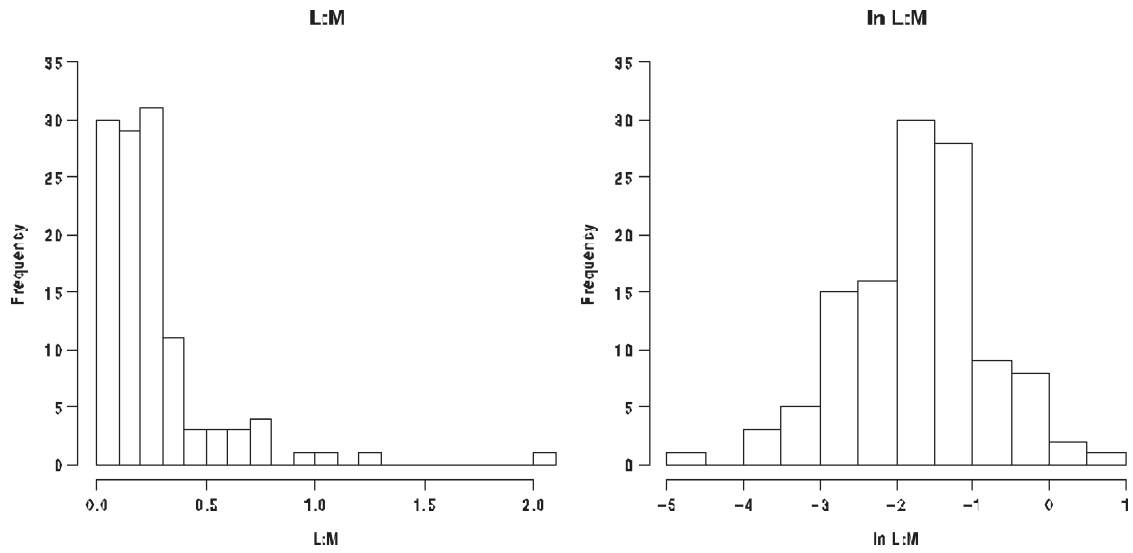
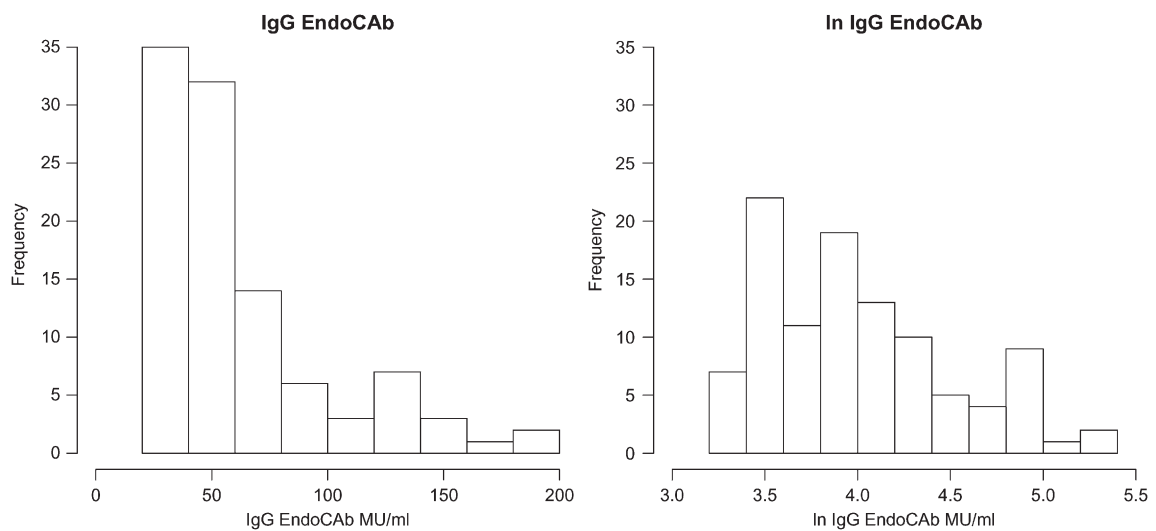


