.44 | 0.6620 |

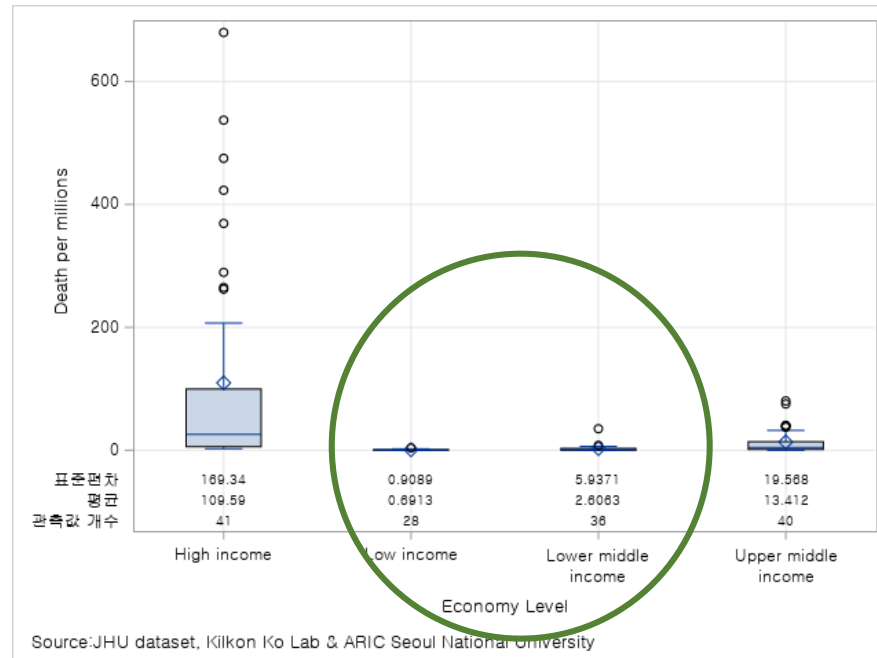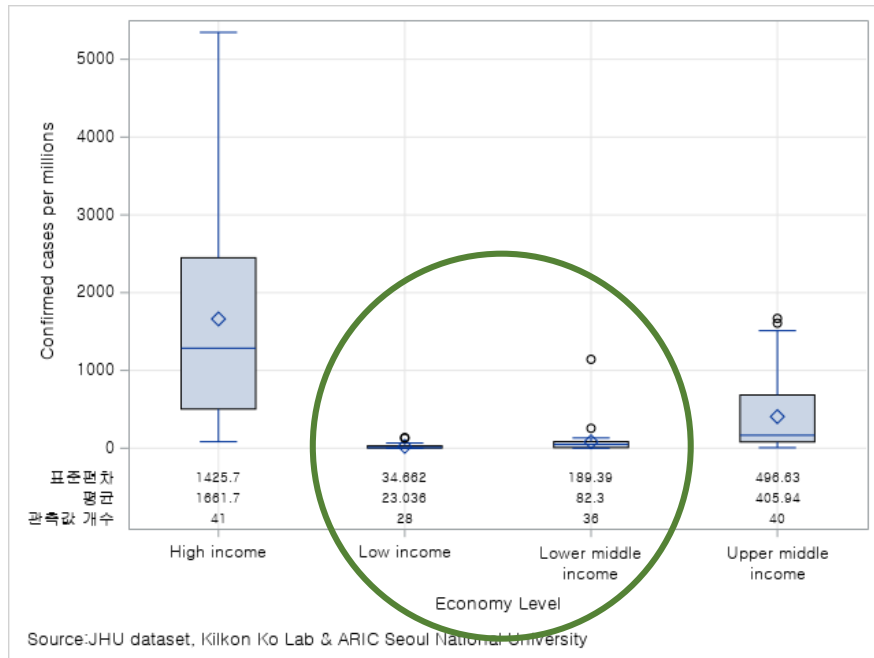| ID | Region |
|---|---|
| WE/EU | Western Europe & EU |
| AP | Asia Pacific |
| AME | Americas |
| SSA | Sub-Saharan Africa |
| MENA | Middle East & North Africa |
| ECA | Eastern Europe & Central Asia |

As a result of analyzing by adding dummy variables for each World Region in 83 countries where more than 1,000 confirmed cases occurred, the Log(Confirmed case) was large when the WTO merchandise Trade volume was high (1% significance level)

Data: JHU, As of May 6, 2020
2019 WB criteria. The income is as of 2018 income.

| Group | Income Range |
|---|---|
| Low income | ~ 1,025USD |
| Lower-middle | 1,025~3,995USD |
| Upper middle | 3,996~12,375USD |
| High | 12,376 USD~ |

▶ NO!! Developed countries are more heterogeneous than the developing countries



Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University



Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

Note: countries less than "1 million Pop" are excluded from the analysis

High income countries took longer time to reach the peak of new cases (around 37 days)



Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University



Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University
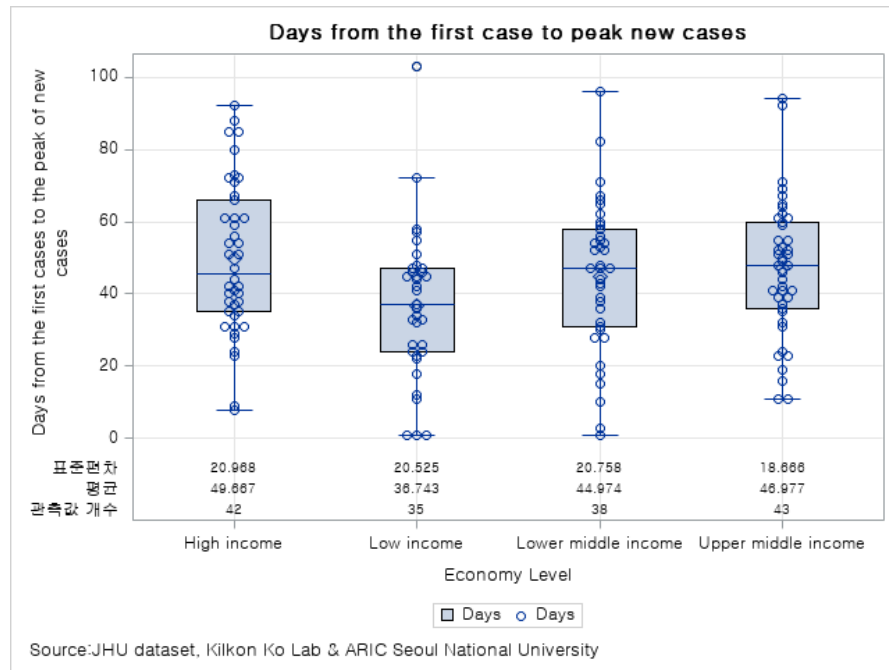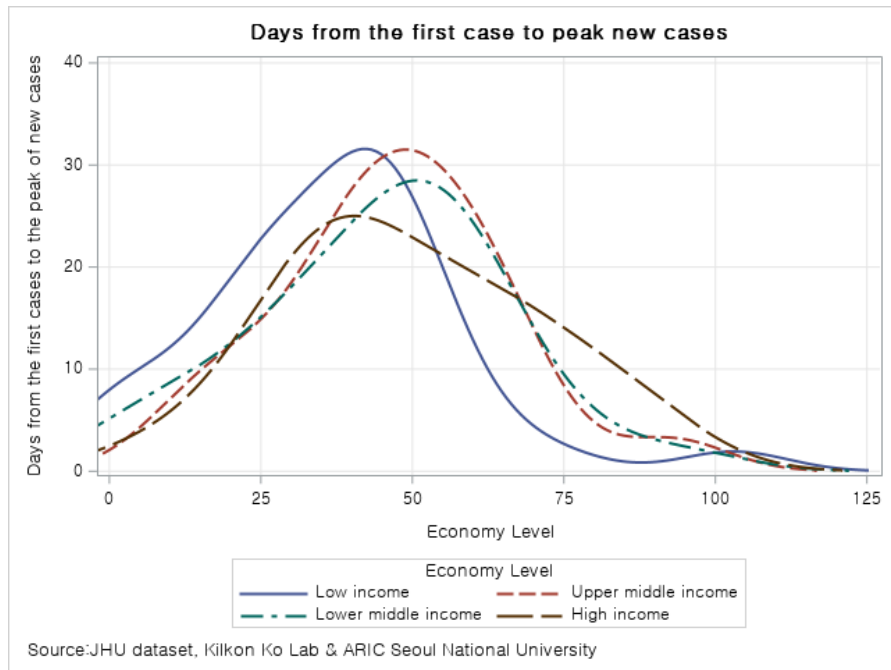
After the first 50 cases,
