

Graphic detail | Power of inequality

A minority of people with covid-19 account for the bulk of transmission

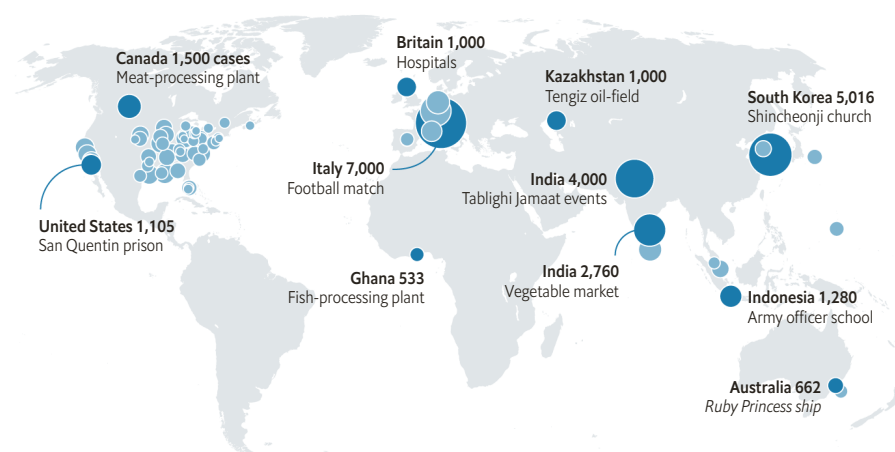
In two Indian states 10% of people caused 60% of subsequent infections

Nov 7th 2020

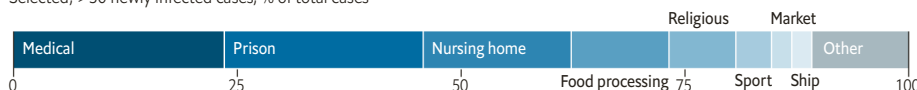
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→ A large share of covid infections are caused by “super-spreading” events

Super-spreading events
Selected, >300 newly infected cases



Setting of super-spreading events
Selected, >30 newly infected cases, % of total cases



VILFREDO PARETO, a 19th-century economist, famously observed in 1896 that 20% of the people in Italy held 80% of the wealth. Pareto’s law has been found to apply to countless social and natural phenomena. Covid-19 is no exception. Just as economists use the Gini coefficient to measure income inequality, epidemiologists use a dispersion parameter, κ , to measure the spread of infections caused by infectious individuals. When κ is zero one individual causes all subsequent infections; as it rises so do the number of infectors.

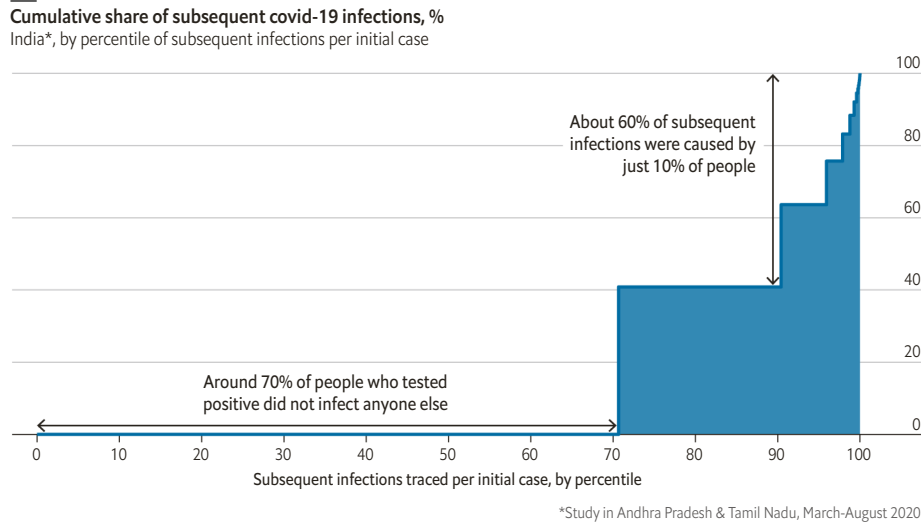
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While many people worry about the reproduction number, R_0 —the average number of infections caused by an infectious individual—experts think the dispersion figure matters, too. Research published recently in *Science* attempts to estimate it more accurately. The paper, by Ramanan Laxminarayan of Princeton University and eight co-authors, gleaned information from test and tracing in two Indian states. The

were subsequently tested for covid-19.

