

Systematic estimates of cause-specific mortality for neonates, children and adolescents under 20 in Africa for 2000 - 2021

Jamie Perin, Hallie Eillerts, Diana Yeung, Francisco Villavicencio, Bob Black, Li Liu

Johns Hopkins University

Institute for Disease Modeling, Gates Foundation, May 22 – May 24, 2023

CA-CODE

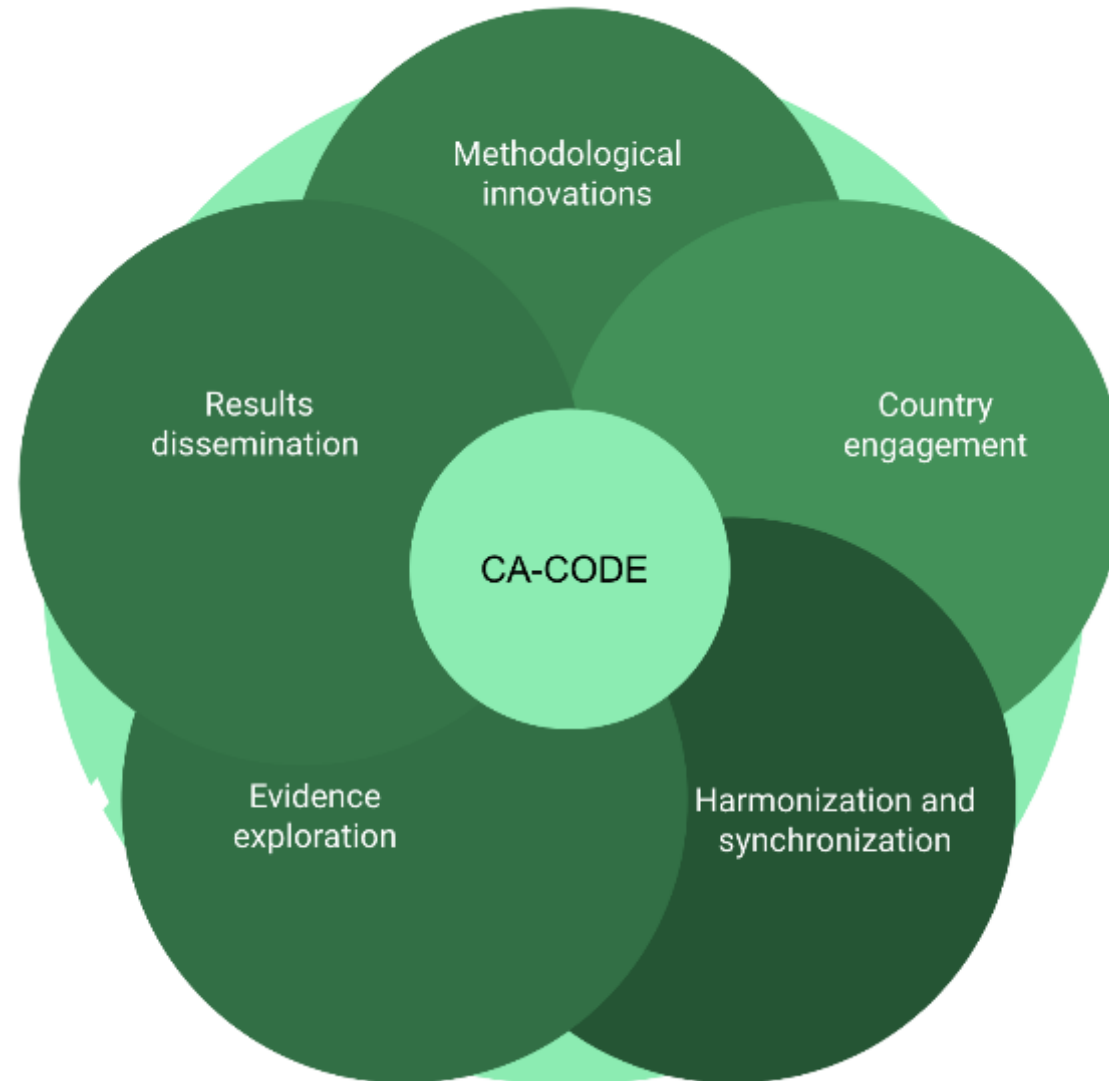
Bob Black
Abhi Datta
Hallie Eilerts-Spinelli
Henry Kalter
Li Liu
Jamie Perin
David Prieto Merino
Sandipan Pramanik
Kate Strong
Francisco Villavicencio
Shelley Walton
Diana Yeung



