Sanitation and Education
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Online Appendix

Qualitative Data Appendix

This research project developed, in part, from a set of interviews that I conducted to explore broadly what factors might be influencing educational decisions in India. Out of these interviews, with families and service providers, there arose parallels to a broader research literature that outlines reasons why school latrines may impact educational outcomes. These interviews help to relate that broader research literature to the Indian context of my quantitative analysis. In this Appendix, I describe the interview methodology and main findings.

Interview Sampling and Structure

I conducted structured interviews primarily in four states in India: Madhya Pradesh (MP), Andhra Pradesh (AP), Tamil Nadu (TN), and Uttar Pradesh (UP). The estimated per capita income of MP and UP are comparable to other major North Indian states (Rs. 7,000-10,000), just as the estimated per capita income of TN and AP are comparable to other major South Indian states (Rs. 10,000-13,000) (Census of India 2001).

Research participants were drawn from an arbitrary and convenient sample found in fields (farmers, fieldworkers), households (parents, children), schools (principals, children), and roadside shops (shop owner, customers). In MP, research participants were located in the rural districts of Sehore (population of 1.1 million) and Vidisha (population of 1.2 million). The sample included 53 private citizens (farmers, fieldworkers, shop keepers, mothers, fathers, etc.), 20 government officials, 6 school officials, and 1 bank manager. The research participants in AP were located in the rural Nalgonda district (population of 3.2 million). The sample included 34 private citizens and 6 school officials. In UP, 8 private citizens and 3 school officials were interviewed in the rural Bhakshi Ka Talab area outside of Lucknow (population of 2.1 million). In TN, interviewees were 10 private citizens who resided in the rural Tiruvallur District (population of 2.7 million). In addition to the interviews, I conducted a survey of 133 households in this district of TN, which included questions about financial decisions families would make if their budgets were less constrained.

Interview lengths ranged from five minutes to two hours, guided by interview methodologies discussed by Seidman (1998) and Emerson, Fretz and Shaw (1995). Participants answered questions about educational and financial decisions and sometimes gave tours of their schools, homes, or villages. The interviews were usually conducted in participants' homes, classrooms, office spaces, or in public places such as restaurants, cafes, camel carts, and roadside shops. For children, the questions included: whether they attended school, whether they liked school and why, what they wished was different about school, what were the reasons they did or did not attend school, and similar questions about their peers. For parents, the questions included: whether they send their children to school, why they send

their children to school, and what factors dissuade them from sending their children to school. For school headmasters, the questions included their satisfaction in their jobs, what innovations they were excited about in their schools, what they would do with additional money for the school, how they motivate the teachers in the school, what they wish was different about the school, why they think that children attend or do not attend school, and the importance of existing or possible school infrastructure (including latrines). For government officials, the questions included: their understanding of the local school situation, how they thought schools could be improved, what they would do if given extra money to improve schools, and why they think children do or not attend school.

I also conducted less-structured interviews and site visits, in which I embedded myself in the community (Emerson, Fretz and Shaw, 1995). I worked on community sanitation projects with the Environmental Sanitation Institute (ESI) and Safai Vidyalaya, two NGOs in Gujarat, to better understand understand the perspectives of beneficiaries and service providers (engineers, NGOs, government officials). I also accompanied ESI on a Nandini Sanitation and Health on Wheels project, in which volunteers traveled to villages to provide sanitation-related education. During this time, I participated in latrine construction, assisted with hygiene-education provision, and conducted interviews and participant observations in three villages. This included living with local families during the visits. I also assisted with household interviews in a large slum in the city of Ahmedabad to better understand sanitation in an urban setting. As part of these interviews, we asked parents and guardians about factors that influence the education decisions they make for their children.

Main Findings

One theme that emerged through this work was that girls highlighted a connection between their educational attainment and their concerns for safety and privacy at school. One 12-year-old discussed her passion for school but that she failed out because of her absence due to monthly menses during mandatory exams that could not be retaken. Another girl recounted a story of a friend who was sexually assaulted while urinating behind bushes, and described an atmosphere of fear where males would target females who were isolated from view. She said that this fear discouraged her and her friends from eating, drinking, and relieving themselves during the school day. Indeed, my school visits often revealed an absence of private locations for children to relieve themselves. In these cases, when I asked about where students could go to the restroom, students often pointed to various places on the school premises such as behind a school sign, next to the building, or behind trees.

By contrast, over the course of my interviews, boys never indicated "safety," "privacy," or "sanitation" as reasons for dropping out of school. Boys' responses were typically related

to working, moving, health problems, or family responsibilities. These responses may reflect boys' unwillingness to acknowledge these concerns, particularly in combination with interviewer bias because I am a female. Boys (and girls) were more willing to share anecdotes about boys they knew being harassed or assaulted, either by other boys or by teachers. Incidents of sexual assault are vastly under-reported, especially when children are the victims, and so these accounts should be expected to only provide a glimpse into the problem.

School headmasters expressed a common sentiment that children followed regimented hygiene routines that did not require them to use sanitation facilities during the school day. This sentiment may help explain why a majority of my visited schools did not have sanitation facilities available to students. This sentiment contrasts the views of children I interviews, for whom access to school sanitation facilities was an important issue. In the absence of centralized government support and the provision of resources, local schools may not be particularly responsive to the needs of traditionally-disadvantaged children.

