The impact of measles immunization campaigns in India using a nationally representative sample of 27,000 child deaths

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[www.cghr.org/measles](http://www.cghr.org/measles)

@CGHR_org and @countthedead
Background

• Measles remains a major killer of children under five years old globally, with much of the remaining burden residing in Africa and Asia

• India was one of the last countries to adopt two doses of the measles vaccine as part of routine immunization schedule

• In 2010, the Indian government implemented second-dose measles vaccines alongside mass immunization campaigns in regions with low immunization rates
Key Messages

• The measles immunization campaign saved 41,000 to 56,000 children in India during 2010 to 2013, or 39%-57% of the expected deaths nationally

• 1–59-month measles mortality rates fell more in the campaign states following launch versus non-campaign states

• Elimination of measles deaths among children in India is feasible
What’s New about this Research?

• The impact of the measles immunization campaign on declines in measles deaths in India was previously unknown.

• This study compared changes in measles mortality trends among children before and after the immunization campaign.

• We provide important evidence for the effectiveness of the measles vaccine in reducing measles mortality.
The Registrar General of India implemented the Million Death Study within the Sample Registration System.

~ 7500 randomly-selected villages or census enumeration blocks from the preceding census are chosen every ten years.

~ 2.4 million homes have been monitored for births and deaths from 2001-13.
Nationwide Mortality Studies: Indian Million Death Study (MDS)

1. Visit 1.4 M homes (“true snapshot” of India) in the “SRS” with a recent death & ask standard questions and get a local language narrative (*adapted* WHO tool)
2. 900 non-medical surveyors (now electronic entry + GPS)
3. Web-based double coding by 400 doctors (guidelines, + adjudication and other strict quality control)
4. Study all diseases, work with RGI/census dept, keep costs <$1 per home
5. Indian totals to date: ~0.8M deaths

Statistical Alliance for Vital Events (SAVE) to expand to Sierra Leone, Ethiopia, Mozambique and elsewhere

Gomes et al, Health Affairs, 2017
Campaign states saw substantial decreases in child measles deaths following campaign launch.

Figure 1 – Supplement 1. State-level distribution of 1–59-month measles deaths before and after measles campaign launch, India, 2005–2013.
Girls had higher measles mortality risk through 2005 to 2013

Figure 7. Distribution of 1–59-month measles mortality risk (relative to all-cause mortality) by sex, India, 2005–2013.
How did we measure the campaign’s impact?

- We compared measles mortality rates among children between two time periods: before and after the measles campaigns launched in 2009/2010
- Using the pre-campaign trend, we calculated the expected number of deaths in 2013 had the campaigns not occurred
- We compared the expected deaths with the actual observed deaths to determine the number of lives saved by the campaign
Declines in measles mortality rates accelerated following campaign launch in campaign states compared to non-campaign states

Figure 2. Interrupted time-series analysis on measles mortality (black) and control mortality (white) among 1-59-month-old children during the measles campaign in India, 2005–2013.
Steeper declines in measles mortality rates were observed in girls than boys in campaign states following campaign launch.

Figure 3. Stratified analysis of interrupted time-series models on measles mortality (black) versus control mortality (white) among 1-59-month-old children, India, 2005–2013.
Measles vaccination coverage increased significantly following campaign launch in campaign states compared to non-campaign states.

Figure 5. National coverage estimates of child measles immunization, maternal literacy, and oral rehydration supplementation by measles campaign states, India, 2005–2013. * Only measles vaccination coverage shown.
Implications for India

- Elimination of measles deaths among children in India is feasible
- The measles vaccine is an effective means of reducing measles deaths among children
- Increased efforts are needed to reduce excess mortality for girls
- Nationwide mortality studies that are representative of the population are an inexpensive and practical way to investigate the impact of health interventions
The measles immunization campaign saved 41,000 to 56,000 children in India during 2010 to 2013, or 39%-57% of the expected deaths nationally.

1–59-month measles mortality rates fell more in the campaign states following launch versus non-campaign states.

Elimination of measles deaths among children in India is feasible.