BILL & MELINDA
GATES *foundation*



2022-2025: CA-CODE objectives

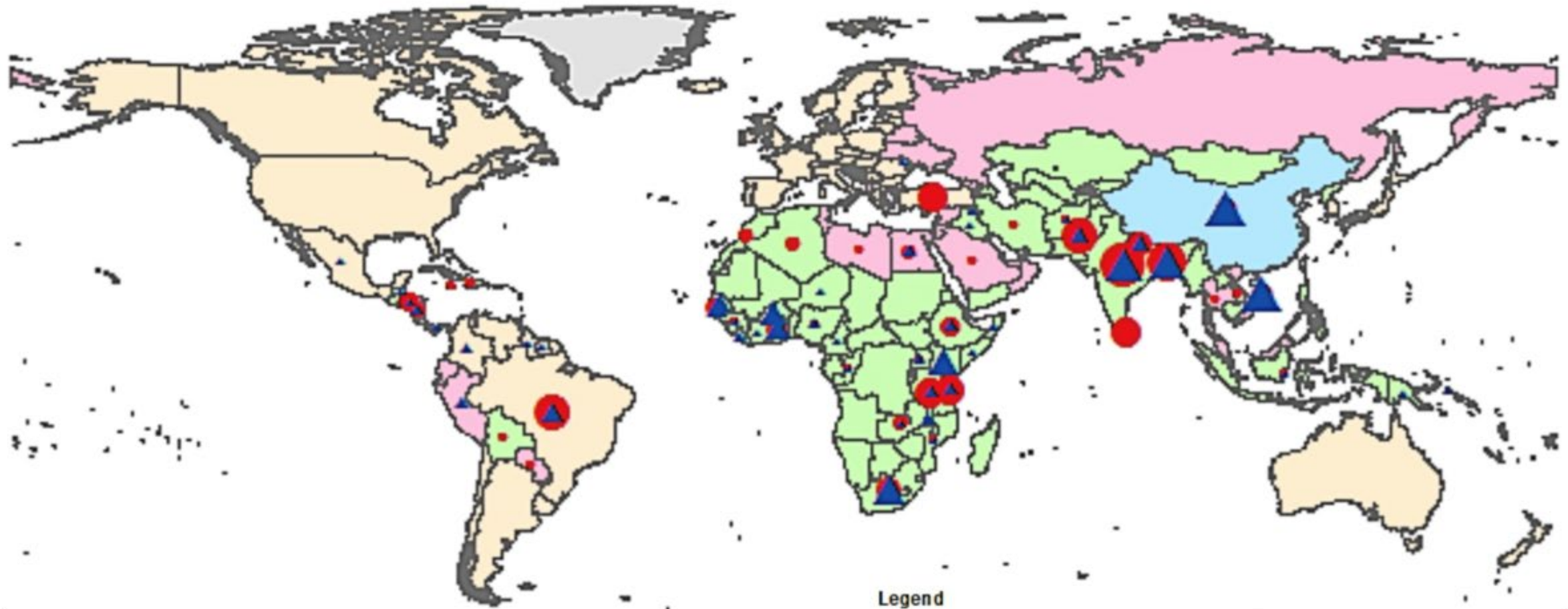


Causes of Mortality for children and adolescents

Age-specific mortality

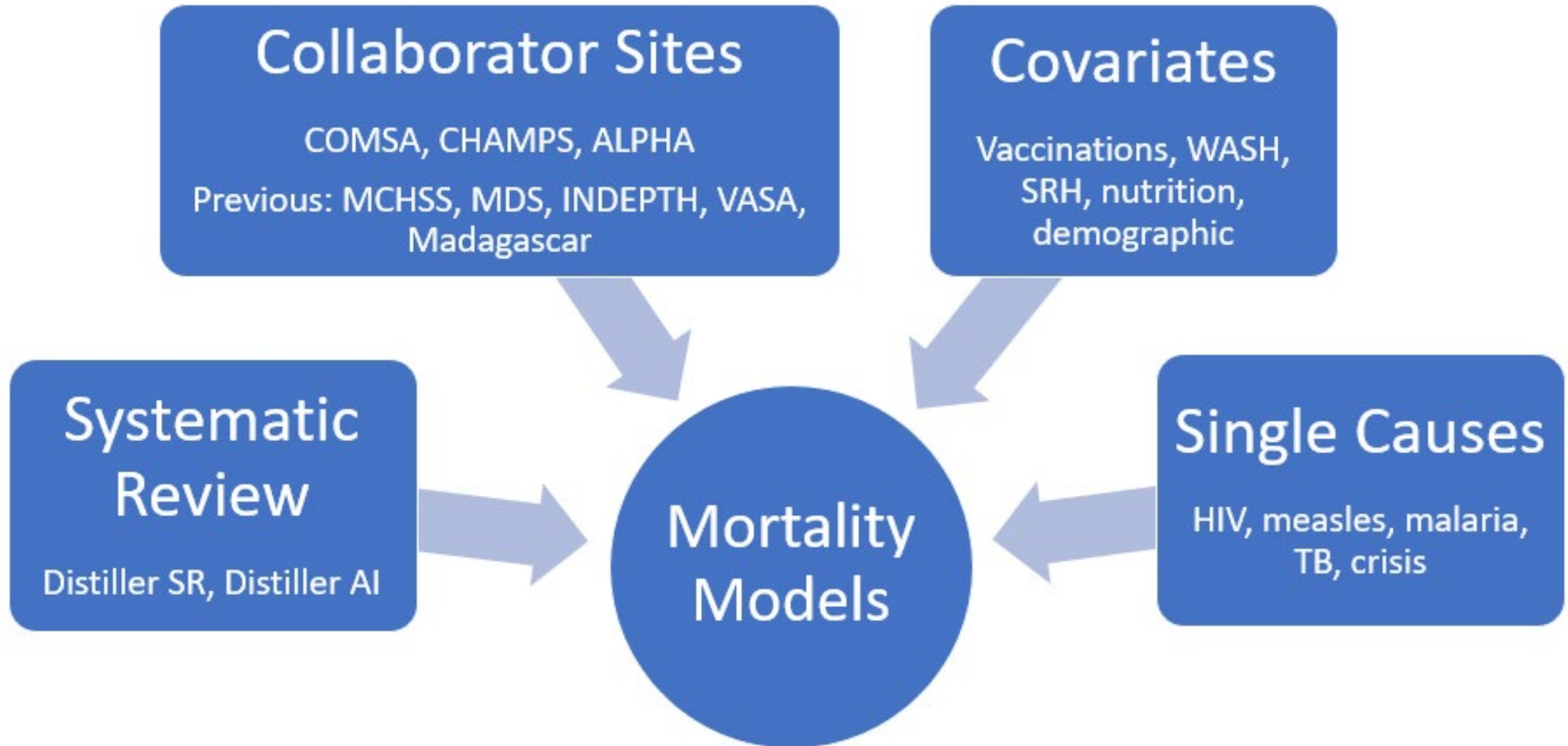
- a. Neonates
- b. Under five years
- c. 5-9 both sexes
- d. 10-14 both sexes
- e. 15-19 females
- f. 15-19 males

Data gap



**~3% U5 deaths (U5D) occurred in countries with adequate VR;
90% of U5D occurred in countries estimated by statistical model using VA**

