

► Case Study

One case study follows. It deals with an effort, called the Million Death Study, to gather valid data on deaths in India at a sustainable cost and in ways that are replicable.

The Aims of the Million Death Study

The Centre for Global Health Research, at the University of Toronto, Canada, is carrying out the Million Deaths Study in India in conjunction with the Registrar General of India. This study is one of the largest research efforts ever undertaken on the causes of premature mortality. Led by Professor Prabhat Jha, the study aims to help India improve the documentation of the underlying causes and risk factors of mortality as a basis for enhancing investments in health, reducing premature death, and improving the health of India's people.²⁶

Vital statistics, such as fertility and mortality data, are crucial for identifying major health issues, identifying new health problems as they arise, making cost-effective public health investments, and evaluating the progress of public health interventions. Yet reliable mortality statistics are rare. As much as 75 percent of global deaths occur in low- and middle-income countries, and the majority of these lack medical supervision and official certification of cause of death.²⁸ In India, for example, 70 percent of deaths go unreported or misclassified.²⁷ Previous mortality estimates for India were largely based on data from the limited spectrum of deaths that occur in hospitals and were consequently biased toward causes of death that affect urban populations more than rural populations. They were also biased toward conditions that are more urgent and lead to hospitalization, rather than taking sufficient account of chronic health problems.²⁸ Moreover, in India and in many other middle- and low-income countries, there is a general dearth of knowledge around the causes of death, especially for middle-aged adults, and the corresponding risk factors leading to premature death.

The Study Approach

The Million Death Study seeks to assess the causes of death of 1 million people in India through monitoring 2.4 million households over two time periods: 1998 to 2003 and 2004 to 2014. The study is based on an approach called "verbal autopsy." The study uses India's Sample Registration System as its sampling framework. Twice a year, trained surveyors conduct surveys in order to identify households in which a death occurred. They then interview household members about the deaths in their families and record information on the events leading to death and the symptoms of the deceased. The verbal autopsies are sent to two independent physicians to be analyzed and ascertain the underlying cause of those deaths.²⁶ By early 2015, 600,000 deaths had been surveyed and 400,000 deaths had been fully coded.²⁹

Key Findings to Date

The study thus far has exposed some mortality estimates and trends that deviate from those previously recognized.²⁷ First, the study has suggested that the top four causes of death in India are cardiovascular disease, chronic respiratory disease, TB, and cancer. Second, one of the most striking findings is related to the effects of tobacco. The average Indian smoker starts smoking later in life than in many other countries and often smokes hand-rolled locally manufactured cigarettes called bidis, which have a lower concentration of cancer-causing agents than commercially manufactured cigarettes. Nonetheless, this study showed that in India, smoking is as much a risk factor for premature death as in Europe and the United States. Moreover, study findings suggest that smoking is a risk factor for TB in India and that 40 percent of all TB deaths in middle-aged men in India can be attributed to smoking.²⁸ Third, the study suggests that some estimates of the burden of disease might be quite different from what was previously thought and that the burden of disease pattern varies greatly across the country. This study, for example, estimates that total malaria deaths are 10 times greater than the World Health Organization estimates, with over half of malaria deaths occurring in people ages 15 to 69 and the state of Odisha accounting for a quarter of India's annual malaria deaths.²⁸ On the other hand, the study suggests that mortality associated with HIV-related infections is lower than UNAIDS estimates, although the rural areas around Mumbai have a particularly high concentration of HIV-related deaths, with an annual death rate of 58 per 100,000.^{28,27} The study has also led to revised estimates of the number of girls who are "missing" due to sex-selective abortion and suggested that most suicides are among young adults, rather than among adult farmers, as had previously been thought.³⁰

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Lessons of Experience

The Million Death Study may offer a model for improving mortality information that is reliable, high impact, low cost, and replicable in other countries. The ideal system to measure mortality would depend on a well-functioning system of vital registration. However, in the absence of such comprehensive registration programs, this study suggests that verbal autopsies can reduce inaccurate data by correctly classifying the underlying causes of 90 percent of the deaths occurring before age 70, an order of magnitude better than the limited cause of death data previously available.²⁸ This can help derive the probable cause of death when one has not been reported and help us to understand the leading causes of death.²⁶ Importantly, this approach has also been shown to be cost-effective. India added recording the causes of death and risk factors to a low-cost, preexisting sample registration system, at a cost of less than \$2 per household.^{28,31}

The long-term goal will always be universal civil registration of deaths with medical certification in order to minimize misclassification and misrepresentation. However, approaches such as those applied in the Million Death Study offer an interim solution for better statistics on mortality for many low- and middle-income countries.