Influence of Chinese city's hygiene on the SARS-CoV-2 transmission

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Value and impact

Theoretical implication: how does hygiene impact the virus transmission, which will help to understand the transmission dynamics of the virus.

Practical implication: to evaluate the effectiveness of national hygienic cities, which will promote city hygiene in China and beyond.

Background

- Transmission dynamics of this emerging infectious disease haven't been fully understood
- Previous research shows the air quality may influence the virus transmission

Methods

National hygienic city

- Ninety-three reconfirm national hygienic cities in China in 2018, this is the newest list of national hygienic city.

Total confirmed cases

- nCov2019 packages
- Excluding infected arrivals from abroad

Move-out data before lockdown

- Baidu Qianxi
- Inspect elements
- 16 days (Jan 10,2020 - Jan 25,2020)
- Each city's move-out strength is presented as a percentage
- Total move-out strength was adjusted by each day's move-out strength.

Results

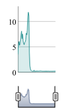

Figure 1. Move out trend from Wuhan. Move the selector at the bottom of figure to explore the trend at date you are interested in.

preserveff05f6cd2908d30b
Figure 2. A comparision of Tianmen and Shiyan

preserveae64fafa8d84d552
Figure 3. A comparision of all cities outside Wuhan

Future work

- Case-control match of hygienic cities and non-hygienic cities
- Multiple linear regression to total confirmed cases
- The difference in mortality & recovery time
- Detailed hygiene condition

Conclusions

- Lockdown of Wuhan effectively cut-down its move-out.
- Top 10% move-out cities from Jan are all in Hubei province
- The national hygienic city may not have significantly better control of the epidemic
- The outliers with weak epidemic control, are more likely to be non- national hygienic city

Limitations

- The transmission may start in early January, 2020 or earlier.
- The move-out data from Wuhan does not include transportation means
- The real performance of local government varies in response to this emerging infectious disease

Contact

- Scan the QR code for this `<project's website>` to find more information.
- There is a version of interactive poster, click `<here>` to view the interactive poster and its source code on github.

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The poster template was from Dr.Peng Zhao's `<xjtlu package>`.

Packages of `<tidyverse>`, `<leafletCN>`, `<plotly>`, `<knitr>` were used in data analysis and visualization.

References

1. Li H, Xu X-L, Dai D-W, Huang Z-Y, Ma Z, Guan Y-J. Air Pollution and temperature are associated with increased COVID-19 incidence: a time series study. International Journal of Infectious Diseases. Published online 2020. `<doi:10.1016/j.ijid.2020.05.076>`
2. Iha Y, Kinjo T, Parrott G, Higa F, Mori H, Fujita J. Comparative epidemiology of influenza A and B viral infection in a subtropical region: a 7-year surveillance in Okinawa, Japan. BMC Infect Dis. 2016;16(1):650-650. `<doi:10.1186/s12879-016-1978-0>`