Sources of causes of death and covariates



Bayesian model

- Multinomial regression in Bayesian framework: Covariates systematically prioritized (selected) in using the LASSO (**L**east **A**bsolute **S**hrinkage and **S**election **O**perator)



- Areas with nationally representative studies have more influence in their estimates (random effects)
- Methods innovation: Verbal autopsy misclassification and confusion matrix

New implementation (in progress)

- Example misclassification matrix (Previous)

$$\begin{bmatrix} 40\% \\ 40\% \\ 20\% \end{bmatrix}_s = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_s * \begin{bmatrix} 40\% \\ 20\% \\ 20\% \\ 20\% \end{bmatrix}_s$$

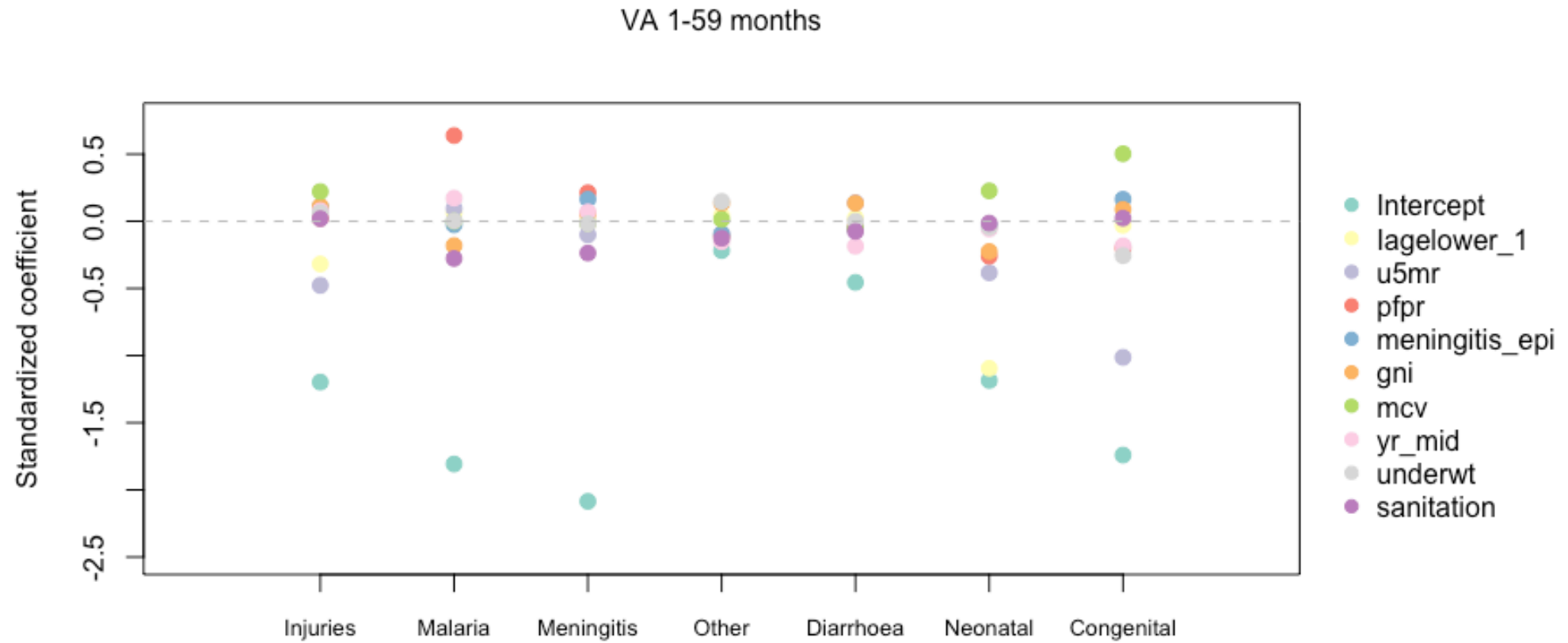
- Example potential misclassification matrix

$$\begin{bmatrix} 40\% \\ 40\% \\ 20\% \end{bmatrix}_s = \begin{bmatrix} 1 & 0.5 & 0 & 0 \\ 0 & 0.5 & 0.67 & 0 \\ 0 & 0 & 0.33 & 1 \end{bmatrix}_s * \begin{bmatrix} 20\% \\ 40\% \\ 30\% \\ 10\% \end{bmatrix}_s$$