lower-middle income countries took 28 days to reach their peak of new cases
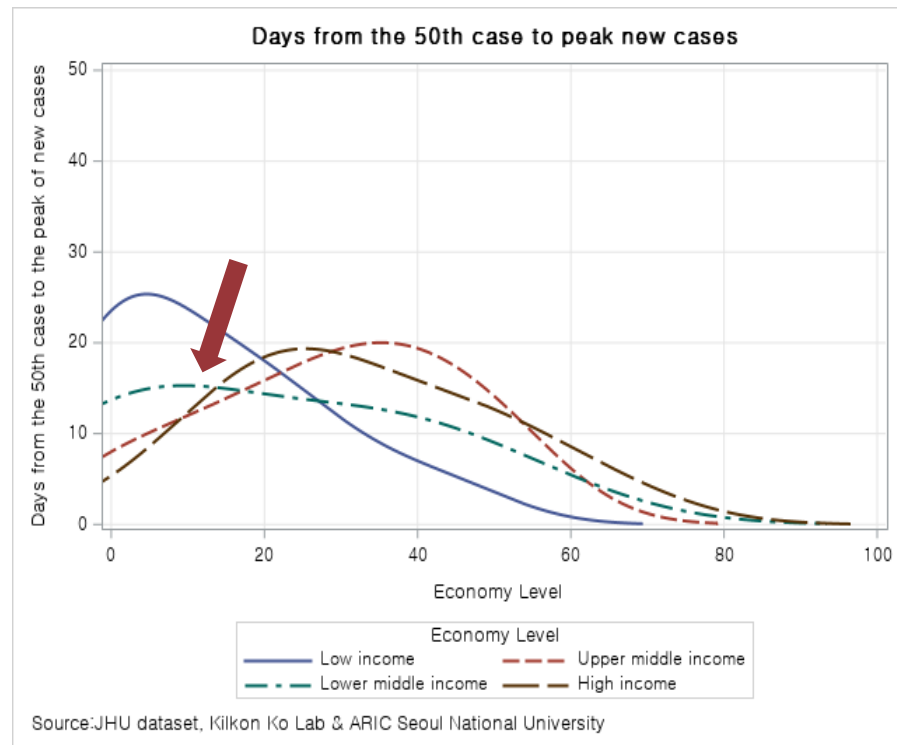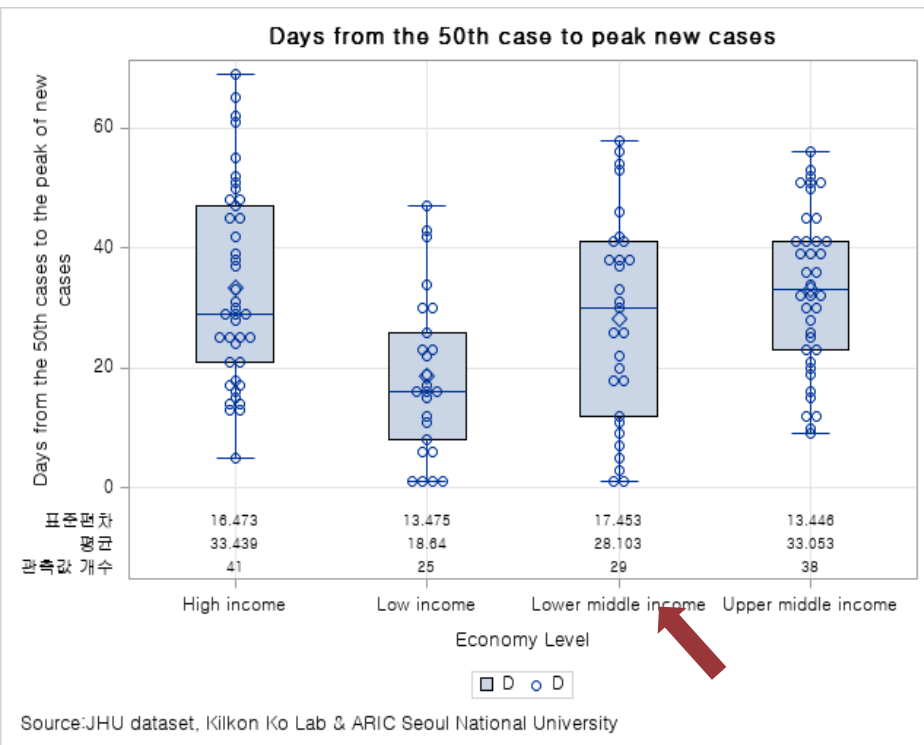
Countries in Africa is less affected than other countries.



