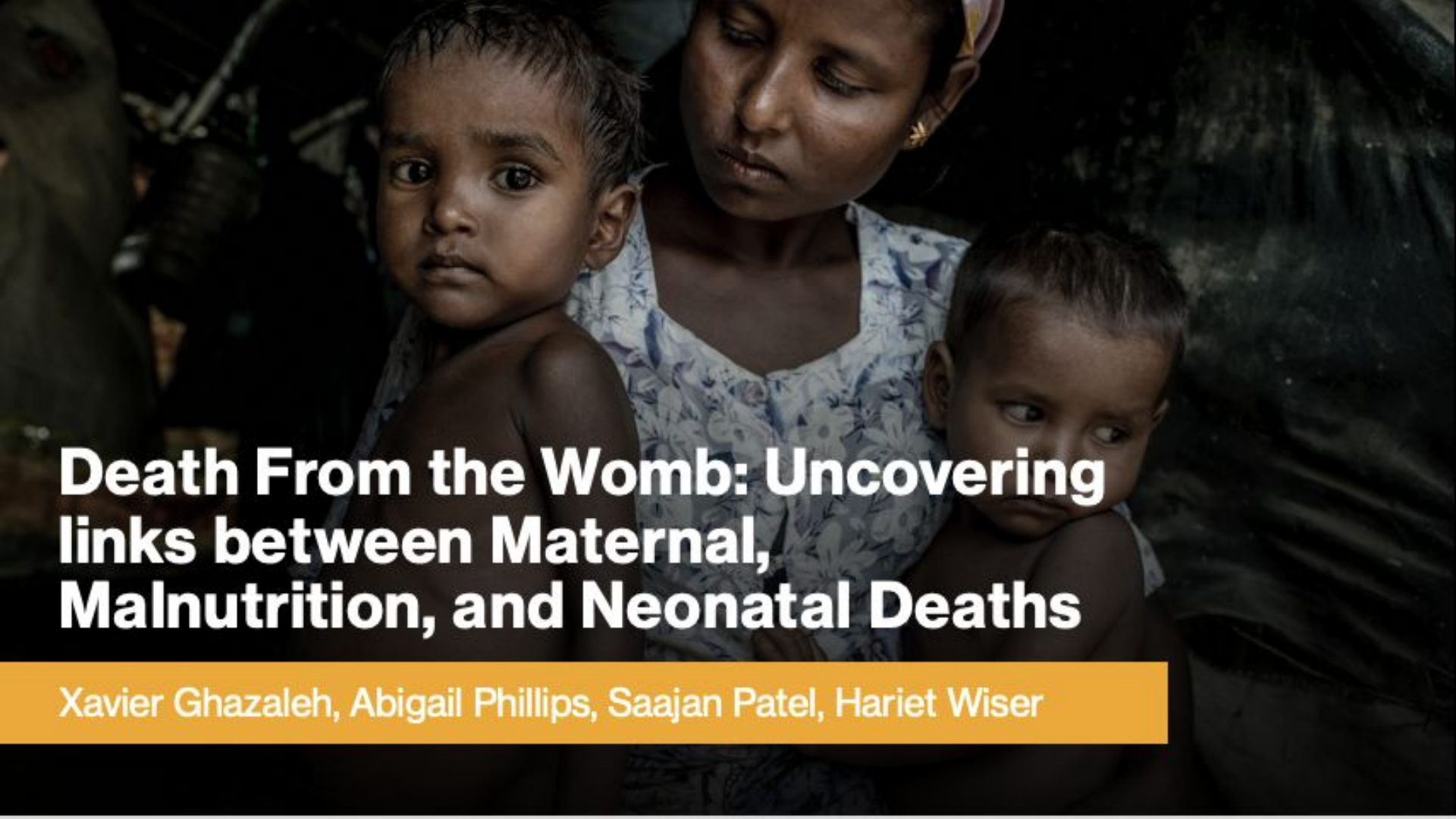
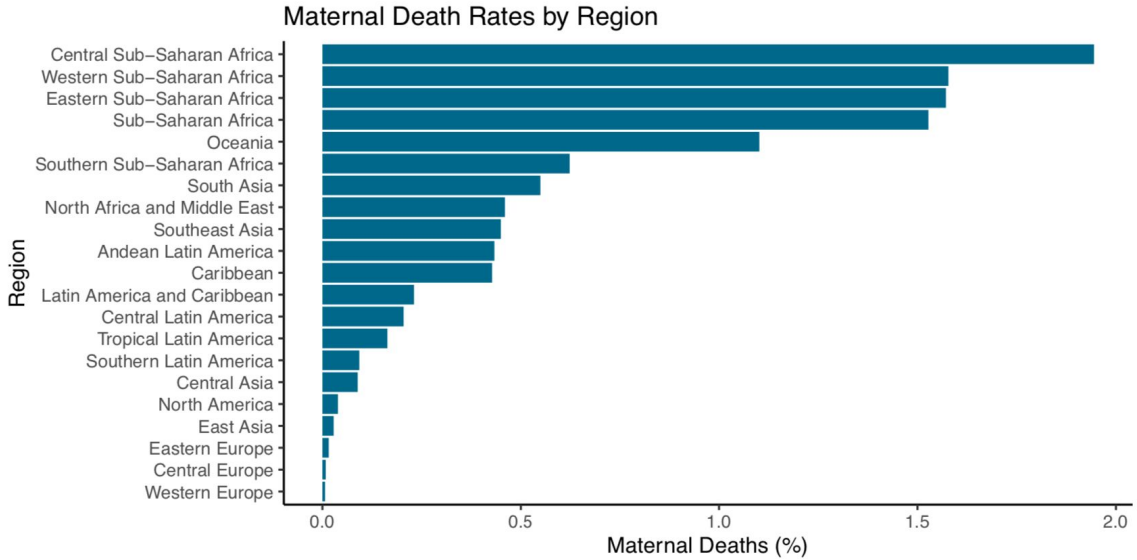


