SUPPLEMENTAL TEXT: STATISTICAL METHODS

To quantify the association between diarrhea and linear and ponderal (weight) growth velocity, we modeled growth as a piecewise linear function of age with knots at 3, 6, 12, and 18 months (Figures 1 and 2).

$$y_{ij} = \beta_0 + \beta_1(\alpha, d) \times t_{ij} + \beta_2(\delta, d) \times (t_{ij} - 3)_+ + \beta_3(\phi, d) \times (t_{ij} - 6)_+ + \beta_4(\gamma, d) \times (t_{ij} - 12)_+ + \beta_5(\eta, d) \times (t_{ij} - 18)_+ + \beta_6 \times sex + \sum_{i=7}^{12} \beta_i \times I(study_i) + b_{0j} + b_{1j} \times t_{ij} + \varepsilon_{ij}$$

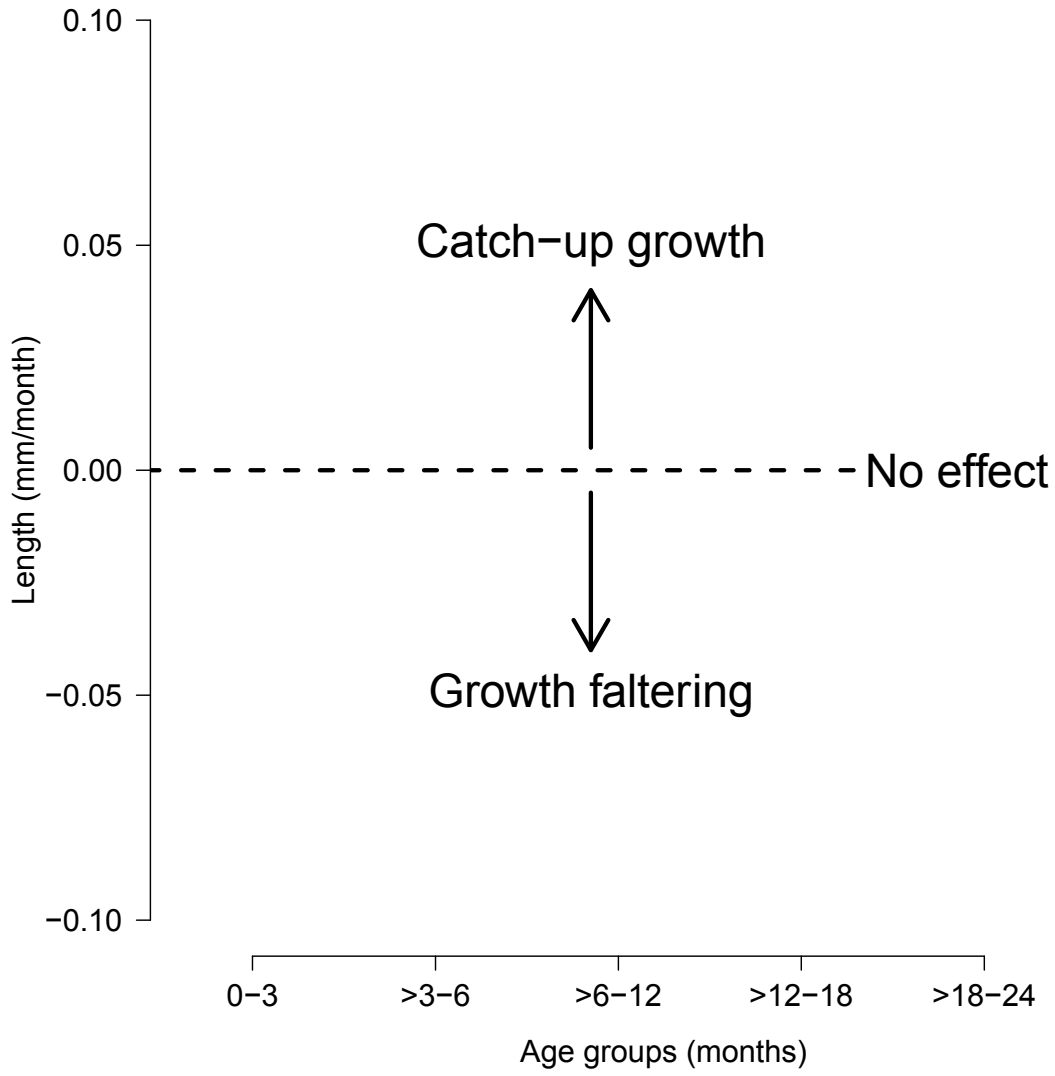
In this model, y is either length or weight, β_0 is the intercept and $\{\beta_1, \beta_2, \beta_3, \beta_4, \beta_5\}$ are piecewise linear splines of age. Also included in the model is a coefficient for sex and indicator variables for each study. We accounted for heterogeneity in growth between children using random effects for the intercept (b_0) and age (b_1) by child. We used a first-order continuous autoregressive error process by age to model serial correlation within child. Diarrhea burden was added to the model using the following for each of the time periods where d represents the percent of days with diarrhea in each period:

$$\beta_1(\alpha, d) = \alpha_1 + \alpha_2 \times d_{[0-3]}$$
$$\beta_2(\delta, d) = \delta_1 + \delta_2 \times d_{(3-6]} + \delta_3 \times d_{[0-3]}$$
$$\beta_3(\phi, d) = \phi_1 + \phi_2 \times d_{(6-12]} + \phi_3 \times d_{(3-6]}$$
$$\beta_4(\gamma, d) = \gamma_1 + \gamma_2 \times d_{(12-18]} + \gamma_3 \times d_{(6-12]}$$
$$\beta_5(\eta, d) = \eta_1 + \eta_2 \times d_{(18-24]} + \eta_3 \times d_{(12-18]}$$

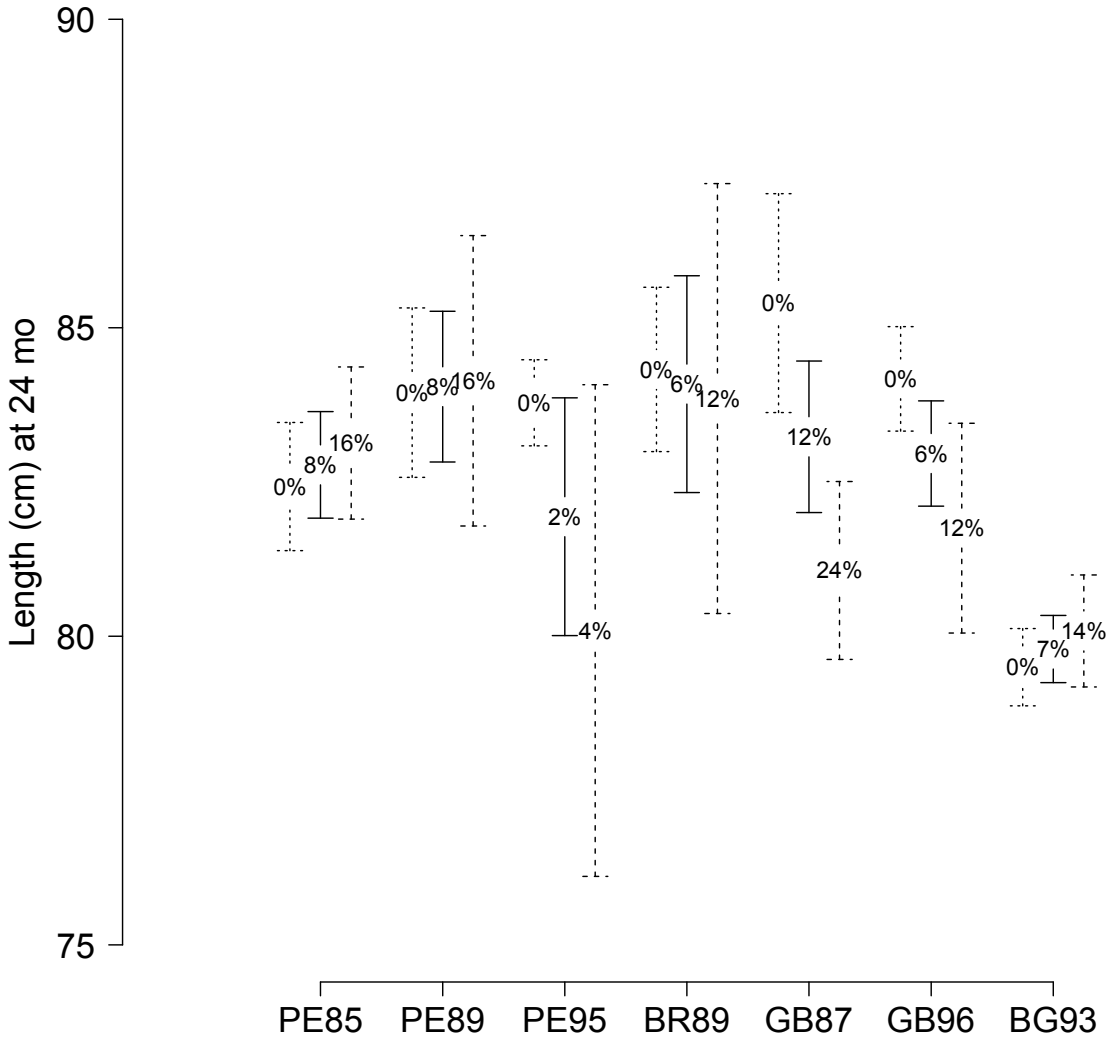
The slope for the first period (0-3 months) is β_1, which is made up of two parts: α_1 is the average length velocity of children without diarrhea (d=0), and α_2 is the change in growth velocity associated with each additional percent increase in diarrhea prevalence. The slope for the second period (3.01-6 months) is $\beta_1 + \beta_2$. β_2 represents the change in slope during the 3.01-6 month period and consists of: δ_1 is the change in slope from 0-3 months to 3.01-6 months in children without diarrhea in either period, δ_2 is the change associated with each additional percent

increase in diarrhea prevalence in current period, and δ_3 is the change associated with each additional percent increase in diarrhea in the previous period. Similarly, the growth velocity for the 6.01 to 12 month period is the sum of $\beta_1 + \beta_2 + \beta_3$, the growth velocity for the 12.01 to 18 month period is $\beta_1 + \beta_2 + \beta_3 + \beta_4$, and the growth velocity for the 18.01 to 24 month period is $\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5$.

