CDDEP THE CENTER FOR Disease Dynamics, Economics & Policy
WASHINGTON DC • NEW DELHI

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EMBARGOED UNTIL SEPTEMBER 30, 1000 HRS US EAST COAST TIME

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LARGEST CONTACT TRACING STUDY TO DATE PUBLISHED IN *SCIENCE* FINDS THAT CHILDREN ARE ACTIVE TRANSMITTERS OF COVID-19

Researchers also find that superspreading is common; 70% of COVID-19 infected patients do not infect any of their contacts. COVID-19 mortality is higher in the 40-69 year age group in India than in other countries.

A team of investigators from CDDEP, the Government of Tamil Nadu and Andhra Pradesh studied disease transmission patterns in 575,071 individuals exposed to 84,965 confirmed cases of COVID-19. The study, based on data collected by tens of thousands of contact tracers in the states of Andhra Pradesh and Tamil Nadu is the largest and most comprehensive analysis of COVID-19 epidemiology to date.

Andhra Pradesh (population 50 million) and Tamil Nadu (population 68 million) are among the Indian states with the largest healthcare workforces and public health expenditures per capita, and are known for their effective primary healthcare delivery models. Both states initiated rigorous disease surveillance and contact tracing early in response to the pandemic. Procedures include syndromic surveillance and SARS-CoV-2 testing for all individuals seeking care for severe acute respiratory illness or influenza-like illness at healthcare facilities; delineation of 5km "containment zones" surrounding cases for daily house-to-house surveillance to identify individuals with symptoms; and daily follow-up of all contacts of laboratory-confirmed or suspect COVID-19 cases, with the aim of testing these individuals 5-14 days after their contact with a primary case, irrespective of symptoms, to identify onward transmission.

The AP-TN study found that:

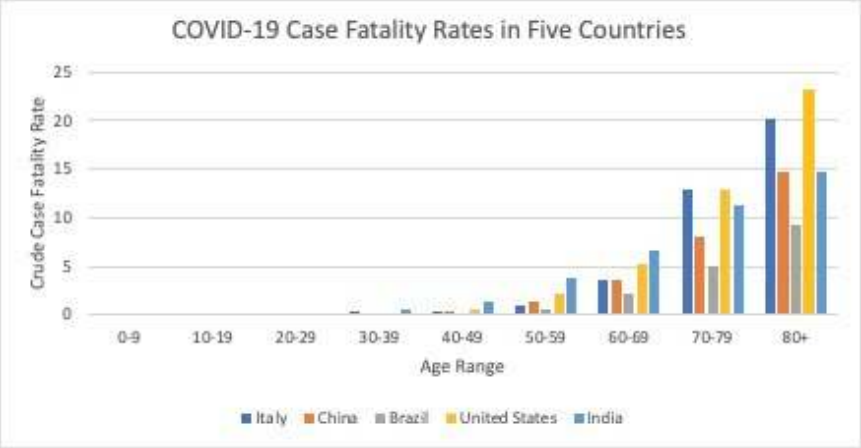
COVID transmission

1. Risk of transmission from an index case to a close contact ranges from 2.6% in the community to 9.0% in the household and does not differ significantly with respect to the age of the index case.
2. Infection probabilities ranged from 4.7-10.7% for low-risk and high-risk contact types, respectively. Same-age contacts were associated with the greatest infection risk.
3. The study found high prevalence of infection among children who were contacts of cases around their own age; this finding of enhanced infection risk among individuals exposed to similar-age cases was also apparent among adults.
4. Not all infected individual transmit COVID-19. Prospective follow-up testing of exposed contacts revealed that 70% of infected individuals did not infect any of their contacts, while 8% of infected

individuals accounted for 60% of observed new infections. This study presents the largest empirical demonstration of superspreading that we are aware of.

Mortality

1. Case-fatality ratios spanned 0.05% at ages 5-17 years to 16.6% at ages ≥85 years.
2. Men were 62% more likely to die than women.
3. 63% of those who died had at least one co-morbidity. 36% had two or more co-morbidities. 45% of those who died were diabetic.
4. Unlike observations in high-income settings, deaths in India are concentrated at ages 50-64 years. The figure below shows case fatality ratios (CFR) at various age groups in India compared to other countries. The CFR is higher in the 40-70 age group in India than in any of the four comparison countries (see figure below). For the age category above 80, the CFR is India is in line with other countries indicating a potential survival effect.



5. Contrary to long hospital stays reported in high-income settings, the median time to death is 6 days following admission (compared to 13 in the United States).

Effect of the Lockdown

1. There are substantial reductions in the reproductive number R_t associated with implementation of India's country-wide shutdown, which have not previously been shown empirically.
2. Case-fatality ratios (proportion of cases that died) have decreased over the course of the epidemic. Individuals who tested positive between in July were 26% less likely to die than those tested in March and April. Those who tested positive in May and June were 13% less likely to die than those tested in March and April.

According the director of CDDEP, Dr Ramanan Laxminarayan, “This study was made possible by the significant contact tracing effort in Andhra Pradesh and Tamil Nadu, which involved tens of thousands of healthcare workers. The results on disease transmission and mortality have the potential to inform policy to fight COVID-19. The study also speaks to the capacity of research emerging from India to help inform the global response to COVID-19”.

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About the Center for Disease Dynamics, Economics & Policy

The Center for Disease Dynamics, Economics & Policy (CDDEP) produces independent, multidisciplinary research to advance the health and wellbeing of human populations around the world. CDDEP projects are global in scope, spanning Africa, Asia, and North America and include scientific studies and policy engagement. The CDDEP team is experienced in addressing country-specific and regional issues, as well as the local and global aspects of global challenges, such as antibiotic resistance and pandemic influenza. CDDEP research is notable for innovative approaches to design and analysis, which are shared widely through publications, presentations and web-based programs. CDDEP has offices in Washington, D.C. and New Delhi and relies on a distinguished team of scientists, public health experts and economists.