Death From the Womb: Uncovering links between Maternal, Malnutrition, and Neonatal Deaths

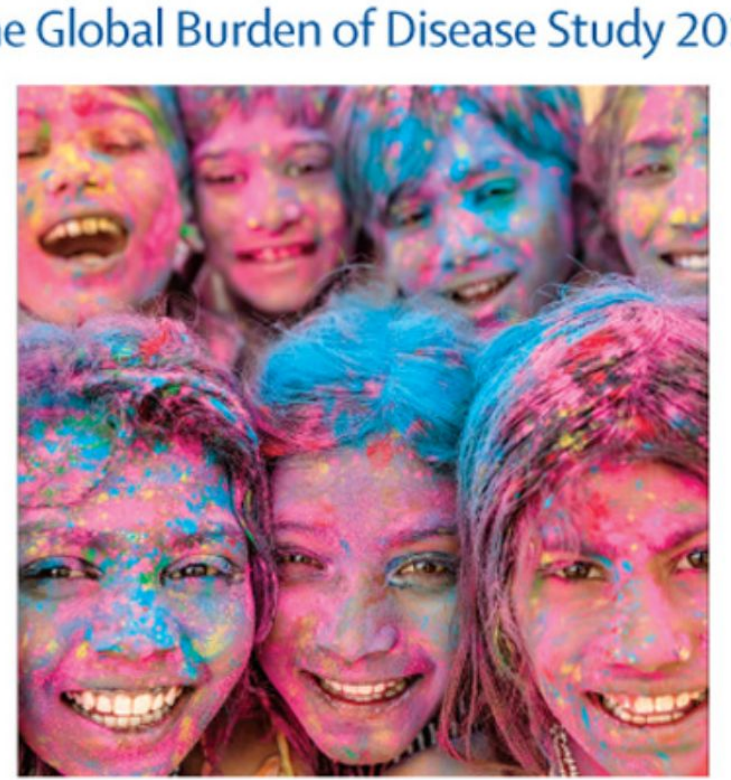
Xavier Ghazaleh, Abigail Phillips, Saajan Patel, Hariet Wiser