SUPPLEMENTAL FIGURE 1. Conceptual framework for statistical model.



SUPPLEMENTAL FIGURE 2. Estimated lengths at 24 months of age, by percent diarrhea and by cohort study, based on model that includes age spline with knots at 3, 6, 12, and 18 months of age, and interactions between age spline and diarrhea prevalence during current and previous period. PE85: Peru 1985, PE89: Peru 1989, PE95: Peru 1995, BR89: Brazil 1989, GB87: Guinea-Bissau 1987, GB96: Guinea-Bissau 1996, BG93: Bangladesh 1993.



SUPPLEMENTAL TABLE 1. General description of studies included in the combined dataset including anthropometry data collected in children <24 months of age.

Dates	Setting	Design	Purpose
1985-1987	Lima, Peru (urban)	Observational	Effects of diarrhea on growth
1989-1991	Lima, Peru (urban)	Observational	Effects of diarrhea on growth
1995-1998	Lima, Peru (urban)	Observational	Effects of diarrhea on growth
1989-2000	Goncalves, Brazil (urban)	Observational	Effects of diarrhea on growth
1987-1990	Bandim, Guinea-Bissau (urban)	Observational	Identify risk factors for diarrhea in Africa
1996-1998	Bandim, Guinea-Bissau (urban)	Randomized trial	Effects of dietary management of diarrhea on growth
1993-1996	Mirzapur, Bangladesh (rural)	Observational	Identify risk factors for diarrhea

SUPPLEMENTAL TABLE 2. Parameters from length model associated with percent diarrhea in current and previous time period.

