

**Double burden of malnutrition in children aged 24-59 months by
socioeconomic status in five south Asian countries: evidence from
Demographic and Health Surveys**

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Supplementary materials

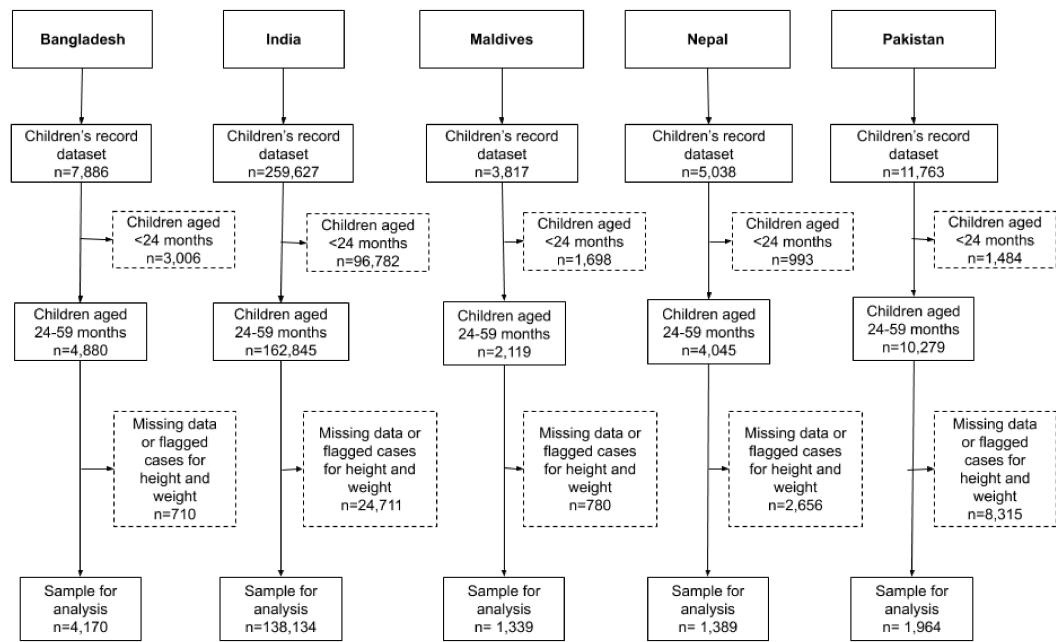


Figure S1: Flowchart of study participants included in this analysis

Table S1: Prevalence of underweight and overweight with 95% confidence intervals (95% CIs) in five South Asian countries, overall and by household's wealth index and highest education level