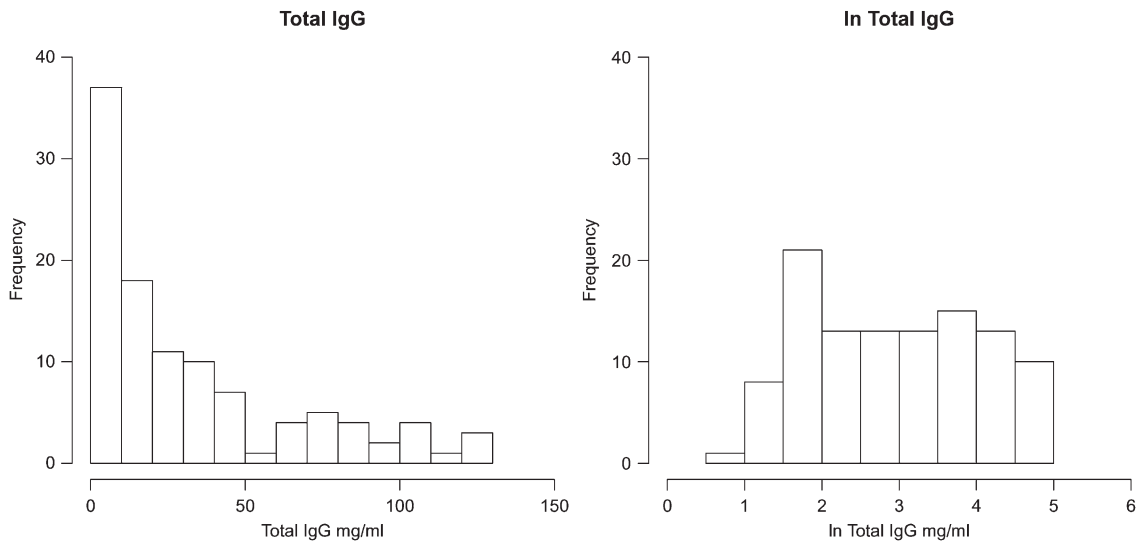
SUPPLEMENTAL FIGURE 1. Mean height-for-age z scores (HAZs) and stunting prevalence in 2007 and 2010 by environmental group. Vertical lines mark bootstrapped 95% confidence intervals (95% CIs).



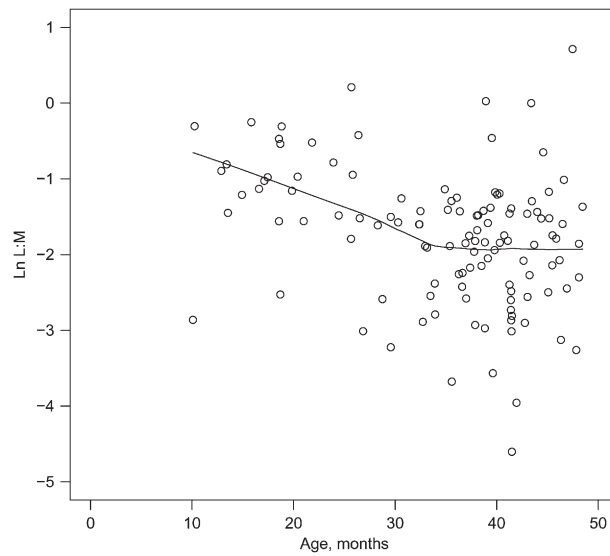
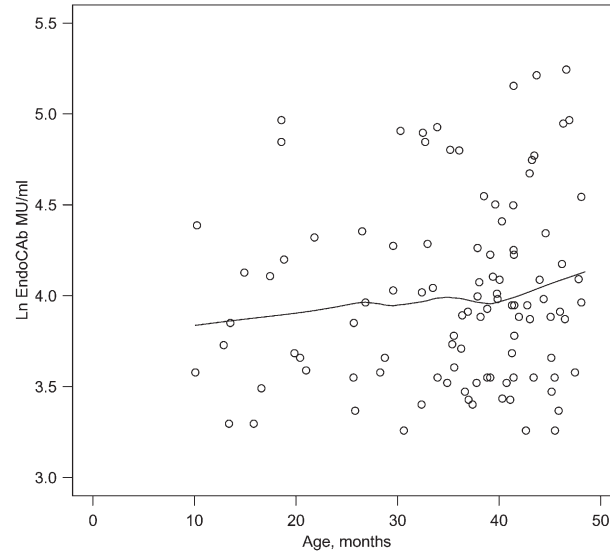
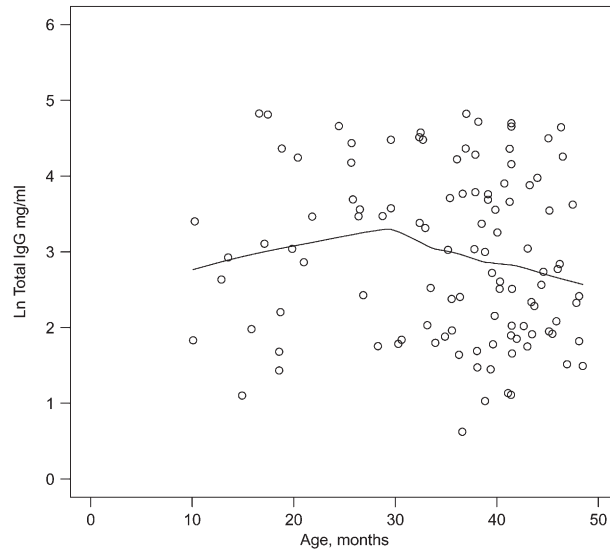
SUPPLEMENTAL FIGURE 2. Histogram distributions of the lactulose:mannitol (L:M) ratio values before and after log transformation.