Days from the 50th case to peak new cases

Source: JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

Days from the 50th case to peak new cases

Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University
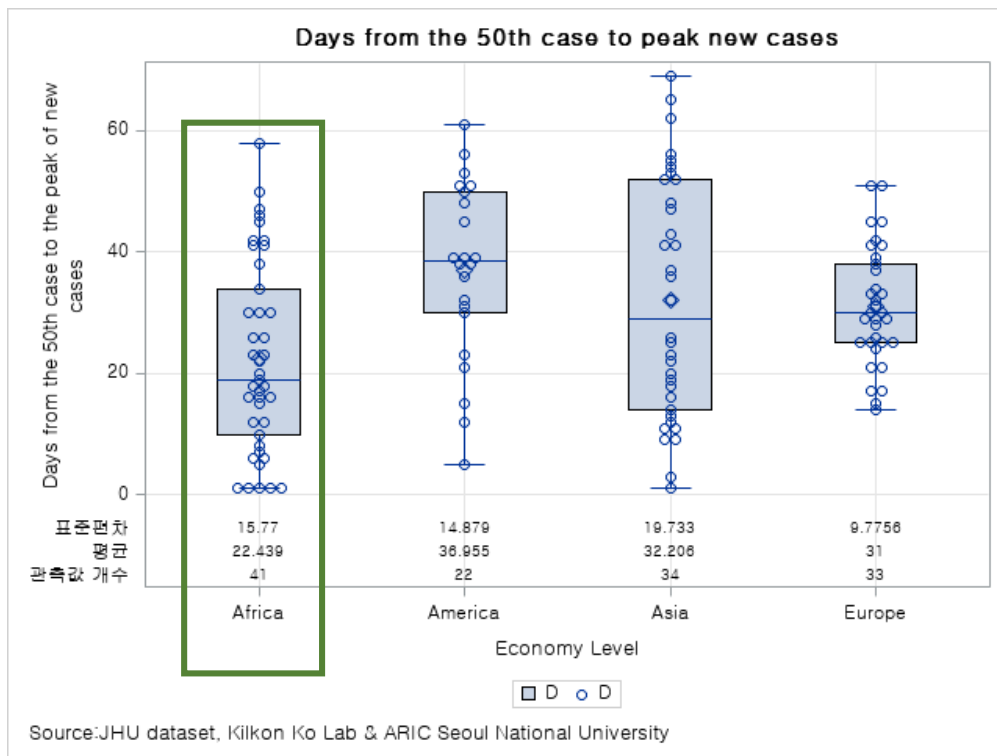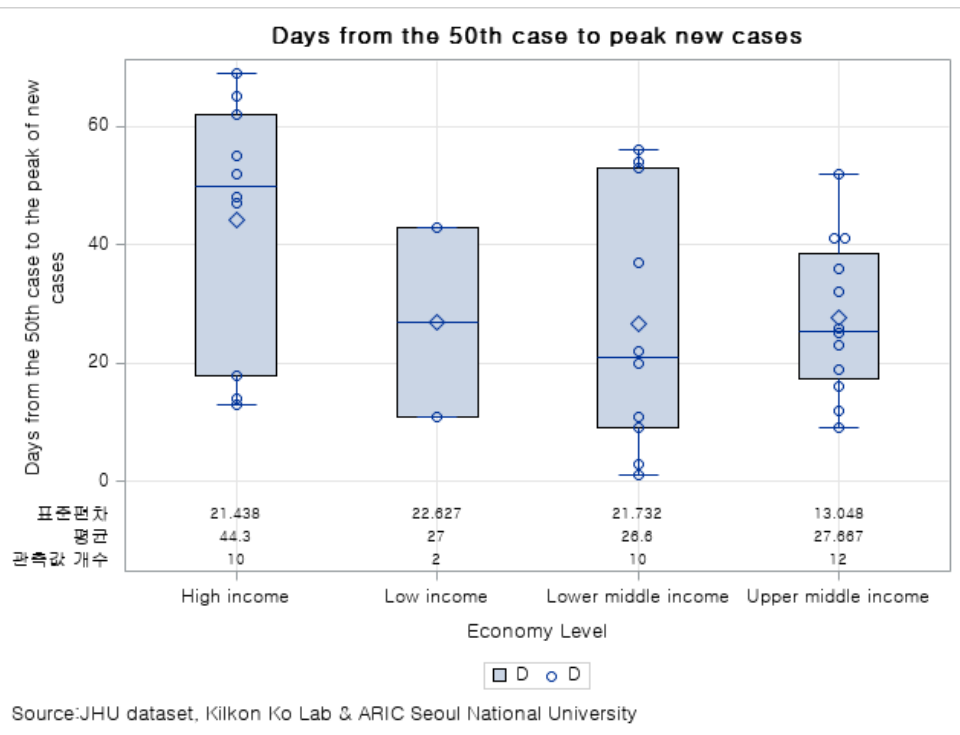
Even within Asia,
the <u>high income countries</u>
took a <u>longer time</u>
to <u>reach the peak</u> of new cases

▶ Opposite! There is a <u>positive correlation</u> between GDP and infection per million.