	Bangladesh	India	Maldives	Nepal	Pakistan
Prevalence of underweight*, % (95% CIs)					
Overall	37.0 (35.6-38.5)	38.1 (37.9-38.4)	18.5 (16.5-20.7)	29.2 (26.9-31.7)	28.2 (26.3-30.2)
Wealth index					
Poorest	49.5 (46.4-52.7)	50.7 (50.1-51.2)	26.3 (21.4-31.9)	35.8 (30.4-41.6)	43.5 (39.2-47.9)
Poorer	44.0 (40.5-47.5)	43.7 (43.2-44.3)	21.0 (16.5-26.5)	28.4 (23.6-33.8)	32.3 (28.0-36.9)
Middle	37.2 (33.9-40.6)	36.1 (35.6-36.7)	21.6 (17.1-26.8)	35.8 (30.6-41.3)	23.4 (19.3-28.1)
Richer	32.5 (29.4-35.7)	29.4 (28.8-30.0)	12.8 (9.3-17.4)	26.4 (21.7-31.7)	23.0 (19.5-26.9)
Richest	19.5 (16.9-22.4)	21.6 (21.0-22.1)	10.4 (7.2-14.8)	13.8 (9.5-19.7)	13.6 (10.4-17.7)
Household's highest education					
No education	42.6 (39.1-46.1)	48.6 (48.1-49.1)	30.9 (24.7-37.9)	36.6 (32.6-40.8)	35.8 (33.1-38.5)
Primary	44.5 (41.7-47.4)	42.7 (42.0-43.4)	20.9 (17.7-24.5)	31.9 (26.6-37.7)	27.6 (23.2-32.5)
Secondary	32.9 (30.8-35.1)	33.2 (32.8-33.6)	12.1 (9.5-15.2)	23.1 (19.3-27.5)	15.0 (11.8-19.0)
Higher	23.0 (19.0-27.6)	20.0 (19.3-20.7)	16.7 (8.5-30.2)	16.1 (11.3-22.6)	8.0 (4.8-12.9)
Prevalence of overweight, % (95% CIs)					
Overall	2.4 (1.9-2.9)	3.5 (3.4-3.6)	9.2 (7.7-10.8)	2.8 (2.1-3.8)	7.3 (6.3-8.5)
Wealth index					
Poorest	1.7 (1.1-2.8)	2.8 (2.7-3.0)	5.9 (3.6-9.4)	3.9 (2.2-6.9)	9.0 (6.8-11.9)
Poorer	1.5 (0.8-2.6)	2.9 (2.7-3.1)	8.8 (5.9-12.9)	1.5 (0.6-3.7)	7.9 (5.7-10.9)
Middle	1.6 (1.0-2.8)	3.2 (3.0-3.4)	7.7 (5.1-11.5)	0.4 (0.1-2.3)	5.9 (3.9-8.8)
Richer	1.6 (1.0-2.7)	3.9 (3.7-4.2)	12.7 (9.1-17.3)	5.1 (3.1-8.3)	5.5 (3.8-7.9)
Richest	5.5 (4.1-7.3)	5.5 (5.2-5.9)	11.0 (7.7-15.4)	3.8 (1.8-7.8)	8.0 (5.6-11.3)
Education level					
No education	1.6 (0.9-2.7)	3.0 (2.8-3.1)	7.0 (4.2-11.7)	2.5 (1.5-4.2)	7.4 (6.0-9.0)
Primary	1.6 (1.0-2.5)	3.1 (2.9-3.4)	6.1 (4.4-8.4)	1.2 (0.4-3.5)	8.8 (6.2-12.2)
Secondary	2.3 (1.7-3.0)	3.5 (3.3-3.6)	13.1 (10.5-16.3)	4.8 (3.1-7.3)	4.7 (3.0-7.3)
Higher	7.0 (4.8-10.0)	6.0 (5.6-6.4)	8.9 (3.5-21.1)	1.8 (0.6-5.4)	9.4 (5.9-14.6)

*Sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures were used to estimate country-representative prevalence.

Table S2: Prevalence of stunting with 95% confidence intervals (95% CIs) in five South Asian countries, overall and by household's wealth index and highest education level

	Prevalence of stunting*, % (95% CI)				
	Bangladesh	India	Maldives	Nepal	Pakistan
Overall	41.6 (40.2-43.1)	41.8 (41.5-42.1)	16.5 (14.6-18.6)	41.6 (39.0-44.2)	48.2 (46.1-50.3)
Wealth index					
Poorest	58.8 (55.7-61.9)	56.9 (56.4-57.4)	19.6 (15.2-24.7)	58.2 (52.3-63.8)	62.3 (57.9-66.4)
Poorer	49.9 (46.4-53.4)	48.0 (47.4-48.5)	20.8 (16.3-26.2)	42.8 (37.3-48.4)	61.0 (56.3-65.5)
Middle	41.3 (38.0-44.8)	39.9 (39.3-40.5)	16.9 (12.9-21.7)	42.4 (37.0-48.0)	47.3 (42.1-52.4)
Richer	35.4 (32.3-38.7)	30.7 (30.1-31.3)	13.5 (9.9-18.2)	37.2 (31.9-42.8)	41.3 (37.0-45.7)
Richest	19.4 (16.7-22.3)	22.8 (22.2-23.4)	11.9 (8.5-16.4)	19.9 (14.7-26.4)	22.8 (18.7-27.6)
Household's highest education					
No education	51.3 (47.7-54.8)	55.0 (54.6-55.5)	21.0 (15.8-27.5)	51.6 (47.4-55.8)	58.8 (56.0-61.6)
Primary	52.5 (49.7-55.4)	47.0 (46.3-47.7)	18.5 (15.5-22.0)	41.1 (35.3-47.1)	50.3 (45.1-55.5)
Secondary	34.4 (32.3-36.6)	35.2 (34.8-35.6)	14.1 (11.3-17.3)	35.3 (30.8-40.0)	26.6 (22.5-31.2)
Higher	24.4 (20.3-29.1)	21.3 (20.5-22.0)	6.8 (2.3-18.5)	26.1 (20.0-33.4)	20.5 (15.2-27.0)

*Sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures were used to estimate country-representative prevalence.