Appendix Figure 1. Histogram of Effect by District

Upper-Primary Schools (6th-8th Grades)   Primary Schools (1st-5th Grades)
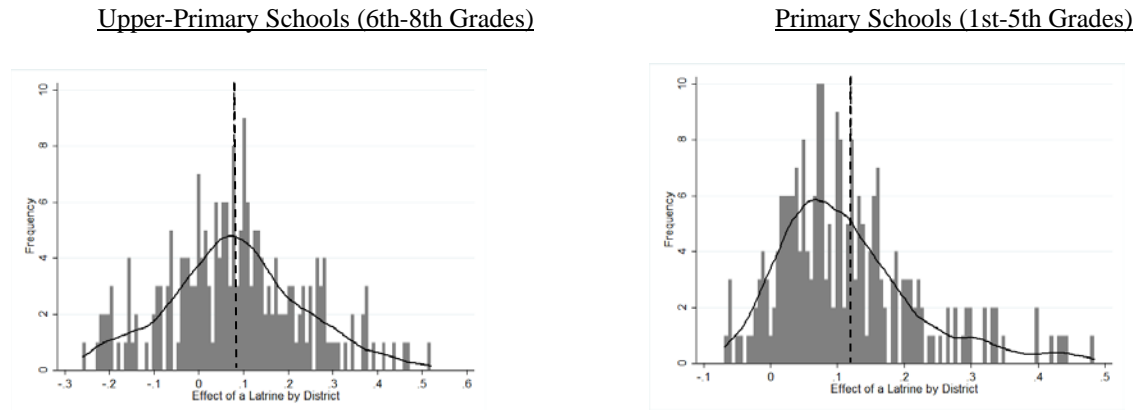
Notes: This is a histogram plotting the average effect of the introduction of a latrine in each district. Overlaid is a kernel density plot. For clarity, the districts in the upper and lower five percent of the distribution have been omitted. The vertical dashed line represents the estimated average effect of a latrine in the entire sample region.

Appendix Figure 2. Relationship between Enrollment Effect from a Latrine and Gender Norms and Income, by State

Upper-Primary Schools (6th-8th Grades)   Primary Schools (1st-5th Grades)

Panel A. Gender Parity Measure

Panel B. Per Capita Income Measure
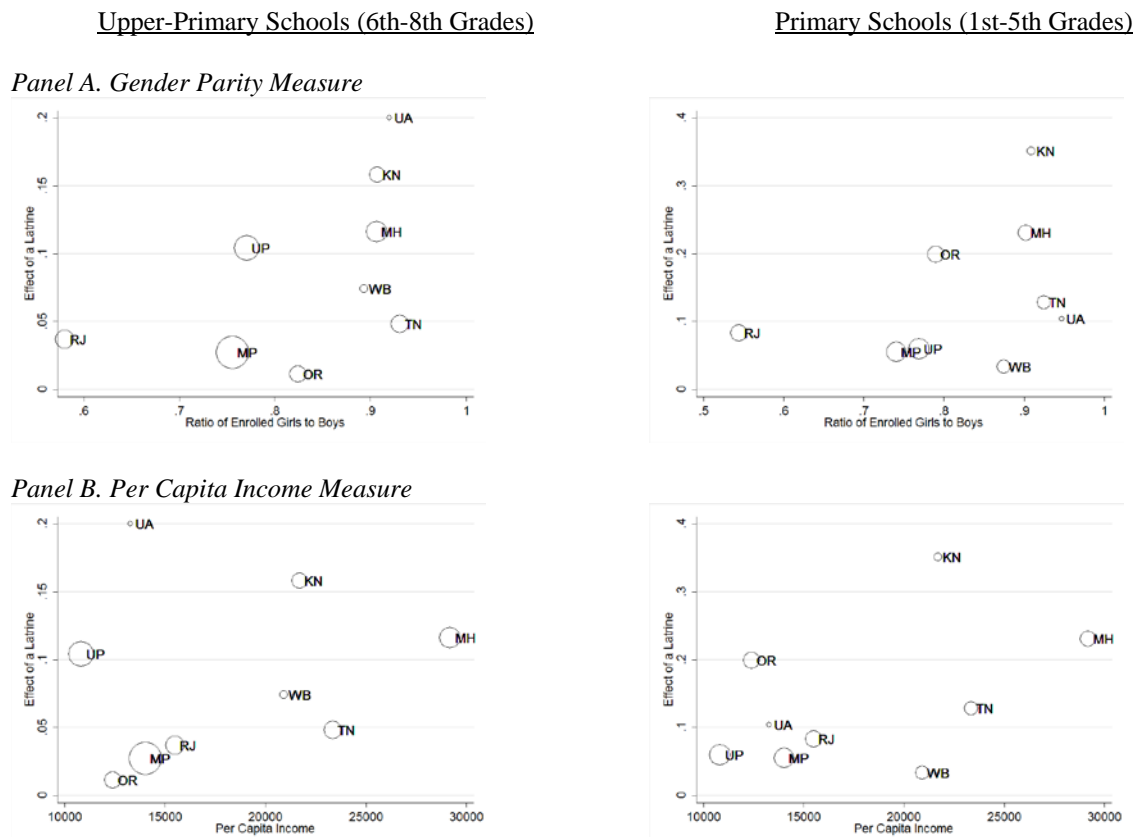
Notes: The gender parity measure in this table is a continuous ratio of the average number of enrolled upper-primary girls in a district at baseline to the average number of enrolled upper-primary boys in a district at baseline, calculated from DISE. The income measure is a per capita income measure, calculated from Census of India 2001 and Economic Survey 2005. The Y-axis signifies the estimated enrollment effect of a latrine by state. Each circle represents one state in India. The size of the circle is weighted by the number of schools in that state, in the sample.

