TECHNICAL APPENDIX: ASSOCIATION BETWEEN MATERNAL HEALTH LITERACY AND CHILD VACCINATION IN INDIA: A CROSS-SECTIONAL STUDY

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PART I: EXPANSION ON STUDY METHODS

Sampling

For the rural site, we employed two-stage probability proportional to size cluster sampling.[1] The sampling units were villages. In stage one, India's 2001 Census provided the sampling frame for rural villages. The district's urban population (approximately 10%)[2] was excluded. In stage two, we selected 20 eligible households within each village using procedures designed to provide near random selection of households.[3]

For the urban site, we established household recruitment targets proportional to cluster size. To sample within clusters, we had intended to use methods identical to those for rural villages. However, procedures were unsuited to a dense area with irregular, superimposed lodgings. Fewer families than anticipated had children aged 12-23 months. To meet sample size goals and limit risk of bias, we conducted a census.

Study Procedures

We used identical procedures for recruitment and inclusion in each study site. Surveyors directly approached households to request participation. No advertisements were used for participant recruitment. No incentives or rewards were offered for participation.

A core team from Delhi trained and supervised rural and urban teams to ensure homogeneity of procedures. Paper forms were used for data collection. The rural survey included eighteen surveyors and two field supervisors. Field supervisors made daily personal contact with each team to provide

supportive supervision and quality control. In each village, supervisors selected five questionnaires at random and went to respondents' dwellings to verify key information. Supervisors checked all forms to ensure accuracy and completeness. The urban survey included eight surveyors and one field supervisor. An on-site field supervisor made contact with surveyors daily and checked all forms for accuracy and completeness.

The questionnaire was fielded in Hindi and Urdu, which differ principally in their written forms. Survey questions were posed as open-ended without prompting and coded using pre-specified lists. Data management software including range codes and limits was used for data entry, storage and transfer.

Study size

We used Monte Carlo simulations to calculate sample size for each site independently, based on pilot data collected in October 2012 from 100 households in rural Hardoi district and 100 households in a New Delhi slum.

For the rural site, we fit a two level logistic mixed model assuming an intra-class correlation coefficient of 0.2, and used the distribution of variables in the rural pilot data and their correlations to estimate models. We fixed the number of households per village to be 20, but inflated this to 23 to accommodate potential missing data. Based on an ordinal logistic mixed model, to detect an odds ratio of 1.5 in the outcome DTP3 between exposure groups with a significance level of $\alpha = 0.05$ and a power of 80%, 50 villages were required.

For the urban site, we used the distribution of variables in the urban pilot data and their correlations to estimate models. Based on a single-level ordinal logistic regression model, to have 80% power to detect a minimum odds ratio of 2 in the outcome variable between exposure groups with a significance level of $\alpha = 0.05$, 590 households were required. This estimate was inflated by 10% due to potential missing data to 656 households.

Statistical methods

Creation of a health literacy variable

For each site, we used exploratory factor analysis to create a health literacy score for each participant. Six variables representing participant responses to health literacy questions were identified a priori as candidate contributors. We used the Kaiser-Meyer Olkin (KMO) test to guage whether independent variables were adequately represented by the factorial solution, and Cronbach's alpha to assess internal consistency.[4] The health literacy score was extracted from the first factor and divided into tertiles. The decision to establish three categories was made a priori.

As input variable distributions differed, we performed separate factor analyses for each site. For the rural site, the first factor explained 52% of the variance (KMO=0.80; Cronbach's alpha=0.80). For the urban site, the first factor explained 52% of the variance (KMO=0.75; Cronbach's alpha=0.80). All variables were retained in the analysis.

Creation of an education variable

Education was measured as the highest number of years of education completed. Education levels for mothers and fathers were coded into four categories: "0" illiterate (no schooling), "1" some primary

education (grades one to five), “2” some upper primary education (grades six to eight), and “3” some secondary, senior secondary, or higher education (grade 9 or higher). Data were grouped into categories for conceptual reasons and due to lack of precision in responses concerning number of years of schooling.