Table S3: Prevalence of wasting with 95% confidence intervals (95% CIs) in five South Asian countries, overall and by household's wealth index and highest education level

	Prevalence of wasting*, % (95% CI)				
	Bangladesh	India	Maldives	Nepal	Pakistan
Overall	12.5 (11.6-13.6)	17.9 (17.7-18.1)	11.1 (9.5-12.9)	6.4 (5.2-7.8)	6.9 (5.9-8.1)
Wealth index					
Poorest	13.3 (11.3-15.6)	20.0 (19.5-20.4)	14.8 (11.0-19.5)	5.9 (3.7-9.4)	11.9 (9.4-15.1)
Poorer	15.0 (12.6-17.6)	18.6 (18.1-19.0)	13.7 (10.0-18.5)	7.4 (5.0-11.0)	5.5 (3.7-8.1)
Middle	11.8 (9.8-14.3)	17.3 (16.8-17.7)	12.5 (9.1-16.9)	6.7 (4.4-10.1)	5.4 (3.4-8.2)
Richer	12.2 (10.2-14.5)	16.8 (16.3-17.2)	6.6 (4.1-10.3)	6.4 (4.1-9.8)	4.7 (3.1-7.0)
Richest	10.3 (8.4-12.6)	15.6 (15.1-16.1)	7.8 (5.1-11.8)	4.9 (2.6-9.2)	6.1 (4.0-9.2)
Household's highest education					
No education	9.1 (7.2-11.3)	19.1 (18.8-19.5)	16.8 (12.1-22.8)	8.0 (6.0-10.7)	7.6 (6.2-9.3)
Primary	14.0 (12.2-16.1)	18.3 (17.8-18.9)	12.1 (9.6-15.1)	7.4 (4.8-11.2)	7.3 (5.0-10.5)
Secondary	13.0 (11.6-14.6)	17.7 (17.4-18.0)	8.1 (6.0-10.8)	4.6 (3.0-7.2)	5.2 (3.4-7.9)
Higher	12.5 (9.5-16.3)	14.2 (13.6-14.8)	13.2 (6.1-26.2)	3.9 (1.8-8.2)	5.1 (2.7-9.4)

*Sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures were used to estimate country-representative prevalence.

Table S4: Associations of household's wealth index and highest education with childhood stunting

	Bangladesh		India		Maldives		Nepal		Pakistan	
	Minimally-adjusted	Fully-adjusted								
Household's wealth index										
Poorest	1.0 (Ref)	1.0 (Ref)								
Poorer	0.7 (0.6-0.8)	0.8 (0.7-0.9)	0.7 (0.7-0.7)	0.8 (0.8-0.9)	1.2 (0.9-1.5)	1.3 (0.9-1.8)	0.5 (0.4-0.6)	0.5 (0.4-0.6)	0.9 (0.7-1.1)	0.9 (0.7-1.1)
Middle	0.5 (0.5-0.6)	0.7 (0.6-0.8)	0.5 (0.5-0.5)	0.7 (0.7-0.7)	0.9 (0.6-1.1)	1.1 (0.8-1.5)	0.4 (0.4-0.6)	0.4 (0.3-0.5)	0.6 (0.5-0.8)	0.6 (0.5-0.7)
Richer	0.4 (0.3-0.5)	0.5 (0.5-0.6)	0.4 (0.3-0.4)	0.5 (0.5-0.6)	0.8 (0.5-1.1)	1.0 (0.7-1.4)	0.4 (0.3-0.5)	0.4 (0.3-0.5)	0.5 (0.4-0.6)	0.4 (0.3-0.5)
Richest	0.2 (0.2-0.2)	0.3 (0.3-0.4)	0.2 (0.2-0.3)	0.4 (0.4-0.5)	0.6 (0.3-1.1)	0.8 (0.3-2.1)	0.2 (0.1-0.2)	0.2 (0.1-0.3)	0.2 (0.2-0.3)	0.2 (0.2-0.3)
Household's highest education										
No education	1.0 (Ref)	1.0 (Ref)								
Primary	0.9 (0.8-1.0)	0.9 (0.8-1.1)	0.8 (0.8-0.8)	0.9 (0.9-0.9)	0.9 (0.7-1.1)	0.9 (0.7-1.1)	0.6 (0.5-0.8)	0.7 (0.5-0.9)	0.8 (0.6-1.0)	1.1 (0.9-1.4)
Secondary	0.4 (0.4-0.5)	0.6 (0.6-0.7)	0.5 (0.5-0.5)	0.7 (0.7-0.7)	0.6 (0.4-0.7)	0.5 (0.4-0.7)	0.5 (0.4-0.7)	0.8 (0.7-1.0)	0.3 (0.3-0.4)	0.6 (0.5-0.8)
Higher	0.3 (0.2-0.3)	0.6 (0.5-0.8)	0.2 (0.2-0.2)	0.5 (0.5-0.5)	0.3 (0.1-1.1)	0.3 (0.1-1.4)	0.4 (0.3-0.5)	0.6 (0.4-0.9)	0.3 (0.2-0.4)	0.6 (0.4-0.8)