Maternal Mortality and Malnutrition



Malnutrition shown to contribute to maternal mortality

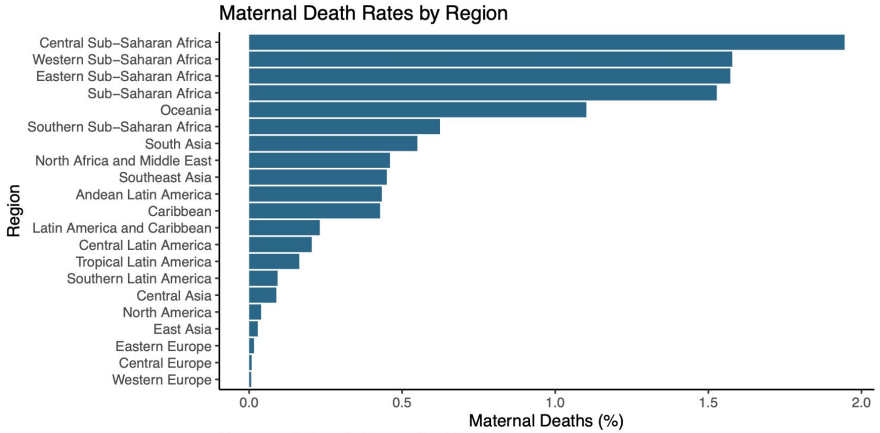
How are their regional death rates related?

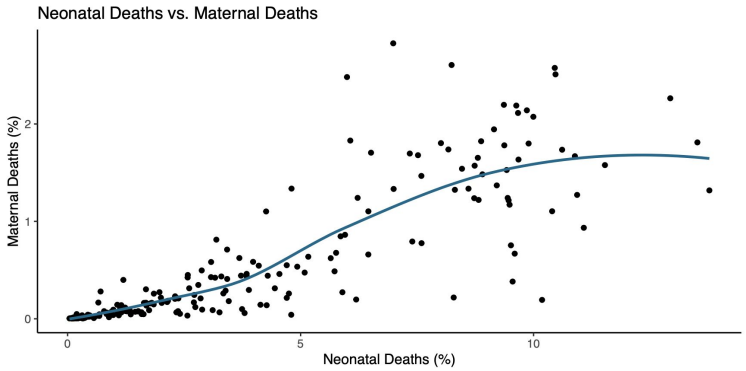


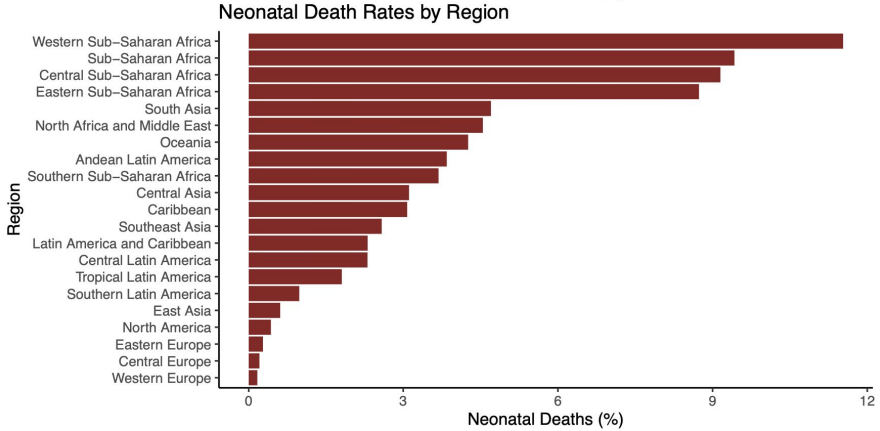
The Global Burden of Disease

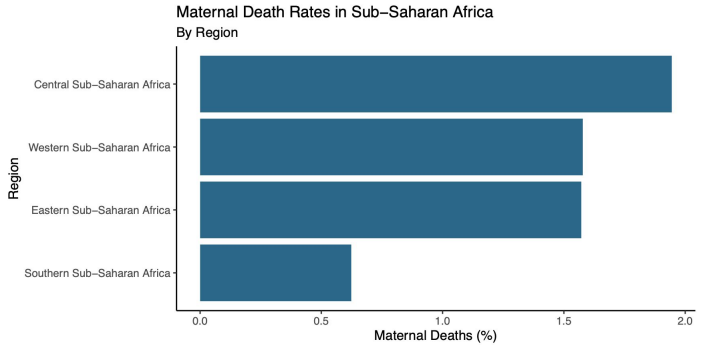
- Produced annually by **The Lancet** since **1990**
- Percent of deaths in **228** regions or countries attributable to **32** issues
- Includes **maternal mortality**, **neonatal mortality**, **nutritional deficiencies**, and **protein-specific malnutrition**

Highlights from Exploratory Data Analysis









Inference and Modeling: Bootstrap Distributions of Correlation

Table 1: Correlation between Neonatal Deaths and Maternal Deaths and 95% Confidence Interval