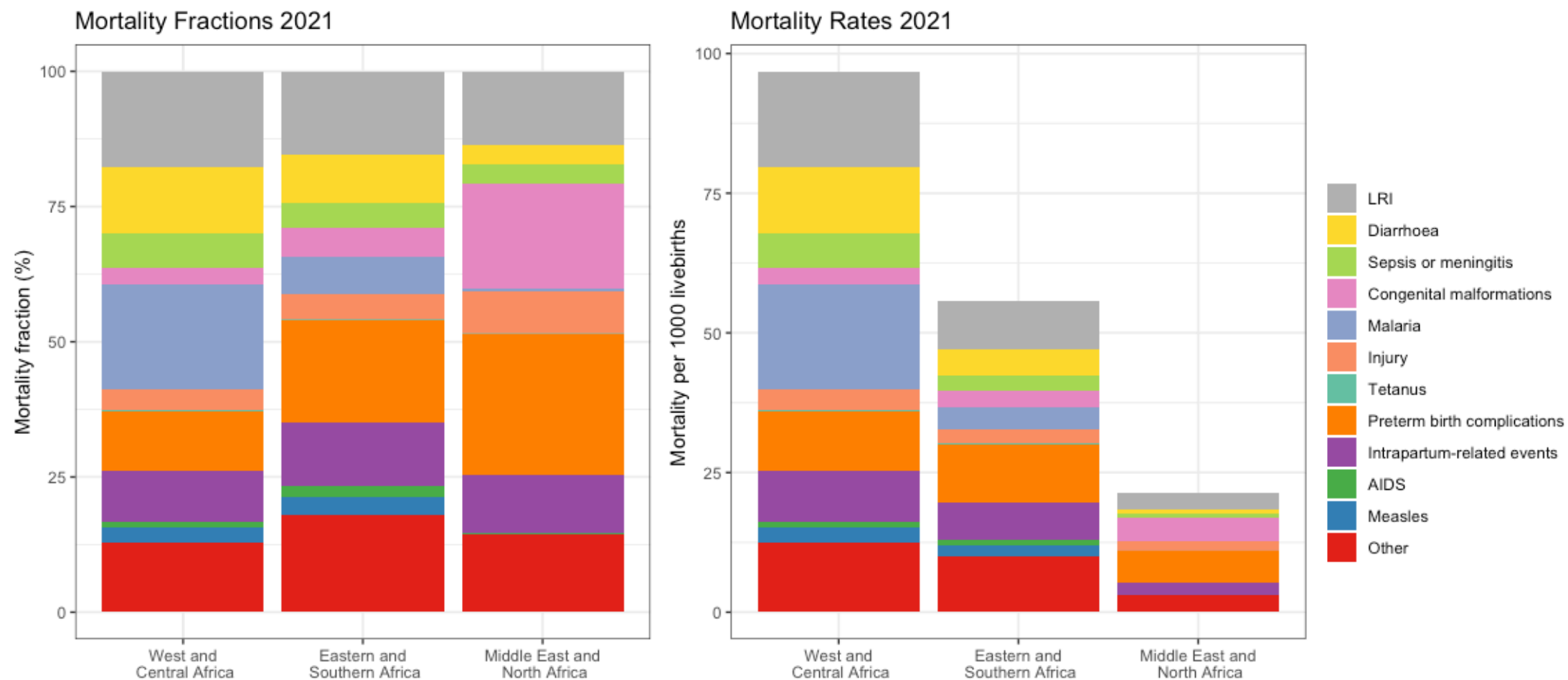
- Decomposed:

$$\begin{bmatrix} 40\% \\ 40\% \\ 20\% \end{bmatrix}_s = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}_s * \mathbf{C}_s * \begin{bmatrix} 20\% \\ 40\% \\ 30\% \\ 10\% \end{bmatrix}_s$$