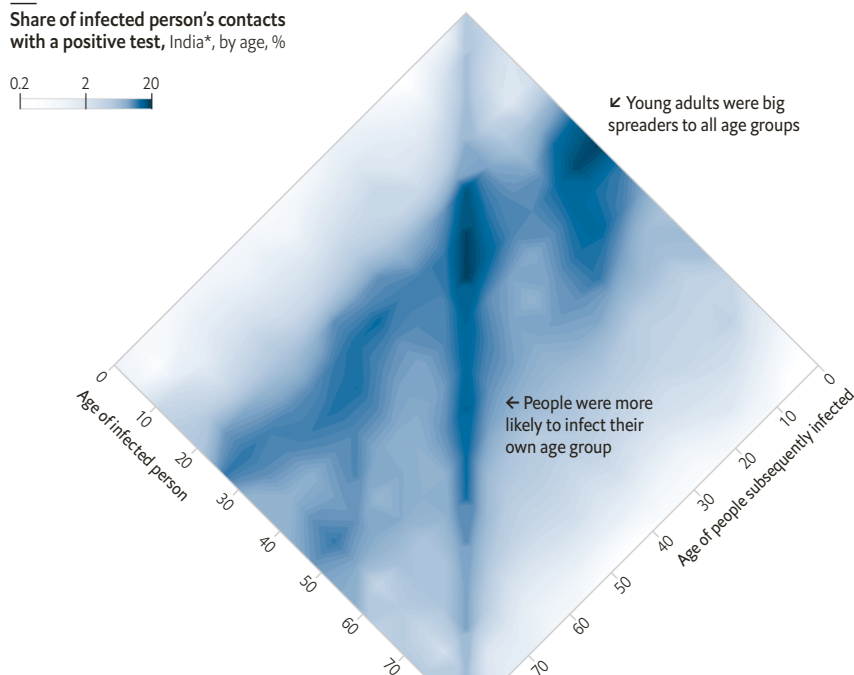
→ **A small share of the population is responsible for a majority of infections**



The study finds that covid-19 transmission is highly concentrated. Of all the contacts traced, 7.5% subsequently tested positive for covid-19 (assumed to be caused by exposure to the infected person identified). Yet the academics find that these infections stem from a minority of originally infectious individuals. Fully 71% of infected people did not transmit the virus on. Most new transmissions were from a few “super-spreaders”: about 10% of the people caused 60% of new infections, giving covid to three other people, on average.

The κ -factor does however depend on how people interact. Early on, studies found a κ close to zero, as a few highly contagious individuals had ample opportunity to spread the disease. As social distancing is enacted to curb outbreaks, the dispersion parameter tends to increase. This new study, in line with others from Hong Kong and China, finds that κ among all 85,000 infectors is around 0.5.