		Estimate in cm±SE		
		Overall	Girls	Boys
	Intercept	51.2±0.2	50.0±0.2	50.9±0.2
	Age[1]	3.4±0.02	3.4±0.04	3.5±0.03
	$Age_{(3-6]}$	-1.5±0.04	-1.5±0.05	-1.5±0.05
	$Age_{(6-12]}$	-0.8±0.02	-0.7±0.03	-0.8±0.03
	$Age_{(12-18]}$	-0.2±0.02	-0.2±0.02	-0.3±0.02
	$Age_{(18-24]}$	-0.1±0.02	-0.1±0.03	-0.08±0.03
	Peru 1985 (27)	-0.1±0.2	-0.1±0.3	-0.2±0.3
	Peru 1989 (11)	0.1±0.2	-0.1±0.3	0.4±0.4
	Peru 1995 (13)	-0.1±0.2	-0.2±0.3	-0.01±0.3
	Brazil 1989 (12)	-0.4±0.2	-0.4±0.3	-0.5±0.3
	Guinea-Bissau 1987 (28)	-0.4±0.3	-0.5±0.3	-0.2±0.4
	Guinea-Bissau 1996 (29)	Ref	Ref	Ref
	Bangladesh 1993 (30)	-1.4±0.2	-1.6±0.3	-1.2±0.3
	Sex (girls=1)	-1.5±0.1	-	-
	Baseline WAZ[2]<-1	-2.6±0.2	-2.5±0.2	-2.6±0.2
Interaction with current diarrhea prevalence	Age:$d^{3}_{[0-3]}$	-0.001±0.001	-0.003±0.002	-0.0001±0.002
	$Age_{(t-3)+}$:$d_{(3-6]}$	-0.004±0.001	-0.002±0.002	-0.006±0.002
	$Age_{(t-6)+}$:$d_{(6-12]}$	-0.003±0.001	-0.002±0.001	-0.005±0.001
	$Age_{(t-12)+}$:$d_{(12-18]}$	-0.002±0.001	-0.003±0.002	-0.002±0.002
	$Age_{(t-18)+}$:$d_{(18-24]}$	-0.003±0.001	0.0008±0.002	-0.006±0.002
Interaction with previous diarrhea	$Age_{(t-3)+}$:$d_{(0-3]}$	0.001±0.002	0.003±0.002	0.0002±0.002
	$Age_{(t-6)+}$:$d_{(3-6]}$	0.003±0.001	0.002±0.002	0.006±0.002
	$Age_{(t-12)+}$:$d_{(6-12]}$	0.004±0.001	0.004±0.001	0.004±0.002
	$Age_{(t-18)+}$:$d_{(12-18]}$	0.004±0.002	0.003±0.003	0.005±0.003

[1] Age spline variable with knots at 3, 6, 12, and 18 months of age
[2] WAZ: weight-for-age Z-score
[3] d refers to percent of days during the period with diarrhea

SUPPLEMENTAL TABLE 3. Estimates of length, height-for-age Z-scores (HAZ), weight, and weight-for-age Z-scores (WAZ) at 24 months of age.

Diarrhea burden	Boys[1]		Girls	
	Length in cm (95% CI)	HAZ (95% CI)	Length in cm (95% CI)	HAZ (95% CI)
No diarrhea	84.0 (83.6, 84.4)	-1.0 (-1.2, -0.9)	82.5 (82.1, 82.9)	-1.0 (-1.1, -0.9)
Average burden[2]	83.6 (83.2, 84.0)	-1.2 (-1.3, -1.0)	82.1 (81.7, 82.5)	-1.1 (-1.3, -1.0)
2x average burden	83.2 (82.8, 83.6)	-1.3 (-1.4, -1.2)	81.8 (81.4, 82.2)	-1.2 (-1.3, -1.1)