Example coefficients



Under five mortality



Subnational Estimates

- India
- China
- **Africa:**
 - Nigeria
 - Ethiopia

CA-CODE: Data portal

 **IGME** UN Inter-agency Group for Child Mortality Estimation

[HOME](#) [DATA](#) [ANALYSIS](#) [PROFILES](#) [RESOURCES](#) [METHODS](#) [ABOUT](#)

CHILD MORTALITY AND STILLBIRTH ESTIMATES

The latest, most reliable data and estimates of stillbirth and child mortality rates for each country based on the research of the United Nations Inter-agency Group for Child Mortality Estimation. Read the latest reports on [stillbirths](#) and [child mortality](#).

<https://childmortality.org/>

 **IGME** UN Inter-agency Group for Child Mortality Estimation

[HOME](#) [ALL-CAUSE MORTALITY](#) [CAUSES OF DEATH](#) [PROFILES](#) [RESOURCES](#) [ABOUT](#)

CHILD MORTALITY AND STILLBIRTH ESTIMATES

The latest, most reliable data and estimates of stillbirth and child mortality rates for each country based on the research of the United Nations Inter-agency Group for Child Mortality Estimation. Read the latest reports on [stillbirths](#) and [child mortality](#).

- Indicator ▲
- Deaths
 - Fraction
 - Rate

- Age group ▲
- Neonatal
 - 1 to 59 months
 - Under 5 years
 - 5 to 9 years
 - 10 to 14 years
 - 15 to 19 years

