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Public Health Efforts and the Decline in Urban Mortality

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Since the mid-19th century, mortality rates in the Western world have plummeted and life expectancy has risen dramatically. Sometimes referred to as "the mortality transition," this development is widely recognized as one of the most significant in the history of human welfare. Two features characterize the mortality transition. First, it was driven by reductions in infectious diseases, and diseases of infancy and childhood. Second, it was concentrated in urban areas: at the turn of the 20th century, major cities were unsanitary havens of pestilence; by 1940, urban mortality rates were comparable to those of rural areas.

Traditionally, economists have attributed the mortality transition to rising incomes, better nutrition, and the onset of modern economic growth. More recent reviews of the literature emphasize the role of public health efforts, especially those aimed at purifying the water supply. For instance, David Cutler, Angus Deaton, and Adriana Lleras-Muney argue that public health efforts drove the dramatic reductions in food- and water-borne diseases at the turn of the 20th century. Similarly, Dora Costa argues that clean-water technologies such as filtration and chlorination were "the biggest contributor[s] to the decline in infant mortality," but acknowledges that the effects of other public health interventions "remain understudied."

Using data on 25 major American cities for the years 1900–1940, we revisit the causes of the urban mortality decline at the turn of the 20th century. Specifically, we conduct a statistical "horse race" that attempts to distinguish the effects of ambitious (and often extraordinarily expensive) public health interventions aimed at controlling mortality from food- and water-borne diseases. Following previous researchers, we explore the extent to which filtering and chlorinating drinking water contributed to the decline in typhoid mortality observed during the period under study and, more generally, to the observed declines in total and infant mortality. In addition, we explore the effects of several other municipal-level efforts

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that were, at the time, viewed as critical in the fight against typhoid and other food- and water-borne diseases, but have not received nearly as much attention from modern-day researchers. These interventions include: the treatment of sewage before its discharge into lakes, rivers, and streams; projects designed to deliver clean water from further afield, such as aqueducts and water cribs; requirements that milk sold within city limits meet strict bacteriological standards; and requirements that milk come from tuberculin-tested cows. Because the urban mortality transition was characterized by substantial reductions in infant and childhood mortality, and because exclusive breastfeeding was not the norm during the period under study, improvements in milk quality seem a particularly promising avenue to explore.

Consistent with previous literature, we find that filtering the municipal water supply sharply reduced typhoid mortality. In fact, our results suggest that the building of a water filtration plant cut the typhoid mortality rate by nearly 40 percent. More generally, however, our results are not consistent with the argument that public health interventions drove the extraordinary reductions in infant and total mortality observed between 1900 and 1940. Specifically, we find that efforts to purify milk had no appreciable effect on infant mortality and no effect on mortality from non-pulmonary tuberculosis (TB), which was often transmitted through infected milk. Likewise, neither chlorinating the water supply nor constructing sewage treatment plants appears to have been effective. Although water filtration is associated with a (statistically insignificant) 1–3 percent decrease in total mortality and an 11–13 percent decrease in infant mortality, these estimates are considerably smaller than those found by previous researchers, including David Cutler and Grant Miller, the authors of the most influential study in this literature.

Because Cutler and Miller's work is so influential, it is important to document why our results are different from theirs. Using their original data and specification, we find that the estimated effect of filtration on total mortality shrinks by half when we correct a handful of transcription errors and use US Bureau of the Census population estimates to consistently calculate the total mortality rate for the entire period under study, 1900–1936. Correcting several errors in their infant mortality counts (79 of 410 infant mortality counts were incorrectly transcribed) reduces the estimated Cutler and Miller effect of filtration on infant mortality by two-thirds.

If public health interventions such as chlorination and filtration cannot explain why mortality fell between 1900 and 1940, what can? Our results point to other factors such as better living conditions and improved nutrition as being responsible for the sharp decline in urban mortality at the turn of the 20th century. However, this is admittedly an educated guess. We hope that readers will embrace the implicit challenge inherent in our results and redouble their efforts to discover the true causes of the urban mortality transition.

NOTE:

This research brief is based on D. Mark Anderson, Kerwin Kofi Charles, and Daniel I. Rees, "Public Health Efforts and the Decline in Urban Mortality," NBER Working Paper no. 25027, September 2018, http://www.nber.org/papers/w25027.