Relationship between GDP and per million infection cases
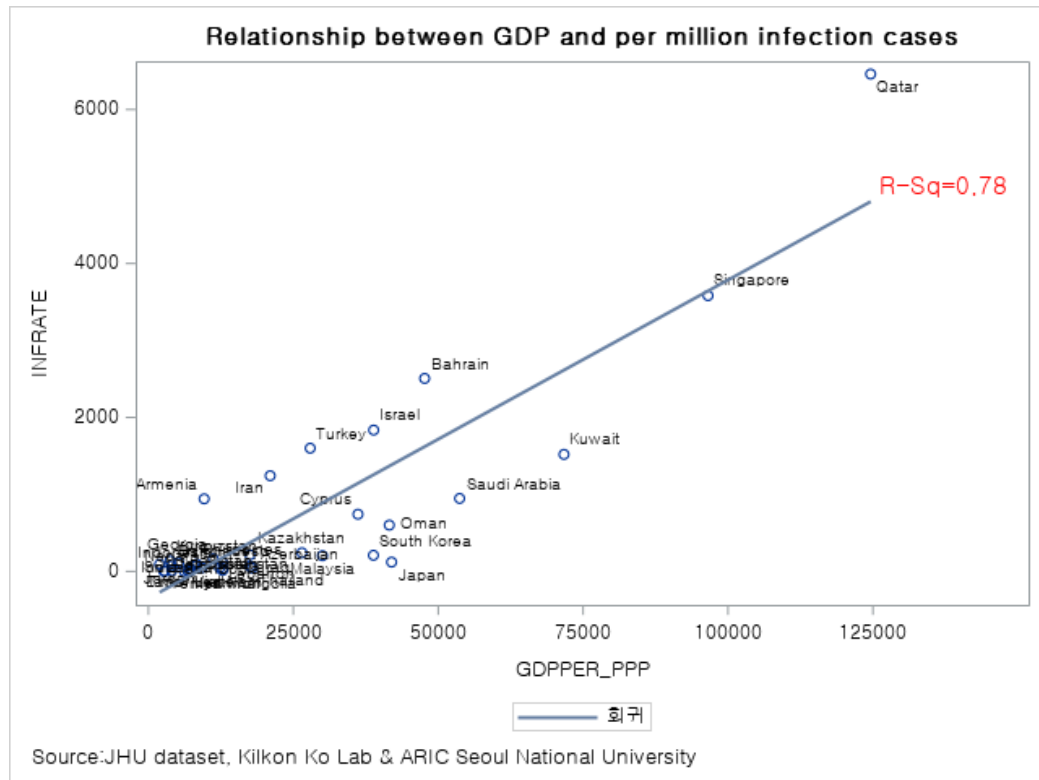
Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

▶ No! Although the rich countries has less fatality rate, the relationship is not strong.
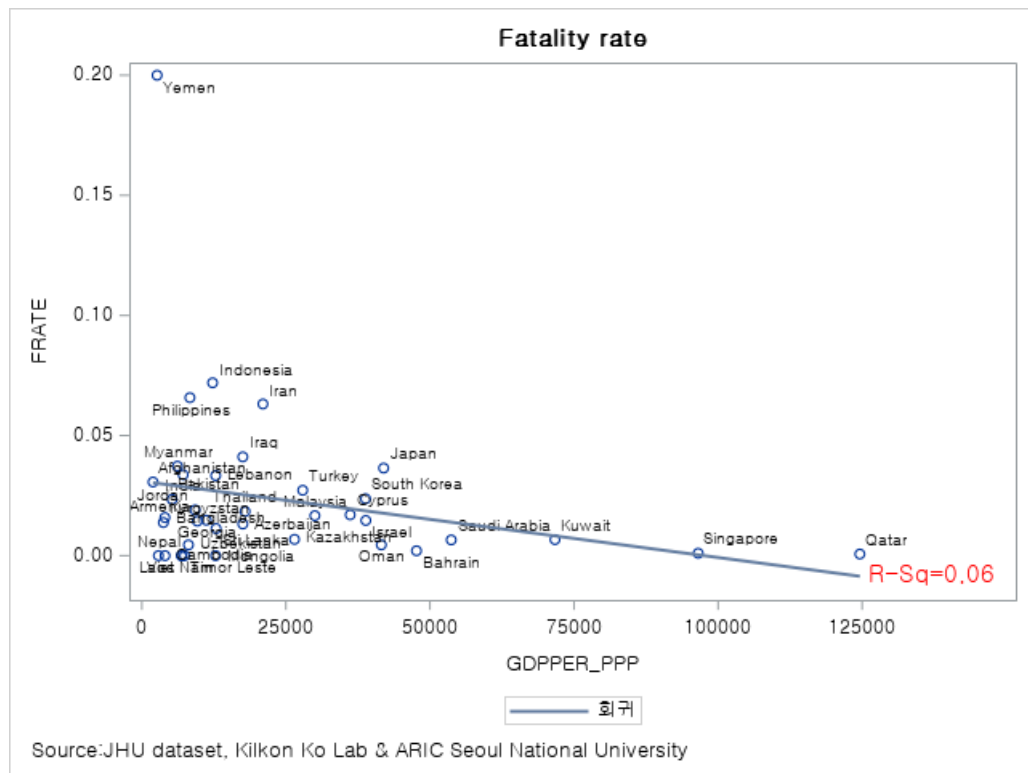