* Minimally adjusted models were adjusted for child's age and sex; and fully-adjusted models were additionally adjusted for area of residence, receiving vitamin A and deworming drug, access to improved sanitation and drinking water, number of under-five children, mother's age at first birth, mother's height, and mother's BMI. Analyses were conducted using sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures.

Table S5: Associations of household's wealth index and highest education with childhood wasting

	Bangladesh		India		Maldives		Nepal		Pakistan	
	Minimally-adjusted	Fully-adjusted								
Household's wealth index										
Poorest	1.0 (0.8-1.2)	1.0 (0.8-1.3)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (0.7-1.4)	1.0 (0.7-1.5)	1.0 (0.6-1.5)	1.0 (0.6-1.6)	1.0 (0.7-1.4)	1.0 (0.6-1.6)
Poorer	1.1 (0.9-1.3)	1.1 (0.9-1.3)	0.8 (0.8-0.8)	0.9 (0.9-0.9)	0.9 (0.6-1.2)	0.9 (0.6-1.3)	1.1 (0.7-1.8)	1.0 (0.6-1.5)	0.6 (0.4-1.0)	0.7 (0.5-1.2)
Middle	0.9 (0.7-1.1)	0.9 (0.7-1.1)	0.7 (0.7-0.8)	0.9 (0.9-0.9)	0.9 (0.6-1.2)	1.0 (0.7-1.5)	1.2 (0.8-1.8)	1.0 (0.6-1.5)	0.7 (0.5-1.1)	0.9 (0.6-1.4)
Richer	0.7 (0.6-0.9)	0.8 (0.6-0.9)	0.7 (0.7-0.7)	0.9 (0.9-0.9)	0.6 (0.4-1.0)	1.1 (0.7-1.7)	1.1 (0.7-1.8)	1.2 (0.7-1.8)	0.6 (0.4-0.9)	0.9 (0.6-1.4)
Richest	0.7 (0.5-0.9)	0.8 (0.6-1.1)	0.6 (0.6-0.7)	0.9 (0.8-0.9)	0.4 (0.2-0.8)	1.3 (0.3-5.0)	0.8 (0.4-1.6)	1.1 (0.5-2.5)	0.7 (0.5-1.1)	1.0 (0.6-1.8)
Household's highest education										
No education	1.0 (0.8-1.3)	1.0 (0.8-1.3)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (0.7-1.4)	1.0 (0.6-1.6)	1.0 (0.7-1.4)	1.0 (0.7-1.4)	1.0 (0.8-1.3)	1.0 (0.7-1.5)
Primary	1.4 (1.2-1.6)	1.5 (1.2-1.7)	0.9 (0.9-0.9)	0.9 (0.9-1.0)	0.8 (0.6-1.0)	0.8 (0.6-1.0)	0.9 (0.5-1.4)	1.0 (0.6-1.6)	0.8 (0.5-1.3)	1.0 (0.6-1.5)
Secondary	1.2 (1.0-1.4)	1.4 (1.2-1.6)	0.8 (0.8-0.8)	0.9 (0.9-0.9)	0.5 (0.4-0.7)	0.6 (0.4-0.8)	0.6 (0.4-1.0)	0.7 (0.5-1.0)	0.9 (0.6-1.3)	1.0 (0.6-1.5)
Higher	1.1 (0.8-1.5)	1.6 (1.1-2.3)	0.7 (0.6-0.7)	0.8 (0.8-0.9)	0.7 (0.2-2.3)	1.8 (0.5-6.9)	0.4 (0.2-0.9)	0.4 (0.2-1.0)	0.9 (0.5-1.5)	0.9 (0.5-1.6)

