

THE LANCET

Infectious Diseases

Supplementary appendix

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Supplement to: Ghafari M, KadivarA, Katzourakis A. Estimates of anti-SARS-CoV-2 antibody seroprevalence in Iran. *Lancet Infect Dis* 2021; published online Feb 15. [http://dx.doi.org/10.1016/S1473-3099\(21\)00053-0](http://dx.doi.org/10.1016/S1473-3099(21)00053-0).

Table S1: Comparing the percentage of exposure in 18 cities of Iran based on seroprevalence data in late April/early June¹ to provincial estimates for population-level exposure based on excess mortality by the end of spring (20 June 2020) and summer (21 September 2020) 1399 in solar Hijri². (.) shows the 95% confidence intervals.

| Province | City | City-level exposure | Province-level exposure in spring | Province-level exposure in summer |
|--------------------|------------|---------------------|-----------------------------------|-----------------------------------|
| Khuzestan | Ahvaz | 9.4%(0.7-21.6) | 16%(12-19) | 47%(37-57) |
| Ardabil | Ardabil | 20.0%(3.2-46.8) | 13%(10-17) | 37%(28-47) |
| Mazandaran | Babol* | 22.4%(11.9-35.1) | 21%(15-27) | 35%(25-45) |
| Esfahan (Isfahan) | Esfahan | 2.7%(0.0-9.8) | 9%(6-11) | 21%(15-27) |
| Golestan | Gorgan | 43.9%(31.4-58.3) | 31%(24-38) | 56%(44-69) |
| Hamedan | Hamedan | 8.3%(1.6-17.0) | 6%(4-8) | 24%(17-31) |
| Kerman | Kerman | 8.2%(2.2-16.6) | 3%(2-4) | 21%(13-26) |
| Kermanshah | Kermanshah | 17.3%(5.3-30.9) | 9%(6-11) | 22%(16-28) |
| Razavi Khorasan | Mashhad | 14.8%(8.2-23.1) | 7%(5-8) | 29%(22-36) |
| Qom | Qom | 58.5%(37.2-83.9) | 36%(28-44) | 57%(44-69) |
| Gilan (Guilan) | Rasht | 72.6%(53.9-92.8)† | 28%(19-36) | 33%(22-44) |
| Kurdistan | Sanandaj | 1.7%(0.0-6.0) | 14%(11-18) | 41%(31-51) |
| Mazandaran | Sari* | 14.7%(7.8-22.4) | 21%(15-27) | 35%(25 - 45) |
| Fars | Shiraz | 7.3%(1.2-14.5) | NA** | 14% (10 - 17) |
| East Azerbaijan | Tabriz | 5.6%(0.0-13.0) | 9%(6-11) | 25% (18 - 32) |
| Tehran | Tehran | 16.3%(13.5-19.5) | 8%(6-11) | 22% (16 - 28) |
| West Azerbaijan | Urmia | 10.0%(0.2-24.3) | 6%(5-8) | 24% (18 - 30) |
| Sistan-Baluchistan | Zahedan | 12.1%(2.3-23.3) | NA** | 24% (20 - 27) |
| Overall | Overall | 17.0%(14.6-19.5) | 10%(2-17) | 27% (20 - 34) |

*Babol and Sari are both located in Mazandaran province.

**No excess mortality was recorded in this province during spring.

†The authors note that their estimated prevalence for Rasht might be biased due to reasons outlined in the discussion². A more recent seroprevalence study in Rasht suggests the level of exposure in this city was 23.7% (18.6-29.6) by the end of April³.