SUPPLEMENTAL FIGURE 3. Histogram distributions of the immunoglobulin G (IgG) endotoxin core antibody (EndoCAb) titer values before and after log transformation. EndoCAb standard median units (MUs) IgG are arbitrary and based on medians of ranges for 1,000 healthy adults in a specific location.



SUPPLEMENTAL FIGURE 4. Histogram distributions of the total IgG titer values before and after log transformation.



SUPPLEMENTAL FIGURE 5. Total IgG, IgG EndoCAB, and L:M by age. Solid lines are loess smoothers (locally weighted scatterplot smoothing). EndoCAB standard MUs IgG are arbitrary and based on medians of ranges for 1,000 healthy adults in a specific location.

SUPPLEMENTAL TABLE 1

Summary of child and household characteristics in 2007 at enrollment in the Sanitation, Hygiene Education, and Water Supply—Bangladesh (SHEWA-B) study

	Mean	Clean environment (N = 66)	Contaminated environment (N = 53)	Difference	P value*
Child characteristics					
Female		0.53	0.58	-0.05	0.544
Age in months at enrollment in 2007†		9.07	9.26	-0.19	0.856
Child breastfed during SHEWA-B		0.98	1	-0.02	0.317
Household characteristics					
Self-owned home		0.94	0.87	0.07	0.240
Number of people living in the household		5.92	6.3	-0.38	0.508
Use of biofuel		1.00	1.00	0.00	‡
Own any homestead land		0.97	0.91	0.06	0.166
Own any land other than homestead land		0.73	0.36	0.37	< 0.001
Agricultural/non-agricultural labor, boarman, shoe/umbrella mechanic		0.14	0.38	-0.24	0.007
Household head: skilled worker/professional		0.06	0.06	0	0.927
Household head: traders/business occupation		0.23	0.11	0.12	0.157
Number of rooms in the household (excluding bathroom and kitchen)		2.94	1.83	1.11	< 0.001
Have electricity		0.73	0.38	0.35	< 0.001
Thatch roof		0.03	0.04	-0.01	0.827
Jute/bamboo/mud walls		0.24	0.34	-0.10	0.291
Earth/bamboo floor		0.70	0.92	-0.22	0.002
Durable good ownership					
Number of wardrobes		0.55	0.42	0.13	0.343
Number of tables		2.12	0.81	1.31	< 0.001
Number of chairs or benches		3.85	1.34	2.51	< 0.001
Number of watches or clocks		2.56	1.25	1.31	0.001
Number of beds/bed frames		1.65	0.36	1.29	< 0.001
Number of basic beds		1.62	1.6	0.02	0.949
Have a radio that is working		0.29	0.17	0.12	0.135
Have a black and white television that is working		0.32	0.15	0.17	0.046
Have a color television that is working		0.23	0.06	0.17	0.011
Have refrigerator		0.06	0	0.06	0.041
Have a bicycle (used for commercial purposes and not a toy for children)		0.36	0.15	0.21	0.012
Have a motorcycle		0.11	0	0.11	0.006
Have a sewing machine		0.14	0	0.14	0.016
Have a land phone		0.02	0	0.02	0.317
Water supply conditions					
