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Global Framework for Rotavirus Vaccine Implementation
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Total Child Deaths: the "envelope"

- Since 2004, the UN Interagency Group for Child Mortality Estimation—UN-IGME (mainly UNICEF, the World Bank, UN Population Division and WHO), has been working closely to harmonize country-specific estimates and trends in neonatal, infant and under-5 mortality.

- In 2008, an independent Technical Advisory Group (TAG) was created to advise UN-IGME on specific methodological issues.

- Annual update of estimates occur around May-June, followed by WHO country consultation July-August, published in September/October each year.
### Under 5 Causes of Death: cause categories and estimation inputs

<table>
<thead>
<tr>
<th></th>
<th>Under 5 Causes of Death: cause categories and estimation inputs</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>ALL CAUSES</td>
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<tr>
<td>2</td>
<td>HIV/AIDS</td>
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<tr>
<td>3</td>
<td>Diarrhoeal diseases</td>
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<td>4</td>
<td>Pertussis</td>
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<td>5</td>
<td>Tetanus (high mortality only)</td>
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<td>6</td>
<td>Measles</td>
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<td>7</td>
<td>Meningitis/encephalitis</td>
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<td>8</td>
<td>Malaria</td>
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<td>9</td>
<td>Acute lower respiratory infections</td>
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<td>10</td>
<td>Preterm (direct complications)</td>
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<td>11</td>
<td>Intrapartum-related complications</td>
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<td>12</td>
<td>Neonatal sepsis</td>
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<td>13</td>
<td>Other Group 1</td>
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<tr>
<td>14</td>
<td>Congenital anomalies</td>
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<tr>
<td>15</td>
<td>Other noncommunicable diseases</td>
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<tr>
<td>16</td>
<td>Injuries</td>
</tr>
<tr>
<td>17</td>
<td>War and disasters outside the envelope</td>
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</tbody>
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#### Global updated data

- **Neonatal**
  - VAMCM
  - 112 data points (~98,000 deaths)
  - + 12 new data points (~1900 deaths)
  - Total: 124 data points (~100,000 deaths)

- **1-59 months**
  - VAMCM
  - 128 data points (~320,000 deaths)
  - + 90 new data points (~49200 deaths)
  - Total: 218 data points (~370,000 deaths)
Data gap

~3% U5 deaths (USD) occurred in countries with adequate VR
90% of USD occurred in countries estimated by VAMCM

Multi-cause Models (VRMCM and VAMCM)

Step 1: covariate selection
Log ratio of each cause to a “base” cause, calculated using meta-regression and step-wise ordinary-least-squares regression with explanatory variables

Step 2:
Explanatory variables identified in step one fitted simultaneously in a multinomial logistic regression model to estimate the proportionate cause of deaths

Step 3:
Multinomial logistic regression framework applied to study-level data to derive the multi-cause model

Step 4: Apply country-level covariates to derive country estimates

Step 5: Post-hoc adjustments for recently scaled up interventions
Post-hoc adjustments

- Use *Plasmodium falciparum* parasite rate (pfpr) in the 1-59m VAMCM to model malaria
- Post-hoc adjustment in 1-59m VAMCM
  - Adjust for the effect of Hib, pneumococcal conjugate vaccine on pneumonia and meningitis
  - Adjust for the effect of rota virus vaccine on diarrhea
  - Remove ITN from post-hoc adjustment as pfpr has considered ITN
Major causes of child mortality in 2015

- Neonatal death: 45%
- Intrapartum related events: 11%
- Sepsis/meningitis: 7%
- Preterm: 16%
- Other: 3%
- Intrapartum related events: 11%
- Other: 3%
- Meningitis: 2%
- Preterm: 2%
- Intrapartum related events: 1%
- Malaria: 5%
- Injury: 6%
- Diarrhea: 9%
- Other: 11%
- Congenital: 4%
- Congenital: 4%
- Other: 13%


- Pneumonia: >30% decline from 2000 to 2015
- Diarrhea: >30% decline from 2000 to 2015
- Malaria: >30% decline from 2000 to 2015
- Measles: >30% decline from 2000 to 2015
- Neonatal other: >30% decline from 2000 to 2015
- Neonatal other: 20-30% decline from 2000 to 2015
- Neonatal other: <20% decline from 2000 to 2015

Deaths per 1,000 live births
Estimated annual rate of reduction at the global level in 2000-2015, by cause

Pathogen-specific diarrheal disease mortality

- IVB Rota mortality – Tate, Burton et al. CID 2016
- BMGF – BMC Infectious Diseases 2015

- Methods
  - counterfactual versus cause-fractions
  - single versus multipathogen studies
  - Inclusion criteria – hospital-based studies versus hospital+community
Thank you