Fatality rate

Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

## Asia
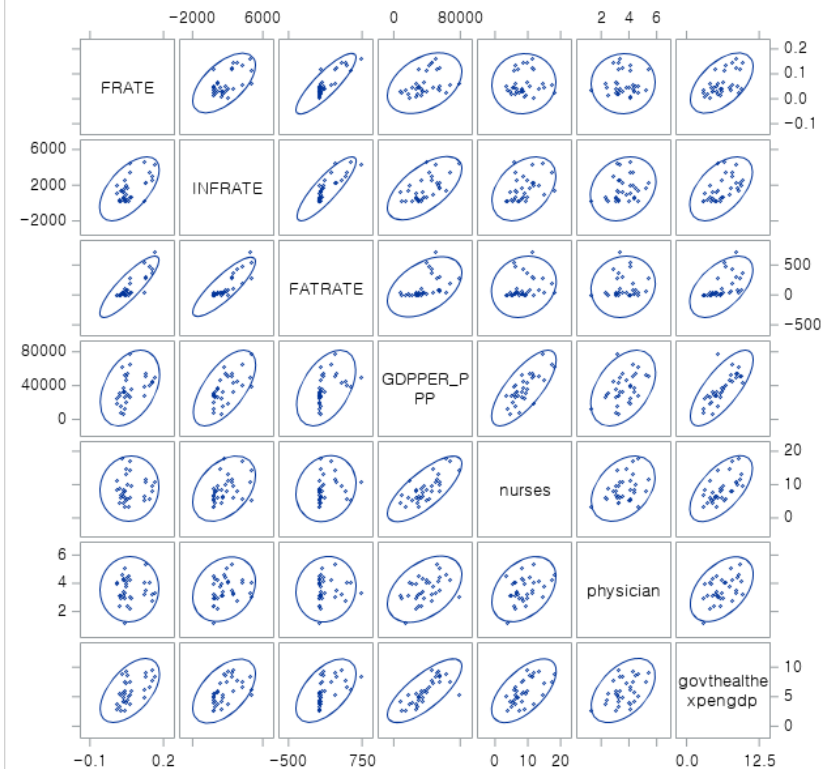
## Europe



Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University

**Europe**, DV=Infection per million

| Parameter | Estimate | Standard Error | T-value | Pr > \|t\| |
|---|---|---|---|---|
| Intercept | -31.7861000 | 870.4843583 | -0.04 | 0.9711 |
| GDPPER_PPP | 0.0541753 | 0.0216362 | 2.50 | 0.0184 |
| nurses | -70.0105017 | 80.3508552 | -0.87 | 0.3910 |
| physician | -107.4719424 | 254.1848430 | -0.42 | 0.6757 |
| Govt.health.expen.gdp | 112.0446427 | 150.0109504 | 0.75 | 0.4613 |

**No!!**

✓ Cambodia has 122 cases but zero death
✓ Viet Nam has 270 cases but zero death
✓ Sri Lanka has 668 cases and 7 deaths

**This is the reason why we should look for success factors not based on general conjectures but on in-depth case studies.**



Trend of new case since the 50th case

Source:JHU dataset, Kilkon Ko Lab & ARIC Seoul National University
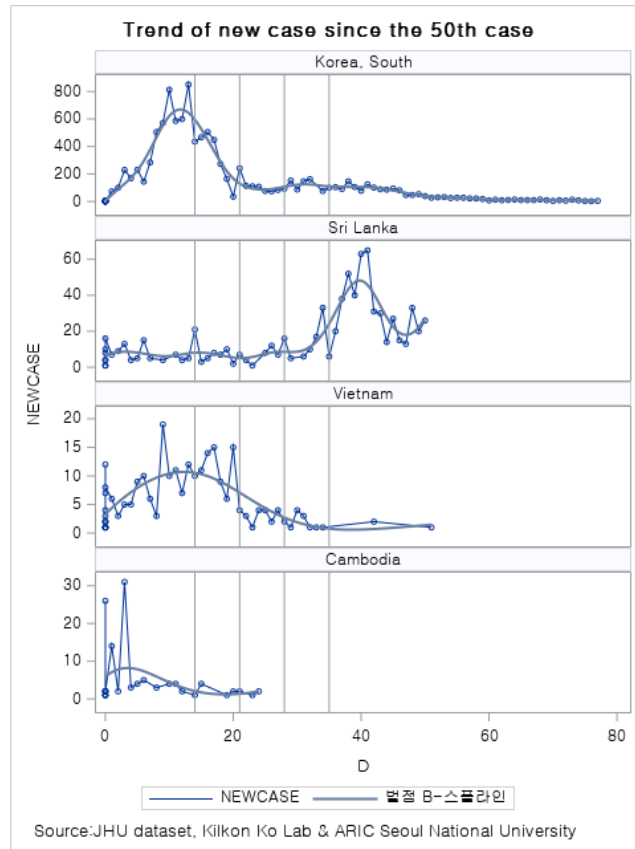
ARIC and SNU work for COVID-19 Country Report Series



So far, the 19 countries' COVID-19 reports have been made .

ARIC will add more with YOU !!!