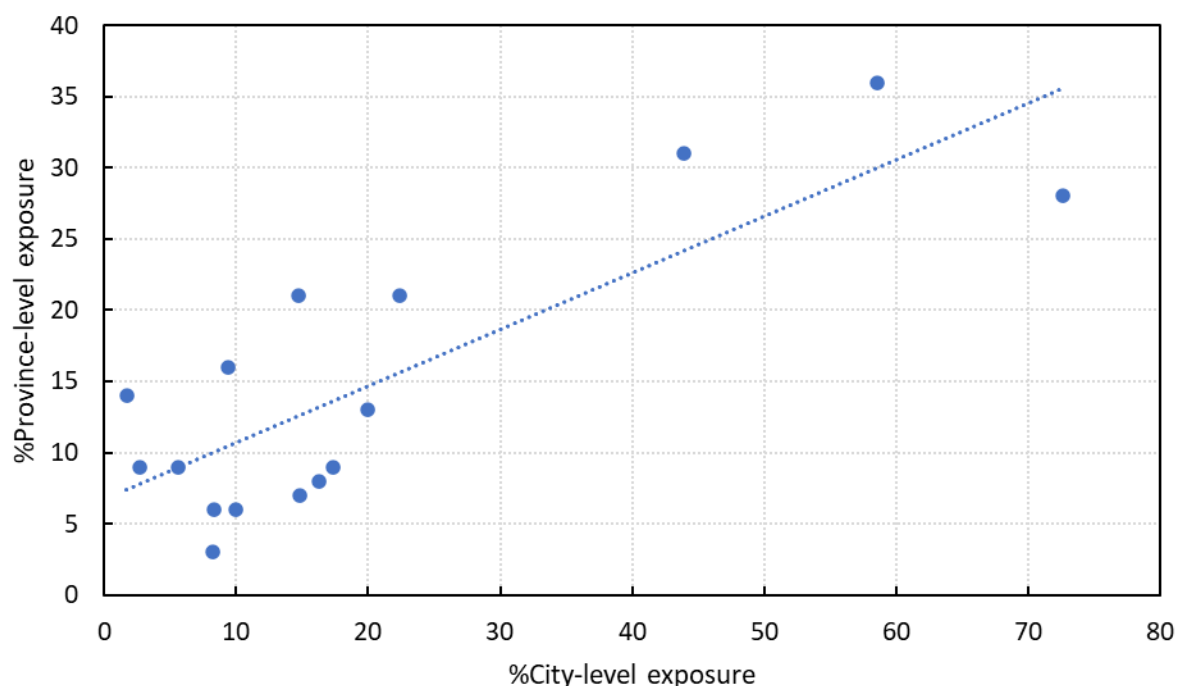


Figure S1: A regression analysis based on the percentage of city-level seroprevalence estimates in late April/early June and percentage of provincial-level estimates by the end of spring (20 June 2020) according to seasonal excess mortality data. The line of best fit (dashed line) corresponds to $R^2 = 0.67$. This analysis excludes Fars and Sistan-Baluchistan provinces which did not show significant levels of excess mortality in spring [3]. If we include those two provinces with an assumed zero excess deaths in spring (and include the two cities, Shiraz and Zahedan, with their corresponding seroprevalence estimates), then the correlation drops to $R^2 = 0.63$. Also, if we remove the 72.6% exposure in Rasht based on seroprevalence as an outlier data, the correlation increases to $R^2 = 0.71$ (and $R^2 = 0.66$ if we assume the two provinces have zero excess deaths). In all these instances, the p-value is very significant ($p < .001$).

References

1. Poustchi H, Darvishian M, Mohammadi Z, et al. SARS-CoV-2 antibody seroprevalence in the general population and high-risk occupational groups across 18 cities in Iran: a population based cross-sectional study. *Lancet Infect Dis* 2020; published online Dec 15. [https://doi.org/10.1016/S1473-3099\(20\)30858-6](https://doi.org/10.1016/S1473-3099(20)30858-6).
2. Ghafari M, Kadivar A, Katzourakis A. Excess deaths associated with the Iranian COVID-19 epidemic: a province-level analysis. *medRxiv* 2020; published online Dec 8. <https://doi.org/10.1101/2020.12.07.20245621> (preprint).
3. Shakiba M, Nazemipour M, Salari A, et al. Seroprevalence of SARS-CoV-2 in Guilan province, Iran, April 2020. *Emerg Infect Dis* 2020; published online Dec 21. <https://doi.org/10.3201/eid2702.201960>.