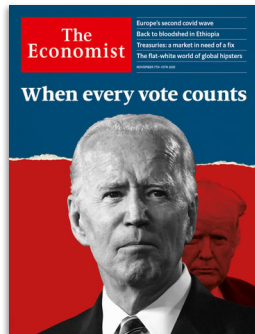
→ **Transmission was more common among similarly aged people**



The authors' treasure trove of data gives clues to how those infections happen. Risk of infection is greatest in private homes and among similarly aged people. That is corroborated by evidence from 1,600 covid-19 "super-spreading" events. Such transmission occurs most often in large buildings, while just three documented events have taken place outdoors. ■

Sources: "Epidemiology and transmission dynamics of covid-19 in two Indian states", by R. Laxminarayan et al., *Science*, 2020; Koen Swinkels

This article appeared in the Graphic detail section of the print edition under the headline "Power of inequality"



From the November 7th 2020 edition

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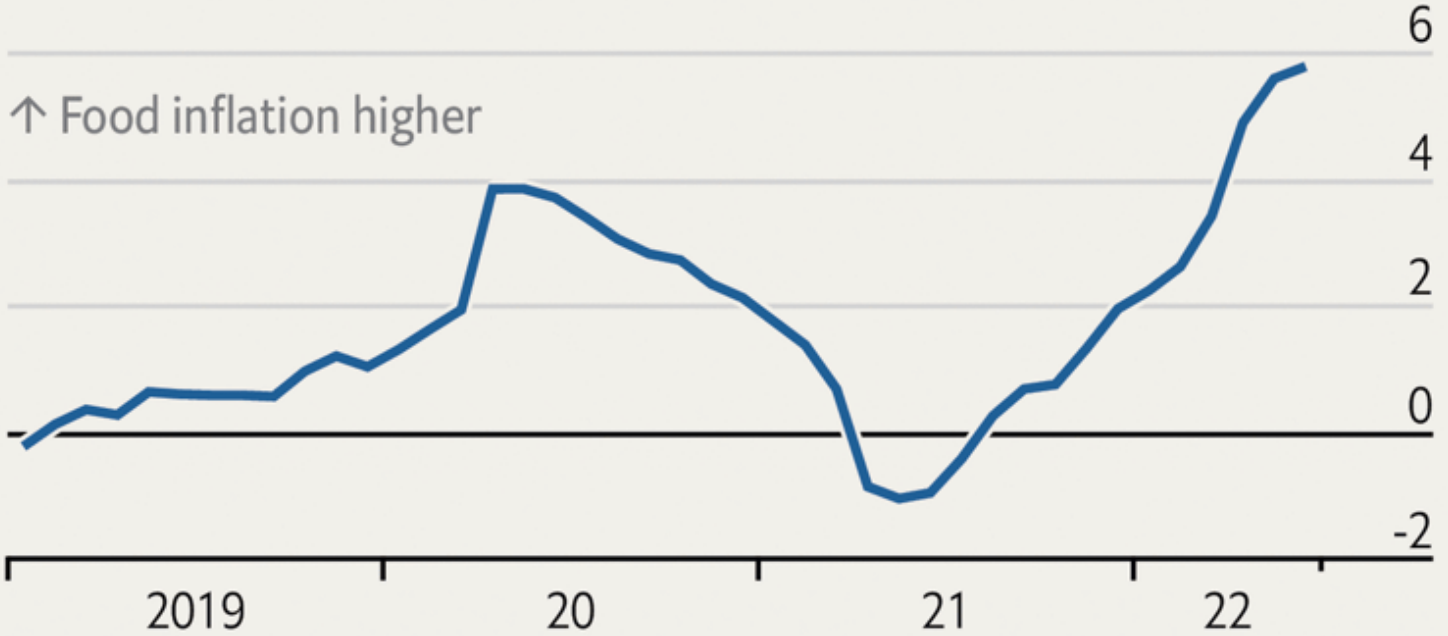
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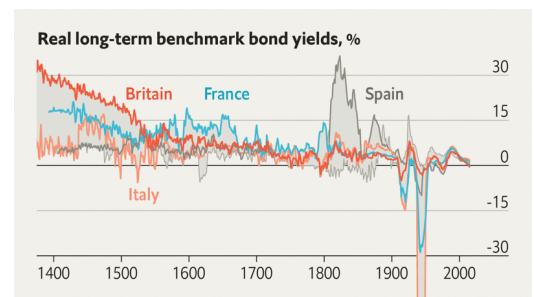
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