Shallow tube well		0.85	0.75	0.1	0.251
Deep tube well		0.05	0.08	-0.03	0.506
Number of households sharing water point		0.95	2.11	-1.16	< 0.001
Sanitation conditions					
Type of toilet facility that households usually use					
Septic tank		0.47	0	0.47	< 0.001
Flush to offset pit latrine		0.26	0	0.26	< 0.001
Pit latrine with slab and water seal		0.27	0	0.27	< 0.001
Flush or pour flush toilet connected to somewhere else		0	0.06	-0.06	0.167
Pit latrine without slab/open pit		0	0.08	-0.08	0.041
Pit latrine with slab and no water seal/broken water seal		0	0.70	-0.70	< 0.001
Hanging toilet/latrine		0	0.06	-0.06	0.079
No facility/bush/field		0	0.11	-0.11	0.025
Stool visible on slab or floor		0.21	0.75	-0.54	< 0.001
Child age < 5 years feces disposal in no specific place/bush/field		0.79	0.83	-0.04	0.57
Hygiene conditions					
Handwashing station with water		1	0.49	0.51	< 0.001
Handwashing station with soap/detergent		1	0.19	0.81	< 0.001
Washing both hands with soap or ash before preparing food		0.19	0.19	0	0.988
Washing both hands with soap or ash before eating		0.17	0.13	0.04	0.636
Fingernails of the child are clean		0.20	0.08	0.12	0.061
Palms of the child are clean		0.43	0.17	0.26	0.005
Fingerpads of the child are clean		0.41	0.15	0.26	0.003
Fingernails of the respondent are clean		0.38	0.11	0.27	0.002
Palms of the respondent are clean		0.67	0.53	0.14	0.174
Fingerpads of the respondent are clean		0.65	0.51	0.14	0.165

*P values calculated using robust SEs that account for clustering at the household level.

†N = 42 clean environment, N = 31 contaminated environment (other children born after the 2007 survey).

‡P value cannot be calculated, because there is no variation in either group.

SUPPLEMENTAL TABLE 2

Summary of fieldworker guesses of group membership (clean and contaminated) compared with actual group membership measured in 2010

Field team guess of household cleanliness	Actual household status	
	Clean environment <i>N</i> (%)	Contaminated environment <i>N</i> (%)
Definitely a clean environment	6 (10)	2 (4)
Probably a clean environment	31 (51)	9 (20)
Probably a dirty environment	16 (26)	17 (38)
Definitely a dirty environment	8 (13)	17 (38)

Fieldworkers were blinded to household environmental classifications (clean or contaminated). At the end of their visit to each household, fieldworkers were asked to guess the household environmental group given four choices: definitely a clean environment, probably a clean environment, probably a dirty environment, or definitely a dirty environment. Data were not recorded for 13 of 119 households.