We also summed maternal and paternal educational categories to create a new seven category variable ranging from 0 to 6. Possible categories for combined maternal and paternal education score included “0” both parents illiterate; “1” one parent with primary education; “4” no illiterate parent; and “6” both parents with some secondary education or higher.

Analysis of the relationship between DTP3 and health literacy

Descriptive analyses

We used frequencies and proportions to summarise categorical data, and means and standard deviations for continuous variables. We assessed crude associations using univariable logistic regression for continuous variables and the $\chi 2$ test for categorical variables. For the rural site, descriptive analyses were done within a multilevel model to account for village-level clustering.

Main analyses

For the rural site, we first estimated a model containing only a random intercept to assess the clustering of variance at each level. This model considered the probability of receiving DTP3 as statistically dependent only on village of residence. We next estimated models including Level 1 (household, parent and child) characteristics to assess their contribution to immunisation status. Model R1 included health

literacy as a predictor of DTP3 status. Model R2 also considered potential confounding due to parental education level. Model R3 included a full set of pre-specified potential confounders (maternal age, parental education, child birth order, religion of the household, child sex, wealth quintile). Model R4 added four Level 2 (village-level) variables to represent the performance of immunisation service delivery (proportions of households per village who reported problems of access, poor service quality, or having received immunisation reminders late or never).

For the urban slum, household, parent and child variables included in models U1 to U3 were identical to those for rural models R1 to R3. Urban models U1 to U3 included fixed effects to control for measured and unmeasured sources of area variation, including characteristics potentially related to vaccination service delivery.

REFERENCES

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2. Office of the Registrar General and Census Commissioner. Annual Health Survey : 2010-11 Fact Sheet: Uttar Pradesh. New Delhi: Government of India, Ministry of Home Affairs. , 2012.
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4. Kim J-O, Mueller C. *Introduction to factor analysis. What it is and how to do it*. Beverly Hills: SAGE, 1978.

PART II: SUPPLEMENTARY RESULTS

WebAppendix Table 1. Characteristics of the Study Setting

Area	Population (millions) [1]	Under-5 Mortality (per 1000)[2]	Immunisation of children 12-23 months	
			Full (%)[3]	DTP3 (%)[4]
India	1210	57.3	61.0[5]	71.5[5]
State of Uttar Pradesh (UP)	200	74.9	45.3[6]	55.9[6]
Hardoi district, UP	4[7]	89.6	49.9[6]	54.4[6]
Delhi (National Capital Region)	17	32.4	71.0[5]	79.0[5]
Kirti Nagar. New Delhi	--	--	--	--

[1] Office of the Registrar General and Census Commissioner. Provisional Population Tables : India : Census 2011. New Delhi: Government of India, Ministry of Home Affairs, 2012

[2] Usha Ram, Prabhat Jha, Faujdar Ram, et al. Neonatal, 1–59 month, and under-5 mortality in 597 Indian districts, 2001 to 2012: estimates from national demographic and mortality surveys. *The Lancet Global Health* 2013.

[3] "Full immunisation" among children 12-23 months is defined as 1 dose of BCG, 3 doses of polio, 3 doses of DPT, and 1 dose of measles vaccine.

[4] "DPT3" - three doses of diphtheria-pertussis-tetanus vaccine

[5] Government of India Ministry of Health and Family Welfare. 2009 Coverage Evaluation Survey. New Delhi: UNICEF India Country Office, 2010.

[6] Office of the Registrar General and Census Commissioner. Annual Health Survey : 2010-11 Fact Sheet: Uttar Pradesh. New Delhi: Government of India, Ministry of Home Affairs, 2012.