5 to 19 years olds only have regional estimates

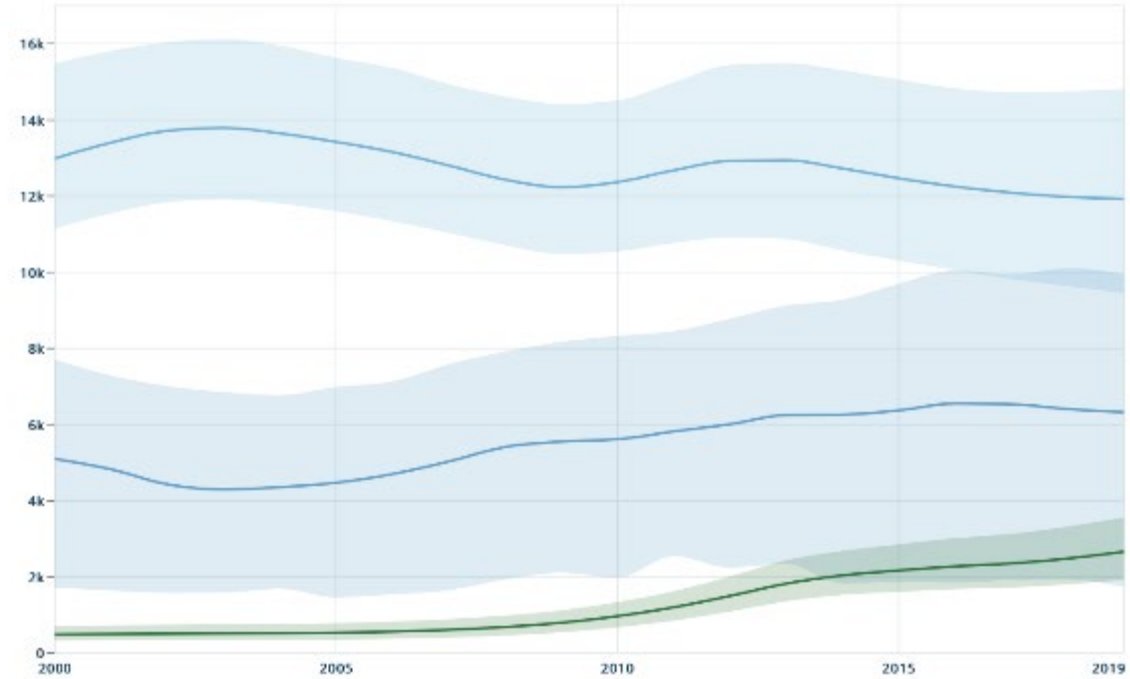
- Sex ▲
- Total
 - Male
 - Female

Sex-specific estimates only available for 15 to

DEATHS IN 5 TO 9 YEARS

CHART ESTIMATES

Number of deaths



Data series and estimates ▲

- Diarrhoeal diseases
- Lower-respiratory tract infections
- Other injuries

- Indicator ▲
- Deaths
- Fraction
- Rate

- Age group ▲
- Neonatal
- 1 to 59 months
- Under 5 years
- 5 to 9 years
- 10 to 14 years
- 15 to 19 years

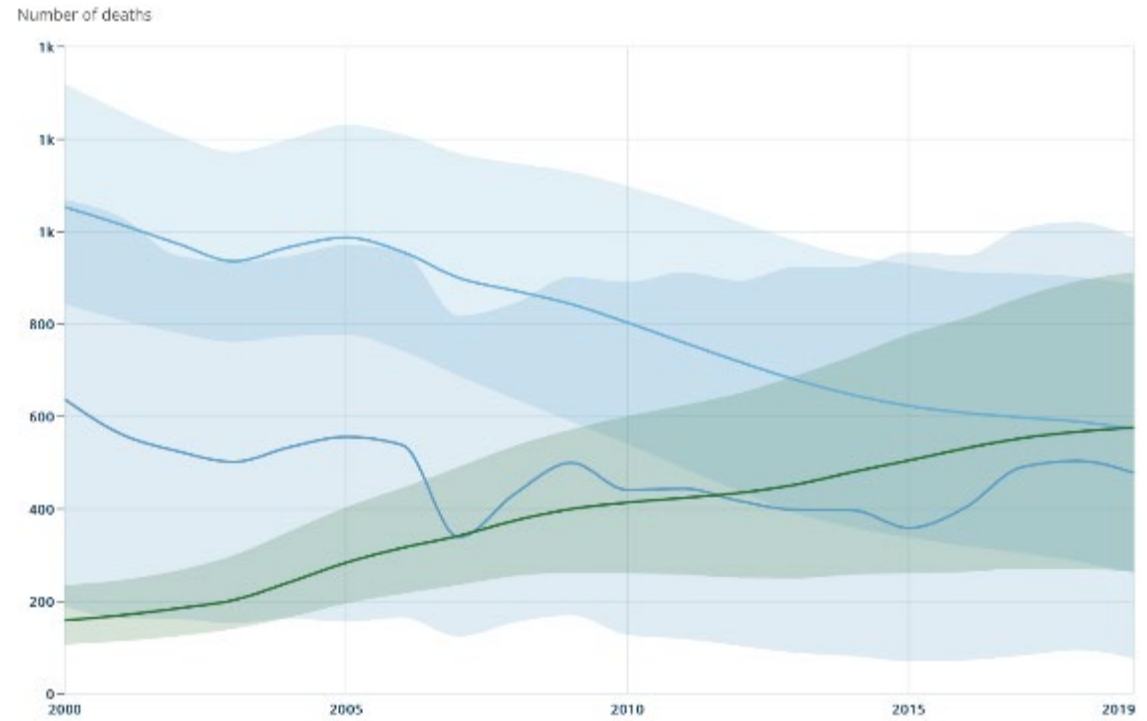
5 to 19 years olds only have regional estimates

- Sex ▲
- Total
- Male
- Female

Sex-specific estimates only available for 15 to

DEATHS IN 5 TO 9 YEARS

CHART ESTIMATES



Data series and estimates ▲

- Diarrhoeal diseases
- Lower-respiratory tract infections
- Other injuries

Thank you

jperin@jhu.edu