SUPPLEMENTAL TABLE 3
Parasite infection prevalence measured in 2010

Parasite prevalence (%)	Clean environment		Contaminated environment		Difference	95% CI
	Percent	95% CI	Percent	95% CI		
<i>Ascaris lumbricoides</i> *						
Prevalent infections, < 5 years	7.5	0.0, 18.0	20.7	11.1, 32.3	-13.2	-27.0, 1.0
Low infection intensity, < 5 years	4.5	0.0, 9.7	6.9	1.5, 14.3	-2.4	-10.7, 5.5
Moderate/heavy infection intensity, < 5 years	3.0	0.0, 9.4	13.8	4.7, 24.1	-10.8	-22.8, 0.5
Prevalent infections, < 20 years	7.5	1.2, 15.8	16.1	8.1, 26.1	-8.6	-20.6, 3.2
Low infection intensity, < 20 years	5.0	1.1, 9.9	6.9	1.9, 13.2	-1.9	-9.3, 5.2
Moderate/heavy infection intensity, < 20 years	2.5	0.0, 8.2	9.2	3.0, 16.6	-6.7	-15.6, 1.4
<i>Trichuris trichiura</i>						
Prevalent infections, < 5 years	10.4	3.4, 17.6	13.8	4.4, 24.1	-3.3	-16.2, 8.1
Low infection intensity, < 5 years	10.4	3.4, 17.6	10.3	3.3, 19.0	0.1	-11.2, 10.5
Moderate/heavy infection intensity, < 5 years	0.0	0.0, 0.0	3.4	0.0, 8.8	-3.4	-8.8, 0.0
Prevalent infections, < 20 years	8.8	3.0, 15.6	10.3	3.2, 20.2	-1.6	-12.9, 8.1
Low infection intensity, < 20 years	8.8	3.0, 15.6	8.0	2.1, 15.7	0.7	-8.5, 9.7
Moderate/heavy infection intensity, < 20 years	0.0	0.0, 0.0	2.3	0.0, 6.1	-2.3	-6.1, 0.0
Hookworm						
Prevalent infections, < 5 years	0.0	†	0.0	-		
Prevalent infections, < 20 years	0.0	-	0.0	-		
<i>Giardia</i> sp.						
Prevalent infections, < 5 years	34.3	22.9, 46.3	37.3	26.2, 50.0	-3.0	-19.3, 14.0
Prevalent infections, < 20 years	36.3	25.3, 47.0	38.6	28.0, 49.2	-2.4	-17.7, 12.7
<i>Cryptosporidium</i> sp.						
Prevalent infections, < 5 years	1.5	0.0, 4.9	1.7	0.0, 5.4	-0.2	-4.6, 4.3
Prevalent infections, < 20 years	1.3	0.0, 4.1	1.1	0.0, 3.7	0.1	-3.2, 3.7
<i>Entamoeba histolytica</i>						
Prevalent infections, < 5 years	0.0	-	0.0	-		
Prevalent infections, < 20 years	0.0	-	0.0	-		

Population < 5 years: *N* = 67 clean and *N* = 58 contaminated for helminth samples; *N* = 67 clean and *N* = 59 contaminated for protozoan samples. Population < 20 years: *N* = 80 clean and *N* = 87 contaminated for helminth samples; *N* = 80 clean and *N* = 88 contaminated for protozoan samples. 95% CI = 95% confidence interval.

*Definitions of infection intensity follow World Health Organization guidelines: *Ascaris* moderate/heavy infection \geq 5,000 eggs per gram; *Trichuris* moderate/heavy infection \geq 1,000 eggs per gram.

† CIs and differences not estimated because of zero prevalence in both groups.

SUPPLEMENTAL TABLE 4

Differences between groups in anthropometry measured at enrollment in 2007 and diarrhea prevalence measured over the next 24 months during the original cohort study¹⁶

Characteristic	Clean environment		Contaminated environment		Difference	95% CI
	Mean	SD	Mean	SD		
HAZ	-0.90	-1.80	-1.90	1.26	1.01	0.28, 1.74
WAZ	-0.99	-1.27	-1.98	1.14	0.99	0.42, 1.56
WHZ	-0.55	-1.30	-1.19	1.06	0.65	0.08, 1.21
Proportion HAZ < -2	0.27	0.45	0.48	0.51	-0.22	-0.45, 0.02
Proportion WAZ < -2	0.21	0.42	0.48	0.51	-0.27	-0.49, -0.05
Proportion WHZ < -2	0.20	0.40	0.19	0.40	0.001	-0.19, 0.19
Diarrhea longitudinal prevalence 2007-2009 (%)	11.67	32.12	15.58	36.29	-3.91	-8.46, -0.63

N = 41 children in clean environment; *N* = 31 children in contaminated environment. Diarrhea longitudinal follow-up: *N* = 1,345 visits for the clean environment group and *N* = 1,001 visits for the contaminated environment group. WAZ = weight-for-age z score; WHZ = weight-for-height z score.