[7] Office of the Registrar General and Census Commissioner. Provisional Population Tables : Uttar Pradesh : Census 2011. New Delhi: Government of India, Ministry of Home Affairs, 2012

WebAppendix Table 2. Characteristics of rural and urban study samples, India 2013 (complete sample)

Characteristics of mothers, children and households	Hardoi, Uttar Pradesh (rural, N=1192)		Kirti Nagar, New Delhi (urban, N=685)	
	Total N (%)	n (%) of DTP3[2]	Total N (%)	n (%) of DTP3[2]
Total	1192 (100.0)	497 (41.7)	685 (100.0)	549 (80.2)
Health literacy				
Low	474(39.8)	158 (33.3)	291(42.5)	217 (74.6)
Medium	322(27.1)	145 (45.0)	166(24.3)	130 (78.3)
High	394(33.1)	193 (49.0)	227 (33.2)	201 (88.5)
Maternal education				
None (0)	696 (58.4)	258 (37.1)	308 (45.0)	234 (76.0)
Some primary (grades 1 to 5)	86 (7.2)	38 (44.2)	128 (18.7)	100 (78.1)
Some upper primary (grades 6 to 8)	218(18.3)	94 (43.1)	116 (16.9)	99 (85.3)
Some secondary or higher (≥ grade 9)	192(16.1)	107(55.7)	133 (19.4)	116 (87.2)
Paternal education				
None (0)	344 (28.8)	117 (34.0)	178 (26.0)	133 (74.7)
Some primary (grades 1 to 5)	207 (17.4)	99 (47.8)	118 (17.2)	93 (78.8)
Some upper primary (grades 6 to 8)	207 (17.4)	85 (41.1)	156 (22.8)	127 (81.4)
Some secondary or higher (≥ grade 9)	434 (36.4)	196 (45.2)	233 (34.0)	196 (84.1)
Mother 's age (mean, sd) *n*	(27.8, 5.6) n=1192	(27.6, 5.3) n=497	(25.2, 4.0) n=684	(25.1, 3.9) n=548
Birth order				
1	303 (25.6)	151 (49.8)	238 (35.3)	200 (84.0)
2	261 (22.1)	98 (37.6)	194 (28.8)	152 (78.4)
3	229 (19.4)	97 (42.4)	140 (20.8)	106 (75.7)
4	173 (14.6)	73 (42.2)	62 (9.2)	56 (90.3)
≥5	216 (18.3)	76 (35.2)	40 (5.9)	28 (70.0)
Child sex				
Male	609 (51,2)	267 (43.8)	355 (51.8)	277 (78.0)
Female	581 (48.8)	230 (39.6)	330 (48.2)	272 (82.4)
Religion				
Hindu	1080 (91.1)	459 (42.5)	620 (90.5)	501 (80.8)
Muslim	106 (8.9)	35 (33.0)	65 (9.5)	48 (73.9)
Quintile of Wealth index				
1st quintile (Poorest 20%)	281 (23.6)	107 (38.1)	140 (20.4)	106 (75.7)
2nd quintile	209 (17.5)	80 (38.3)	171 (25.0)	133 (77.8)
3rd quintile	230 (19.3)	80 (34.8)	109 (15.9)	85 (78.0)
4th quintile	234 (19.6)	109 (46.6)	128 (18.7)	106 (82.8)
5th quintile (Richest 20%)	238 (20.0)	121 (50.8)	137 (20.0)	119 (86.9)
Immunisation reminder given late (> 1 month ago) [3]				
No	646 (54.5)	284 (44.0)	533 (78.0)	417 (78.2)
Yes	540 (45.5)	212 (39.3)	150 (22.0)	131 (87.3)
Immunisation reminder never given				
No	1032 (87.0)	470 (45.5)	627 (91.8)	517 (82.5)
Yes	154 (13.0)	26 (16.9)	56 (8.2)	31 (55.4)

Village / Neighbourhood Characteristics	Hardoi, Uttar Pradesh (rural, N=60)		Kirti Nagar, New Delhi (urban, N=9)	
	Number	%	Number	%
Village electrification				
Not electrified	8	13.3	0	0.0
< 6 hours	30	50.0	3	33.3
≥ 6 hours	22	36.7	6	66.7
Any health facility in village /neighbourhood				
Yes	58	96.7	9	100.0
No	2	3.3	0	0.0
Service delivery problems	Mean (SD)	Range	Mean (SD)	Range
Proportion of parents citing **lack of access** as reason for child's incomplete immunisation	14.7 (19.7)	0.0 to 0.95	2.3 (3.3)	0.0 to 0.11
Proportion of parents citing **poor service quality** as reason for child's incomplete immunisation	09.1 (16.0)	0.0 to 0.95	2.8 (3.7)	0.0 to 0.11
Proportion of parents who received a **late reminde**r	45.5 (20.2)	0.05 to 0.95	21.9 (21.2)	0.0 to 0.61
Proportion of parents who **never received a reminder**	13.0 (15.8)	0.0 to 0.75	8.2 (8.8)	0.0 to 0.43