Diarrhea burden	Boys[1]		Girls	
	Weight in kg (95% CI)	WAZ (95% CI)	Weight in kg (95% CI)	WAZ (95% CI)
No diarrhea	11.5 (11.3, 11.7)	-0.5 (-0.6, -0.3)	11.1 (10.9, 11.3)	-0.3 (-0.4, -0.1)
Average burden	11.4 (11.3, 11.5)	-0.6 (-0.6, -0.5)	11.0 (10.9, 11.1)	-0.4 (-0.4, -0.3)
2x average burden	11.3 (11.1, 11.5)	-0.6 (-0.8, -0.5)	10.9 (10.7, 11.1)	-0.4 (-0.6, -0.3)

[1] The models were run overall with sex as a covariate in the model.
[2] The average burden of diarrhea overall is 5%, 7%, 8%, 7%, and 5% of days with diarrhea in the 0-3, >3-6, >6-12, >12-18, and >18-24 month age groups, respectively.

SUPPLEMENTAL TABLE 4. Parameters from length model associated with percent diarrhea in current and previous time period.

		Overall estimate in kg (SE)	Girls estimate in kg (SE)	Boys estimate in kg (SE)
	Intercept	3.7±0.05	3.3±0.06	3.6±0.07
	Age[1]	1.0±0.01	0.91±0.02	1.0±0.01
	$Age_{(3-6]}$	-0.5±0.02	-0.44±0.02	-0.5±0.02
	$Age_{(6-12]}$	-0.2±0.01	-0.23±0.02	-0.3±0.02
	$Age_{(12-18]}$	-0.1±0.01	-0.07±0.01	-0.08±0.01
	$Age_{(18-24]}$	-0.01±0.01	0.01±0.01	-0.03±0.01
	Peru 1985 (27)	-0.2±0.1	-0.1±0.1	-0.3±0.1
	Peru 1989 (11)	0.2±0.1	0.2±0.1	0.1±0.1
	Peru 1995 (13)	0.4±0.1	0.5±0.1	0.2±0.1
	Brazil 1989 (12)	-0.003±0.1	0.1±0.1	-0.1±0.1
	Guinea-Bissau 1987 (28)	-0.1±0.1	-0.2±0.1	-0.1±0.1
	Guinea-Bissau 1996 (29)	Ref	Ref	Ref
	Bangladesh 1993 (30)	-0.4±0.1	-0.5±0.1	-0.4±0.1
	Sex (girls=1)	-0.4±0.04	-	-
	Baseline WAZ[2]<-1	-1.0±0.05	-0.9±0.1	-1.0±0.1
Interaction with current diarrhea prevalence	$Age:d^{3}_{[0-3]}$	-0.0002±0.001	-0.0009±0.001	0.0003±0.001
	$Age_{(t-3)+}:d_{(3-6]}$	-0.002±0.001	-0.0004±0.001	-0.004±0.001
	$Age_{(t-6)+}:d_{(6-12]}$	-0.002±0.0004	-0.002±0.002	-0.002±0.001
	$Age_{(t-12)+}:d_{(12-18]}$	-0.002±0.001	-0.001±0.001	-0.002±0.001
	$Age_{(t-18)+}:d_{(18-24]}$	-0.002±0.001	-0.002±0.001	-0.001±0.001
Interaction with previous diarrhea	$Age_{(t-3)+}:d_{(0-3]}$	0.0002±0.001	0.001±0.001	-0.0002±0.001
	$Age_{(t-6)+}:d_{(3-6]}$	0.002±0.001	0.001±0.001	0.004±0.001
	$Age_{(t-12)+}:d_{(6-12]}$	0.003±0.001	0.004±0.001	0.003±0.001
	$Age_{(t-18)+}:d_{(12-18]}$	0.004±0.001	0.002±0.001	0.005±0.001

[1] Age spline variable with knots at 3, 6, 12, and 18 months of age
[2] WAZ: weight-for-age Z-score
[3] d refers to percent of days during the period with diarrhea