Correlation	Lower-Bound	Upper-Bound
0.854	0.804	0.895

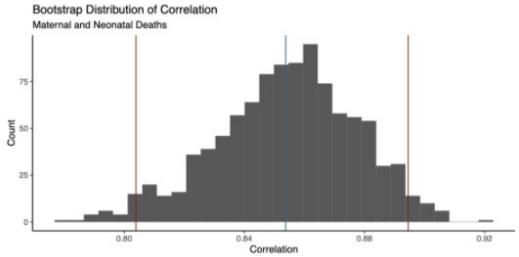


Table 2: Correlation between Deaths from Nutritional Deficiencies and Maternal Deaths and 95% Confidence Interval

Correlation	Lower-Bound	Upper-Bound
0.787	0.714	0.852

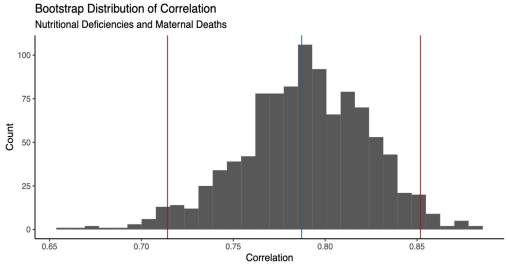
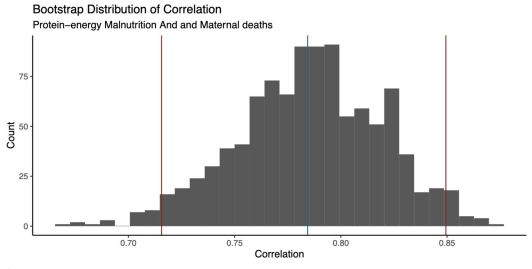


Table 3: Correlation between Deaths from Nutritional Deficiencies and Protein-Energy Malnutrition and 95% Confidence Interval

Correlation	Lower-Bound	Upper-Bound
0.784	0.716	0.849



Regression Modeling

Table 4: Model of the Effect of the Rate of Neonatal Deaths and Deaths from Nutritional Deficiencies and Protein-Energy Malnutrition on the Maternal Death Rate

Term	Estimate	Standard Error	Statistic	P-Value
(Intercept)	-0.077	0.031	-2.497	0.013
`Neonatal deaths (%)`	0.114	0.009	13.290	0.000
`Nutritional deficiencies (%)`	0.408	0.337	1.212	0.227
`Protein-energy malnutrition (%)`	-0.223	0.363	-0.614	0.540

Table 5: Explanatory Power of the Model

R-Squared	Adjusted R-Squared
0.788	0.785

$$\widehat{maternal} = -0.077 + 0.114 \times neonatal + 0.408 \times nutritional - 0.223 \times protein$$

Table 6: Model of the Effect of the Rate of Neonatal Deaths and Deaths from Nutritional Deficiencies on the Maternal Death Rate

Term	Estimate	Standard Error	Statistic	P-Value
(Intercept)	-0.071	0.029	-2.428	0.016
`Neonatal deaths (%)`	0.114	0.009	13.339	0.000
`Nutritional deficiencies (%)`	0.202	0.026	7.884	0.000

Table 7: Explanatory Power of the Model

R-Squared	Adjusted R-Squared
0.788	0.786

$$\widehat{maternal} = -0.071 + 0.114 \times neonatal + 0.202 \times nutritional$$

Table 8: Model of the Effect of the Rate of Deaths from Nutritional Deficiencies on the Maternal Death Rate in Sub-Saharan Africa

Term	Estimate	Standard Error	Statistic	P-Value
(Intercept)	0.920	0.190	4.829	0.000
`Nutritional deficiencies (%)`	0.221	0.066	3.353	0.002

Table 9: Explanatory Power of the Model

R-Squared
0.788

$$\widehat{maternal} = .920 + .221 * nutritional$$

Conclusions

Table 1: Correlation between Neonatal Deaths and Maternal Deaths and 95% Confidence Interval

Correlation	Lower-Bound	Upper-Bound
0.854	0.804	0.895

Table 8: Model of the Effect of the Rate of Deaths from Nutritional Deficiencies on the Maternal Death Rate in Sub-Saharan Africa

Term	Estimate	Standard Error	Statistic	P-Value
(Intercept)	0.920	0.190	4.829	0.000
`Nutritional deficiencies (%)`	0.221	0.066	3.353	0.002

Future Work?

- Data over time
- Look at relationship between more variables that are related to babies & motherhood mortality rates
- More research to pick variables that are interrelated