[1] Note: Numbers may not sum to the total sample size due to missing values. For the rural site, the following values were missing: birth order 0.8% (10/1192); religion 0.5% (6/1192); reminder last year 0.5% (6/1192); reminder never 0.5% (6/1192); and health literacy 0.2% (2/1192). For the urban site, the following values were missing: birth order 1.6% (11/685); reminder last year 0.3% (2/685); reminder never 0.3% (2/685); health literacy 0.1% (1/685); mother's age 0.1% (1/685).

[2] Column refers to percentage of participants receiving three doses of diphtheria-tetanus-pertussis vaccine "DTP3"

[3] We asked each mother "When did someone last come to your home to give information about immunisation?" Those who replied "within the last month" or "before the last immunisation day" were considered to have received an "on-time" reminder; else, the reminder was considered "late".

Webappendix Table 3. Relationship between health literacy and parental education score in rural and urban sites

	Hardoi, Uttar Pradesh (rural, N=1170)			Kirti Nagar, New Delhi (urban, N=670)		
Health literacy	Low *n*(%)	Medium *n*(%)	High *n*(%)	Low *n*(%)	Medium *n*(%)	High *n*(%)
Parental education score						
0	170(62.5)	70(25.7)	32(11.8)	102 (79.7)	21 (16.4)	5 (3.9)
1	50 (54.9)	25 (27.5)	16 (17.6)	56 (70.0)	18 (22.5)	6 (7.5)
2	84 (42.4)	60 (30.3)	54 (27.3)	49 (45.8)	30 (28.0)	28 (26.2)
3	119 (44.9)	86 (32.4)	60 (22.6)	61 (51.7)	33 (28.0)	24 (20.3)
4	14 (10.7)	23 (17.5)	94 (71.7)	15 (19.0)	34 (43.0)	30 (38.0)
5	21 (19.3)	36 (33.0)	52 (47.7)	3 (4.2)	16 (22.2)	53 (73.6)
6	8 (7.7)	13 (12.5)	83 (79.8)	0 (0.0)	10 (11.6)	76 (88.4)

Parental education score is the sum of maternal and paternal education categories ("0" none; 1 "some primary"; "2" some upper primary; "3" some secondary or higher). It ranges from "0" both parents have received no schooling to "6" both parents have attended secondary or higher.

Webappendix Table 4. Reasons for incomplete immunisation1 given by mothers of 1043 under-vaccinated children aged 12-23 months, India 2013

Reasons[2, 3]	Hardoi, Uttar Pradesh (rural, N=1192)		Kirti Nagar, New Delhi (urban, N=685)	
	n	%	*n*	%
Total children with incomplete immunisation[4]	**852**	**100**	**191**	**100**
Lack of awareness concerning vaccines or vaccination schedule	306	35.9	39	20.4
Out of town	265	31.1	53	27.7
Lack of time/no one to take the child for vaccination	153	18.0	26	13.6
No nearby facility/no visit of immunization team[5]	147	17.3	5	2.6
Vaccinator / assistant nurse midwife absent, scheduled session not held, vaccines not available[6]	103	12.1	0	0.0
Vaccination has side-effects/would harm the child	75	8.8	16	8.4
Child is sick at scheduled visit	46	5.4	19	9.9
Location of immunization centre unknown	27	3.2	4	2.1
Reaction during first dose/with a previous child	12	1.4	0	0.0
Don't believe in vaccination/it's useless/not our tradition	11	1.3	3	1.6
Family members do not allow the child to be vaccinated	9	1.1	0	0.0
Long waiting times, services inconvenient[6]	6	0.7	5	2.6
Only polio vaccine is needed	4	0.5	0	0.0
Social/language barriers	1	0.1	0	0.0
Cannot afford vaccination/too poor to vaccinate	0	0.0	0	0.0
The child is a girl	0	0.0	0	0.0

[1] Children aged 12-23 months were defined as incompletely immunised if they did not receive all of the following vaccines: 1 dose of BCG, 3 doses of DPT, 3 doses of polio, and 1 dose of measles.