* Minimally adjusted models were adjusted for child's age and sex; and fully-adjusted models were additionally adjusted for area of residence, receiving vitamin A and deworming drug, access to improved sanitation and drinking water, number of under-five children, mother's age at first birth, mother's height, and mother's BMI. Analyses were conducted using sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures.

Table S6: Socioeconomic status-adjusted odds ratios (ORs) of stunting for various child, household and maternal factors

	OR (95% CI)*				
	Bangladesh	India	Maldives	Nepal	Pakistan
Child's variables					
Sex					
Male	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Female	1.0 (0.9-1.1)	1.0 (1.0-1.0)	1.3 (1.0-1.8)	1.0 (0.8-1.2)	0.9 (0.8-1.1)
Age					
2-3 years	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
3-4 years	1.1 (1.0-1.3)	1.0 (1.0-1.1)	0.9 (0.6-1.2)	0.7 (0.5-0.9)	0.9 (0.7-1.1)
4-5 years	0.8 (0.7-0.9)	0.9 (0.8-0.9)	0.5 (0.4-0.8)	0.7 (0.5-0.9)	0.8 (0.6-1.0)
Received vitamin A in last 6 months					
No	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Yes	1.0 (0.9-1.2)	1.0 (1.0-1.0)	1.1 (0.7-1.7)	0.8 (0.5-1.1)	1.1 (0.9-1.3)
Received deworming drug in last 6 months					
No	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Yes	1.0 (0.9-1.1)	0.9 (0.9-1.0)	1.1 (0.7-1.6)	1.0 (0.8-1.3)	0.8 (0.6-1.0)
Household variables					
Area of residence					
Urban	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Rural	0.9 (0.8-1.1)	0.9 (0.9-1.0)	0.9 (0.4-2.0)	1.0 (0.8-1.3)	0.7 (0.6-0.9)
Improved access to sanitation					
No	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Yes	0.8 (0.7-1.0)	0.9 (0.9-0.9)	0.7 (0.4-1.2)	0.6 (0.5-0.8)	1.3 (1.0-1.7)
Improved access to drinking water					
No	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Yes	0.9 (0.8-1.2)	1.2 (1.1-1.2)	1.0 (0.5-1.7)	1.1 (0.8-1.5)	1.2 (1.0-1.6)
No. of children under five	1.2 (1.1-1.3)	1.1 (1.1-1.1)	1.0 (0.9-1.2)	1.1 (1.0-1.3)	1.1 (1.0-1.2)
Maternal variables					
Mother's age at first birth					
Less than 20 years	1.1 (0.9-1.3)	1.1 (1.1-1.1)	0.8 (0.6-1.2)	0.8 (0.7-1.1)	0.9 (0.7-1.1)
20-24 years	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
25 years or more	0.6 (0.4-0.9)	0.8 (0.8-0.8)	1.0 (0.7-1.6)	0.5 (0.3-0.9)	0.8 (0.6-1.0)
Mother's BMI category					
Normal weight	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Underweight	1.3 (1.1-1.5)	1.3 (1.2-1.3)	0.9 (0.5-1.6)	1.4 (1.1-1.9)	1.7 (1.2-2.3)
Overweight	0.7 (0.6-0.8)	0.8 (0.7-0.8)	0.9 (0.7-1.2)	0.6 (0.4-0.8)	1.0 (0.8-1.2)
Mother's height category					
<145 cm	4.9 (3.9-6.3)	3.5 (3.4-3.7)	6.2 (3.6-10.7)	4.1 (2.7-6.1)	3.7 (2.2-6.2)
145-149 cm	2.5 (2.1-3.0)	2.2 (2.1-2.3)	3.3 (2.1-5.4)	2.7 (2.0-3.8)	2.3 (1.7-3.0)
150-154 cm	1.9 (1.5-2.2)	1.5 (1.5-1.6)	2.5 (1.6-4.0)	1.6 (1.2-2.2)	1.4 (1.1-1.7)
155 cm or more	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)

* Logistic regression models were adjusted for household's wealth index and highest education. Analyses were conducted using sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures.