As of May 3

| Country | 1<sup>st</sup> Confirmed Case | 2<sup>nd</sup> Confirmed Case | Total Confirmed | Total Death | # of conducted test | per 1,000 people |
|---------|-------------------|-------------------|-----------------|-------------|---------------------|------------------|
| Cambodia | Jan 27 | Mar 7 | 122 | 0 | 12,378 | 0.76 |
| Sri Lanka | Jan 27 | Mar 11 | 707 | 7 | 29,378 | 1.35 |
| Vietnam | Jan 23 | Jan 31 | 271 | 0 | 261,004 | 2.68 |

As of April 26 from Our World in Data

## What made them so successful in combating COVID-19?

Mandatory quarantine from abroad

Very Strong Social Distancing

Common Aspects of Responding COVID-19

Recognition of country's weakness

Importance of personal hygiene
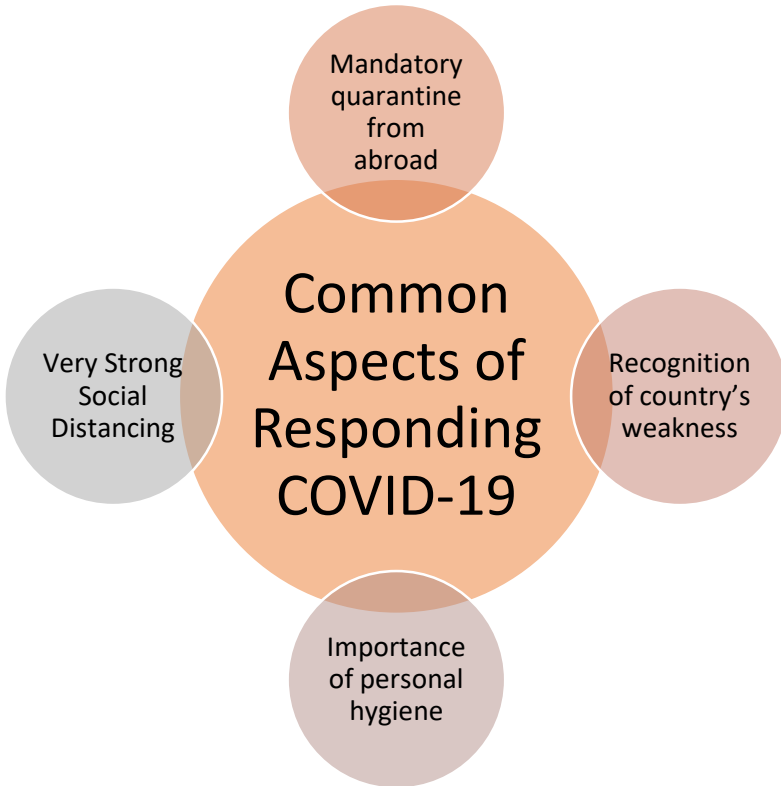
✓ Very strong "social distancing"

✓ Emphasizing the importance of personal hygiene including wearing masks

✓ Spontaneously realizing the country's limitations and prepare to the lack of quarantine system as a developing countries

✓ Mandatory quarantines for overseas inflow

- Cancelled the celebration of Khmer New Year (April 13-16)
  : implementing 'No-holiday' policy to all employees and officials

- Targeting the entire community of people, not the people.

- Less than 50% internet penetration rate, having a device to use Internet

- Television and radio as a medium of remote learning

- Smartphone and Facebook attracting viewers

- The availability of contents due to Open Education Repository (OER) and Others ([WB](#))

- As of 23 March, forty-five quarantine centers have been built in the country by the Sri Lanka Army as a preventive measure to tackle the coronavirus pandemic. (link)

- Tackling the misinformation and fake news by the government
1) Sri Lankan Police requested to the general public to not mislead themselves from rumors which are spread across social media platforms. (link)
2) Former MPS are currently under investigation for delivering false information to the public (link)

→ prevent the public from being panic
→ providing the adequate information at right timing

Densely populated neighbor of China

Weak healthcare system

Low budget for combating the coronavirus

one of the most susceptible countries to the COVID-19 at the beginning stage

# Vietnamese Governement declared fighting COVID-19 as a WAR

Immediate response policy implementations

1) Mobilizing on all fronts

2) Vietnam's surveillance state

3) War rhetoric



CHUNG SỨC ĐỒNG LÒNG CHỐNG DỊCH COVID - 19

join hands to combat the COVID-19 epidemic



**Việt Nam News** ✔
@VietnamNewsVNS

URGENT: Ministry of Health looks for passengers on flights with #COVID19 patients. Please check!vietnamnews.vn/society/654109 …#Vietnam #flights #coronavirus

MINISTRY OF HEALTH
**URGENT NOTIFICATION**
Updated 8h on 25/3/2020

HOTLINES: 19009095 - 19003228

The following flights were identified having passengers infected with COVID-19

| DATE | ORIGIN ► DESTINATION | | FLIGHT | |
|------|------|------|------|------|
| 15/3/2020 | Dubai | ► HCMC | EK 364 | Connecting from Emirates EK 30 from London to Dubai |
| 15/3/2020 | Moscow | ► Ha Noi | SU 290 | |
| 15/3/2020 | Bangkok | ► Ha Noi | TG 560 | Connecting from London |
| 17/3/2020 | Brunei | ► HCMC | BI 381 | Connecting from Malaysia |
| 19/3/2020 | Dubai | ► HCMC | EK 392 | Connecting from Emirates EK 4 from London to Dubai |
| 19/3/2020 | Japan | ► HCMC | NH 831 | Connecting from United States |
| 20/3/2020 | Tokyo | ► Ha Noi | JL 751 | |

Ministry of Health calls for all passengers on these flights immediately contact the City Disease Control Center for health monitoring instructions.
Travel agencies have responsibility for notifying the passengers purchasing air tickets on the flights mentioned above.