[2] All mothers of children with incomplete immunisation were asked the reason for the child's not being fully immunised. Questions were open-ended; responses were recorded using a pre-established list.

[3] Reasons are non-exclusive and sum to more than the number of incompletely immunised children.

[4] A total of 71.5% (852/1192) of children in the rural site and 27.9% (191/685) of children in the urban site were not fully vaccinated.

[5] These responses reflect "lack of access".

[6] These responses were categorised as "poor service quality".

Webappendix Table 5. Random effects for the rural models of the crude and adjusted association between maternal health literacy and receipt of DTP3 vaccine (n=1170)

	Model R1, Crude		Model R2		Model R3		Model R4	
Variables	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)	Estimate	(95% CI)
Level 2 variance	0.90	(0.54-1.50)	0.94	(0.56-1.56)	0.95	(0.57-1.59)	0.35	(0.17-0.69)

Statistical models for the rural site: Model R1 - crude association between maternal health literacy and child's DTP3 status; Model R2 – Model R1 adjusted for parental education score; Model R3 – Model R2 adjusted for maternal (age), child (sex, birth order) and household (religion, wealth quintile) characteristics; Model R4 – Model R3 adjusted for village-level service delivery (access, quality, receipt of reminders).

Webappendix Table 6. Sensitivity analysis: Alternative models of the association between maternal health literacy and receipt of DTP3 vaccine among children 12-23 months using maternal education rather than maternal and paternal education score, Hardoi, Uttar Pradesh, India 2013 (rural N= 1170)

	Model R1. Crude			Model R2S			Model R3S			Model R4S		
Variables	OR	(95%CI)	Prob	OR	(95%CI)	Prob	OR	(95%CI)	Prob	OR	(95%CI)	Prob
Health literacy												
Low	ref											
Medium	1.74	(1.25 - 2.42)	<0.001	1.62	(1.15 - 2.27)	0.006	1.58	(1.12 - 2.5)	0.009	1.53	(1.09 - 2.16)	0.015
High	1.88	(1.38 - 2.57)	<0.001	1.40	(0.95 - 2.04)	0.087	1.40	(0.93 - 2.09)	0.106	1.31	(0.88 - 1.97)	0.175
Maternal education												
None (0)	ref											
Some primary (grades 1 to 5)				1.36	(0.78 - 2.37)	0.275	1.14	(0.64 - 2.05)	0.639	1.12	(0.63 - 1.99)	0.689
Some upper primary (grades 6 to 8)				1.19	(0.81 - 1.73)	0.370	1.17	(0.79 - 1.72)	0.429	1.20	(0.81 - 1.76)	0.358
Some secondary or higher (≥ grade 9)				1.97	(1.28 - 3.03)	0.002	1.77	(1.13 - 2.77)	0.012	1.78	(1.15 - 2.77)	0.010
Mother's age (mean)							1.02	(0.99 – 1.06)	0.259	1.02	(0.99 -1.06)	0.245
Birth order												
1	ref											
2							0.56	(0.38 – 0.84)	0.004	0.55	(0.37 - 0.82)	0.003
3							0.65	(0.42 – 1.00)	0.050	0.63	(0.41 - 0.97)	0.039
4							0.74	(0.44 - 1.24)	0.250	0.72	(0.43 - 1.21)	0.214
5 or more							0.60	(0.34 – 1.06)	0.079	0.58	(0.33 -1.02)	0.057
Child sex												

Muslim (ref. Hindu)							0.52	(0.31 – 0.88)	0.015	0.54	(0.32- 0.89)	0.016

Table2: (continued)