Table S7: Socioeconomic status-adjusted odds ratios (ORs) of wasting for various child, household and maternal factors

	OR (95% CI)*				
	Bangladesh	India	Maldives	Nepal	Pakistan
Child's variables					
Sex					
Male	1.0 (Ref)				
Female	1.0 (0.8-1.2)	0.9 (0.8-0.9)	0.8 (0.6-1.1)	0.9 (0.6-1.4)	0.7 (0.5-1.0)
Age					
2-3 years	1.0 (Ref)				
3-4 years	1.0 (0.8-1.2)	0.9 (0.9-0.9)	1.1 (0.7-1.7)	0.8 (0.5-1.4)	0.9 (0.6-1.4)
4-5 years	1.2 (0.9-1.5)	0.9 (0.8-0.9)	1.3 (0.9-2.0)	0.9 (0.6-1.6)	0.7 (0.5-1.1)
Received vitamin A in last 6 months					
No	1.0 (Ref)				
Yes	1.1 (0.9-1.3)	1.1 (1.1-1.1)	1.6 (0.9-2.9)	0.6 (0.3-1.0)	1.0 (0.7-1.4)
Received deworming drug in last 6 months					
No	1.0 (Ref)				
Yes	0.9 (0.7-1.1)	1.0 (1.0-1.1)	1.8 (1.0-2.9)	1.1 (0.6-1.8)	0.7 (0.5-1.1)
Household variables					
Area of residence					
Urban	1.0 (Ref)				
Rural	1.1 (0.9-1.4)	0.9 (0.9-1.0)	2.7 (0.9-7.8)	0.6 (0.4-0.9)	1.0 (0.6-1.5)
Improved access to sanitation					
No	1.0 (Ref)				
Yes	1.2 (0.9-1.4)	0.9 (0.8-0.9)	0.7 (0.4-1.4)	0.6 (0.4-1.0)	0.7 (0.5-1.1)
Improved access to drinking water					
No	1.0 (Ref)				
Yes	1.2 (0.9-1.6)	1.0 (1.0-1.1)	1.5 (0.7-3.2)	1.5 (0.7-3.3)	0.6 (0.4-0.9)
No. of children under five	0.9 (0.8-1.0)	0.9 (0.9-1.0)	1.1 (0.9-1.3)	0.8 (0.6-1.0)	1.0 (0.9-1.1)
Maternal variables					
Mother's age at first birth					
Less than 20 years	1.0 (0.8-1.3)	1.0 (1.0-1.0)	1.1 (0.8-1.6)	1.1 (0.7-1.7)	0.9 (0.6-1.4)
20-24 years	1.0 (Ref)				
25 years or more	0.9 (0.6-1.5)	0.9 (0.9-1.0)	0.6 (0.4-1.2)	1.1 (0.4-2.6)	1.1 (0.7-1.8)
Mother's BMI category					
Normal weight	1.0 (Ref)				
Underweight	1.5 (1.2-1.9)	1.4 (1.4-1.5)	1.7 (1.0-3.0)	1.7 (1.0-2.8)	1.3 (0.8-2.1)
Overweight	0.6 (0.4-0.8)	0.6 (0.6-0.6)	0.7 (0.5-1.0)	0.5 (0.2-1.1)	0.6 (0.4-0.9)
Mother's height category					
<145 cm	1.3 (1.0-1.8)	1.0 (1.0-1.1)	1.0 (0.6-1.8)	1.1 (0.6-2.2)	1.4 (0.6-3.0)
145-149 cm	1.1 (0.9-1.5)	1.1 (1.0-1.1)	0.6 (0.4-1.0)	1.0 (0.6-1.7)	0.9 (0.5-1.5)
150-154 cm	1.0 (0.8-1.3)	1.0 (1.0-1.1)	1.1 (0.7-1.7)	0.7 (0.4-1.2)	1.2 (0.8-1.8)
155 cm or more	1.0 (Ref)				

* Logistic regression models were adjusted for household's wealth index and highest education. Analyses were conducted using sampling weights provided by the Demographic and Health Survey (DHS) and Stata's survey estimation procedures.