♡ 30    12:41 PM - Mar 25, 2020

💬 40 people are talking about this

- Social Consensus and Anti-epidemic campaign

  - Educational song about the virus + famous pop stars / posters

  - Launching a new app to alert the suspected infections

    → Make citizens feel "comfortable" to come over the pandemic situation

    → Criticism: is it voluntary?

- Strong Trust buildings (individuals - individuals & individuals – state)

  - Open communications using SNS, text messages and TV broadcasts

    → Rebuilding public trust

- Pre-emptive measures

  - Massive and aggressive testing

    → Could detect the possible infections readily in advance

▶ Heavily damaged labor-intensive industries
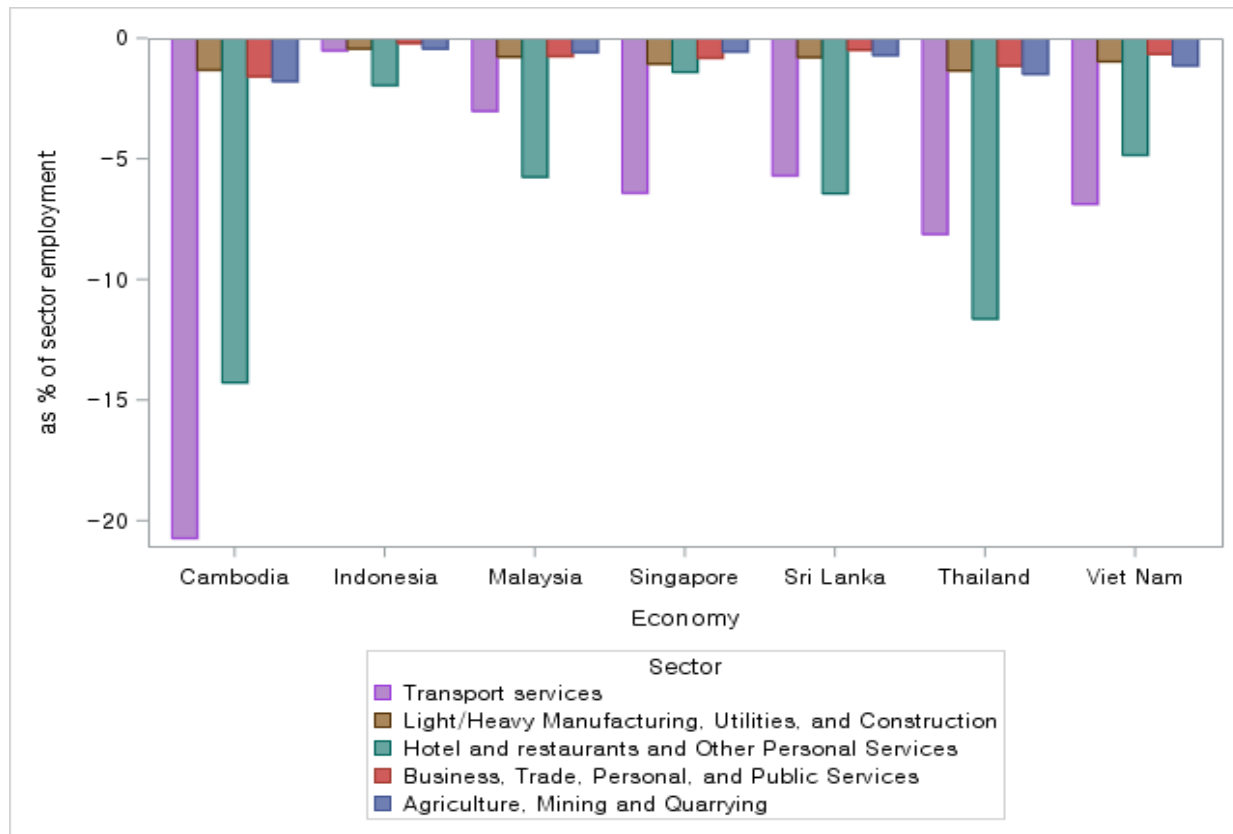


✓ Short-term

✓ mild impact scenario

✓ ADB

## Developing countries do their own ways of responding COVID-19

- Some of them are successful, others not

- Do not simply impose the ways that developed countries' approach
  (e.g. more hospital, more inspection, more IT, etc.) to developing countries

- It's time to understand the developing countries' way of response

- Post-Corona Impacts will be acute to developing countries

ARIC is open to all for broader collaboration !!!

# THANK YOU