	Model R1. Crude			Model R2S			Model R3S			Model R4S		
Variables	OR	(95%CI)	Prob	OR	(95%CI)	Prob	OR	(95%CI)	Prob	OR	(95%CI)	Prob
Quintile of Wealth index												
1st quintile (Poorest 20%)	ref											
2nd quintile							1.02	(0.67 - 1.57)	0.909	1.04	(0.68 - 1.58)	0.873
3rd quintile							0.82	(0.54 - 1.25)	0.362	0.84	(0.55 - 1.28)	0.418
4th quintile							1.19	(0.78 - 1.81)	0.421	1.17	(0.78 - 1.78)	0.439
5th quintile (Richest 20%)							1.44	(0.93 - 2.23)	0.106	1.37	(0.89 - 2.11)	0.147
Proportion of parents citing lack of access as reason for child's incomplete immunisation										0.16	(0.04 - 0.67)	0.012
Proportion of parents citing poor service quality as reason for child's incomplete immunisation										0.90	(0.14 - 5.73)	0.912
Proportion of parents who received a late reminder										0.34	(0.10 - 1.09)	0.071
Proportion of parents who have never received a reminder										0.02	(0.00 - 0.11)	0.000

Statistical models for the rural site: Model R1 - crude association between maternal health literacy and child's DTP3 status; Model R2S – Model R1 adjusted for maternal education; Model R3S – Model R2S adjusted for maternal (age), child (sex, birth order) and household (religion, wealth quintile) characteristics; Model R4S – Model R3S adjusted for village-level service delivery (access, quality, receipt of reminders).

Webappendix Table 7. Sensitivity analysis: Alternative models of the association between maternal health literacy and receipt of DTP3 vaccine among children 12-23 months using maternal education rather than maternal and paternal education score, Kirti Nagar, New Delhi, India (urban, N= 670)

	Model U1. Crude			Model U2S			Model U3S		
Variables	OR	(95%CI)	p	OR	(95%CI)	p	OR	(95%CI)	p
Health literacy									
Low	ref								
Medium	1.36	(0.84 - 2.19)	0.212	1.21	(0.71 -2.07)	0.480	1.20	(0.70 - 2.08)	0.507
High	2.70	(1.63 - 4.47)	<0.001	1.99	(1.00 - 3.98)	0.049	2.02	(1.00 - 4.06)	0.048
Cluster (Neighbourhood number)									
1	ref								
2	0.52	(0.14 - 1.97)	0.341	0.54	(0.14 - 2.01)	0.355	0.49	(0.12 - 1.96)	0.314
3	0.72	(0.23 - 2.26)	0.573	0.74	(0.24 - 2.34)	0.614	0.69	(0.21 - 2.29)	0.548
4	1.17	(0.29 - 4.77)	0.821	1.24	(0.31 - 5.07)	0.759	1.38	(0.33- 5.71)	0.660
5	0.27	(0.06 - 1.24)	0.092	0.26	(0.06 - 1.23)	0.090	0.21	(0.04 - 1.03)	0.055
6	0.72	(0.22 - 2.38)	0.590	0.75	(0.23 - 2.48)	0.639	0.76	(0.22 - 2.58)	0.657
7	0.89	(0.20 - 3.86)	0.873	0.92	(0.21 - 4.03)	0.913	0.93	(0.21 - 4.17)	0.926
8	0.83	(0.25 - 2.72)	0.763	0.85	(0.26 - 2.80)	0.801	0.77	(0.23 - 2.64)	0.680
9	1.70	(0.50 - 5.72)	0.395	1.80	(0.53 - 6.10)	0.343	1.55	(0.43 - 5.49)	0.501
Maternal education									
None (0)	ref								
Some primary (grades 1 to 5)				1.01	(0.57 - 1.80)	0.950	0.99	(0.55 - 1.76)	0.969
Some upper primary (grades 6 to 8)				1.42	(0.68 - 2.94)	0.341	1.32	(0.63 - 2.78)	0.458
Some secondary or higher (≥ grade 9)				1.60	(0.73 - 3.51)	0.234	1.44	(0.64 - 3.25)	0.377

Table3: (continued)

