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

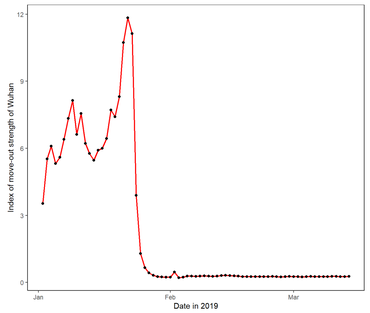

Figure 1: Move out trend from Wuhan

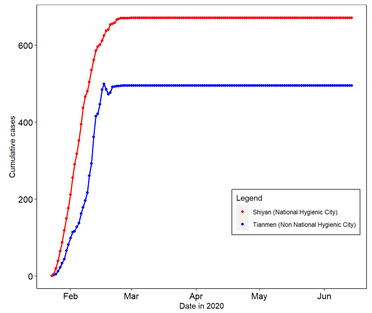

Figure 2: A comparision of Tianmen and Shiyan

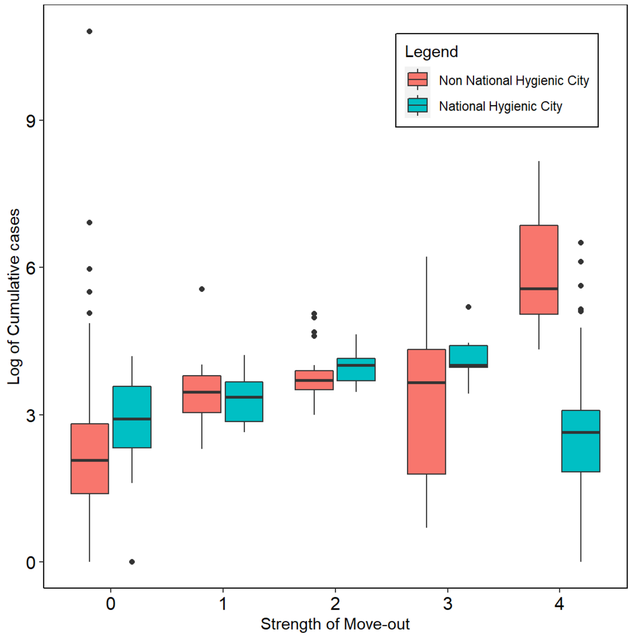

Figure 3: A comparision of all cities outside Wuhan

Conclusions

- Lockdown of Wuhan effectively cut-down its move-out.
- Top 10% move-out cities are 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

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

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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Acknowledgements

Data were from <Baidu Qianxi>, Dr.Guangchuang Yu's <nCov2019 packages>, and <National Health Commission of the People's Republic of China.>

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>