¹⁶Huda TM, Unicomb L, Johnston RB, Halder AK, Yushuf Sharker MA, Luby SP, 2012. Interim evaluation of a large scale sanitation, hygiene and water improvement programme on childhood diarrhea and respiratory disease in rural Bangladesh. *Soc Sci Med* 75: 604-611.

SUPPLEMENTAL TABLE 5

Anthropometry measured in 2010 after the fieldworkers revisited each household

Characteristic	Clean environment		Contaminated environment		Difference	95% CI
	Mean	SD	Mean	SD		
HAZ	-1.66	1.15	-2.57	1.33	0.91	0.47, 1.36
WAZ	-1.62	1.08	-2.04	1.14	0.42	0.02, 0.83
WHZ	-0.99	0.98	-0.86	1.22	-0.12	-0.54, 0.30
HCZ	-1.82	1.00	-2.12	0.98	0.30	-0.05, 0.65
Proportion HAZ < -2	0.33	0.48	0.74	0.45	-0.40	-0.57, -0.23
Proportion WAZ < -2	0.33	0.48	0.49	0.50	-0.16	-0.45, -0.03
Proportion WHZ < -2	0.11	0.31	0.09	0.30	0.01	-0.10, 0.13

N = 66 children in clean environment; *N* = 53 children in contaminated environment. HCZ = head circumference-for-age z score.

SUPPLEMENTAL TABLE 6

Linear regression estimates of the association between environmental enteropathy biomarkers and anthropometry z scores among all children with biomarker measurements measured in 2010 ($N = 107$ for Total IgG; $N = 117$ for EndoCAB and L:M ratio)

Outcome	Ln total IgG		Ln IgG EndoCAB		Ln L:M ratio	
	Unadjusted	Age and sex adjusted	Unadjusted	Age and sex adjusted	Unadjusted	Age and sex adjusted
HAZ	-0.01 (-0.23, 0.22)	0.02 (-0.22, 0.26)	-0.07 (-0.20, 0.05)	-0.08 (-0.20, 0.04)	-0.24 (-0.52, 0.05)	-0.33 (-0.62, -0.05)
WAZ	-0.04 (-0.20, 0.13)	-0.004 (-0.18, 0.17)	-0.01 (-0.12, 0.10)	-0.02 (-0.13, 0.09)	-0.16 (-0.37, 0.04)	-0.24 (-0.47, -0.01)
WHZ	-0.07 (-0.25, 0.11)	-0.04 (-0.22, 0.14)	0.05 (-0.04, 0.14)	0.04 (-0.05, 0.13)	-0.07 (-0.28, 0.14)	-0.09 (-0.34, 0.16)
HCZ	-0.05 (-0.12, 0.21)	-0.02 (-0.14, 0.19)	-0.04 (-0.12, 0.04)	-0.03 (-0.11, 0.06)	0.04 (-0.19, 0.26)	-0.04 (-0.28, 0.19)

EndoCAB standard MUs IgG are arbitrary and based on medians of ranges for 1,000 healthy adults in a specific location.

SUPPLEMENTAL TABLE 7

Robustness check comparisons of different estimators for the difference between outcomes in children from clean and contaminated household environments measured in 2010