	Model U1. Crude			Model U2S			Model U3S		
Variables	OR	(95%CI)	Prob	OR	(95%CI)	Prob	OR	(95%CI)	Prob
Birth order									
1	ref								
2							0.72	(0.43 - 1.22)	0.225
3							0.74	(0.43 - 1.32)	0.313
4							2.50	(0.96 - 6.48)	0.059
5 or more							0.59	(0.26 - 1.4)	0.210
Child sex									
Female (ref. male)							1.36	(0.91- 2.05)	0.137
Religion of household									
Muslim (ref. Hindu)							0.88	(0.46- 1.69)	0.707
Quintile of Wealth index									
1st quintile (Poorest 20%)	ref								
2nd quintile							1.00	(0.53 - 1.89)	0.986
3rd quintile							0.99	(0.49 - 2.05)	0.999
4th quintile							1.22	(0.59 - 2.54)	0.589
5th quintile (Richest 20%)							1.73	(0.80 - 3.73)	0.156

Statistical models for the urban site: Model U1 - crude association between maternal health literacy and child's DTP3 status; Model U2S – Model U1 adjusted for maternal education; Model U3S – Model U2S adjusted for maternal (age), child (sex, birth order) and household (religion, wealth quintile) characteristics.

Webappendix Table 8. Sensitivity analysis: Results of random effects logistic regression models investigating a potential interaction between health literacy and study setting (urban, rural)

Urban (N=670)

	Crude			Adjusted for parental education			Fully adjusted		
Variables	OR	(95%CI)	*p*	OR	(95%CI)	p	OR	(95%CI)	p
Health literacy									
Low	ref								
Medium	1.76	(1.11 - 2.81)	0.017	1.51	(0.93 – 2.48)	0.099	1.59	(0.95 – 2.66)	0.075
High	3.23	(1.89 – 5.51)	<0.001	2.32	(1.17 -4.60)	0.016	2.50	(1.25-5.01)	0.010

Rural (N=1170)

	Crude			Adjusted for parental education			Fully adjusted		
Variables	OR	(95%CI)	*p*	OR	(95%CI)	p	OR	(95%CI)	p
Health literacy									
Low	ref								
Medium	1.76	(1.26-2.44)	0.001	1.65	(1.17-2.31)	0.004	1.66	(1.17-2.31)	0.004
High	1.90	(1.40 – 2.61)	<0.001	1.41	(0.97-2.03)	0.068	1.46	(0.97-2.03)	0.053

Rural and urban sites combined (N=1840)

	Crude			Adjusted for parental education			Fully adjusted		
Variables	OR	(95%CI)	*p*	OR	(95%CI)	p	OR	(95%CI)	p
Health literacy									
Low	ref								
Medium	1.77	(1.35-2.31)	<0.001	1.60	(1.21-2.12)	0.001	1.63	(1.23-2.16)	0.001
High	2.19	(1.67-2.87)	<0.001	1.60	(1.17-2.20)	0.003	1.66	(1.20-2.30)	0.002

Rural and urban sites combined, with interaction by study site (N=1840)

	Crude			Adjusted for parental education			Fully adjusted		
Variables	OR	(95%CI)	*p*	OR	(95%CI)	p	OR	(95%CI)	p

Health literacy									
Low	ref								
Medium	1.75	(1.26-2.42)	0.001	1.63	(1.17 - 2.27)	0.004	1.61	(1.15-2.27)	0.005
High	1.90	(1.39-2.60)	<0.001	1.42	(1.00 - 2.02)	0.051	1.43	(0.98-2.07)	0.059
Urban Setting	5.00	(2.36- 10.60)	<0.001	5.17	(2.41 - 11.07)	<0.001	5.43	(2.52 - 11.71)	<0.001
Interaction – urban and medium HL	1.00	(0.57- 1.76)	0.994	0.96	(0.54 - 1.70)	0.837	0.96	(0.54 - 1.70)	0.881
Interaction – urban and high HL	1.90	(1.39-2.60)	0.094	1.65	(0.87- 3.13)	0.116	1.65	(0.87- 3.13)	0.127

Crude models include health literacy.
Adjusted models include health literacy and parental education score.
Fully adjusted models include health literacy, parental education score, maternal age, household wealth quintile, household religion, child sex, child birth order.