Scaling of mortality in 742 metropolitan areas

Usama Bilal(a), Caio P. de Castro^(b,c), Tania Alfaro(d), Tonatiuh B. Gutierrez^(e), Mauricio L. Barreto^(b,c), Carlos M. Leveau^(f,g), Kevin M. Folgar^(a), J. Jaime Miranda(h), Felipe Montes⁽ⁱ⁾, Pricila Mullachery^(a), Maria F. Pina^(j,k), Daniel A. Rodriguez^(l), Gervasio F. Santos^(b,c), Roberto F. S. Andrade^(b,c), Ana V. D. Roux^(a)

(a) Drexel Dornsife School of Public Health, Philadelphia PA, USA.
(b) Center for Data and Knowledge Integration for Health (CIDACS), Fiocruz, Salvador, Brazil.
(c) Federal University of Bahia, Salvador, Bahia, Brazil.
(d) Escuela de Salud Pública, Universidad de Chile, Santiago de Chile, Chile.
(e) Instituto Nacional de Salud Pública, Cuernavaca, Mexico.
(f) Instituto de Producción, Economía y Trabajo, Universidad Nacional de Lanús, Buenos Aires, Argentina.
(g) Consejo Nacional de Investigaciones Científicas y Técnicas, Buenos Aires, Argentina.
(h) Universidad Peruana Cayetano Heredia, Lima, Peru.
(g) Department of Industrial Engineering, Universidad de los Andes, Bogotá, Colombia.
(h) Institute for Information and Communication on Health - FIOCRUZ, Rio de Janeiro, Brazil.
(k) Instituto de Investigação e Inovação em Saúde, Porto, Portugal.
(l) Department of City and Regional Planning, University of California, Berkeley, CA, USA.

Considering that are complex systems, we analyze how all-cause and disease-specific mortality scales with city population size on 742 cities in 10 Latin American (LA) countries and United States (US). Results show that more populated cities have lower all-cause mortality in US cities, while LA cities had similar mortality across city sizes. Sexually transmitted infections and homicides show higher rates in larger cities. Tuberculosis mortality behaves sublinearly in US and Mexican cities and superlinearly in other LA cities. Other communicable, maternal, neonatal, and nutritional deaths, and deaths due to noncommunicable diseases are sublinear in the US and linear or superlinear in LA. Our results reveal distinct patterns, suggesting no universal relation between city size and mortality. This stays in opposition to more common behavior in other studies, indicating the need of more accurate investigations on scaling behavior of health outcomes in cities. Sci. Adv. 7, eabl6325 (2021).