Outcome	Unadjusted difference	Age- and sex-adjusted difference	Fully adjusted* difference	Mahalanobis matched† difference	GenMatch‡ difference
<i>Ascaris</i> , proportion infected	-0.14 (-0.30, 0.02)	-0.12 (-0.28, 0.04)	-0.12 (-0.30, 0.06)	-0.20 (-0.35, -0.05)	-0.24 (-0.42, -0.07)
<i>Trichuris</i> , proportion infected	-0.05 (-0.18, 0.09)	-0.05 (-0.18, 0.08)	0.02 (-0.13, 0.17)	-0.04 (-0.19, 0.11)	-0.10 (-0.27, 0.08)
<i>Giardia</i> , proportion infected	-0.02 (-0.20, 0.16)	-0.02 (-0.19, 0.16)	0.01 (-0.21, 0.23)	-0.02 (-0.21, 0.18)	0.05 (-0.16, 0.26)
Ln total IgG (mg/mL)	-0.33 (-0.76, 0.09)	-0.32 (-0.74, 0.10)	-0.60 (-1.05, -0.14)	-0.45 (-0.91, 0.01)	-0.32 (-0.80, 0.16)
Standardized ln total IgG	-0.30 (-0.69, 0.08)	-0.29 (-0.67, 0.09)	-0.54 (-0.95, -0.13)	-0.41 (-0.82, 0.01)	-0.29 (-0.73, 0.14)
Ln EndoCAB (MU/mL)	-0.58 (-1.30, 0.14)	-0.66 (-1.40, 0.07)	-0.48 (-1.29, 0.33)	-1.02 (-1.95, -0.09)	-1.01 (-1.99, -0.03)
Standardized ln EndoCAB	-0.29 (-0.64, 0.07)	-0.33 (-0.69, 0.04)	-0.24 (-0.63, 0.16)	-0.50 (-0.96, -0.05)	-0.50 (-0.98, -0.02)
Ln L:M ratio	-0.37 (-0.68, -0.06)	-0.28 (-0.60, 0.04)	-0.29 (-0.64, 0.07)	-0.35 (-0.74, 0.05)	-0.18 (-0.63, 0.26)
Standardized ln L:M ratio	-0.42 (-0.77, -0.07)	-0.31 (-0.67, 0.05)	-0.32 (-0.72, 0.08)	-0.39 (-0.83, 0.06)	-0.20 (-0.70, 0.30)
HAZ	0.91 (0.17, 1.65)	0.96 (0.51, 1.41)	0.54 (0.06, 1.01)	0.70 (0.22, 1.18)	0.65 (0.13, 1.18)
WAZ	0.42 (0.02, 0.83)	0.48 (0.08, 0.88)	0.04 (-0.48, 0.55)	0.24 (-0.22, 0.70)	0.11 (-0.42, 0.63)
WHZ	-0.12 (-0.54, 0.30)	-0.10 (-0.52, 0.32)	-0.19 (-0.61, 0.24)	-0.22 (-0.68, 0.24)	-0.36 (-0.85, 0.13)
HCZ	0.30 (-0.05, 0.65)	0.36 (0.02, 0.71)	0.08 (-0.36, 0.53)	0.16 (-0.24, 0.57)	0.19 (-0.26, 0.65)
Proportion HAZ < -2	-0.40 (-0.57, -0.24)	-0.42 (-0.59, -0.26)	-0.22 (-0.42, -0.02)	-0.30 (-0.49, -0.11)	-0.28 (-0.50, -0.05)
Proportion WAZ < -2	-0.16 (-0.34, 0.02)	-0.17 (-0.34, 0.01)	-0.02 (-0.26, 0.22)	-0.08 (-0.28, 0.11)	0.01 (-0.24, 0.26)
Proportion WHZ < -2	0.01 (-0.10, 0.13)	0.004 (-0.11, 0.12)	0.10 (-0.03, 0.23)	0.01 (-0.13, 0.14)	0.04 (-0.11, 0.19)

Columns 1-3 repeat information presented in the text (Table 1 and 2) to facilitate the comparison. Estimates are clean minus contaminated (95% CIs). All estimates are restricted to the children from the original SHEWA-B sample < 4 years old ($N = 119$ for anthropometry, $N = 118$ for enteropathy biomarkers, $N = 116$ for parasitic infections). EndoCAB standard MUs IgG are arbitrary and based on medians of ranges for 1,000 healthy adults in a specific location.

*Fully adjusted models adjust for age, age squared, sex, household head occupation, land ownership other than the homestead, number of people in the household, number of rooms in the house, house floor materials, house wall materials, house electricity, and asset ownership (tables, watches, beds, radio, television, and/or bicycle). The text has details on the model selection process.

† Matching estimators include the adjustment covariates used in fully adjusted models plus the propensity score estimated using main effects of the covariates.