Appendix Table 1. Characteristics of Matched Schools in 2002, and Differences from Unmatched Schools

	Average in Matched Schools (1)	Difference from Unmatched Schools (2)	Number of Observations (3)
Total enrollment	149.351	0.316	842,072
	(152.765)	(0.616)	
Any latrine	0.392	0.059**	802,251
	(0.488)	(0.002)	
Sex-specific latrines	0.183	0.050**	842,072
	(0.387)	(0.001)	
Girls-only latrine	0.029	0.005**	842,072
	(0.169)	(0.001)	
Unisex latrine only	0.151	-0.026**	842,072
	(0.358)	(0.001)	
Blackboard	0.911	-0.067**	842,072
	(0.285)	(0.001)	
Library	0.446	-0.016**	785,081
	(0.497)	(0.002)	
Computers	0.063	0.039**	842,072
	(0.243)	(0.001)	
Playground	0.495	0.039**	795,157
	(0.500)	(0.002)	
Water source: Pump	0.510	-0.037**	779,054
	(0.500)	(0.002)	
Water source: Well	0.059	0.012**	779,054
	(0.235)	(0.001)	
Water source: Tap	0.162	0.043**	779,054
	(0.369)	(0.001)	
Electricity	0.213	0.085**	797,872
	(0.410)	(0.002)	
Medical checkups	0.574	-0.018**	783,580
	(0.494)	(0.002)	
Ramps	0.052	0.002**	751,773
	(0.222)	(0.001)	

Notes: Column 1 reports the average value of the indicated variable in 2002, for a given row, for the sample of schools matched in the data for both 2002 and 2003. Column 2 reports the estimated difference in 2002 for schools that did not match to data from 2003, controlling for district fixed effects. Column 3 reports the number of observations. Robust standard errors are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 2. Effect of a School Latrine on Student Enrollment, by Student Sex and Age

	Children between Ages 10 to 16		Children between Ages 5 to 9	
	All Students	By Student Sex	All Students	By Student Sex
	(1)	(2)	(3)	(4)
Built a Latrine	0.076**		0.116**	
	(0.008)		(0.004)	
Built a Latrine * Females		0.065**		0.105**
		(0.010)		(0.004)
Built a Latrine * Males		0.039**		0.093**
		(0.010)		(0.004)
p-value of the Difference		0.033		0.003
R^2 Statistic	0.279	0.209	0.159	0.138
Number of Observations	53,321	106,642	363,258	726,516
Number of Schools	17,796	17,796	121,206	121,206

Notes: Columns 1 and 3 report the average enrollment effect on all students between the ages of 10 to 16 and 5 to 9, respectively, in which the dependent variable for each school is regressed on a dichotomous variable for whether a school had a latrine, year-by-district fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). In Columns 2 and 4, all right-hand-side variables are interacted with student sex. Below the estimates by student sex, p-values are reported for the difference in estimated coefficients for girls and boys.

   The dependent variable is the natural logarithm of enrollment plus one. The estimates are drawn from AY 2002-03, AY 2003-04, and AY 2005-06. The unit of observation in Columns 1 and 3 is school-year; thus, there are three observations per school. The unit of observation in Columns 2 and 4 is school - student sex - year; thus, there are six observations per school. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 3. Effect of a Latrine on Total Enrollment, Robustness to Matching Techniques

	Main Specification	Nearest Neighbor Matching	Coarsened Exact Matching	Nearest Neighbor, No Replacement	Kernel-Based Matching	Mahalanobois Matching	Radius Matching
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Upper-Primary Schools (6th-8th Grades)							
Built a Latrine	0.079**	0.069**	0.067**	0.074**	0.062**	0.058**	0.068**
	(0.008)	(0.011)	(0.008)	(0.008)	(0.008)	(0.010)	(0.011)
R^2 Statistic	0.326	0.300	0.310	0.303	0.298	0.306	0.333
Number of Observations	53,388	45,750	51,408	45,750	53,388	45,750	53,388
Number of Schools	17,796	11,048	17,136	15,250	17,796	11,279	17,796
Panel B: Primary Schools (1st-5th Grades)							
Built a Latrine	0.121**	0.108**	0.116**	0.109**	0.109**	0.108**	0.125**
	(0.003)	(0.006)	(0.004)	(0.004)	(0.003)	(0.007)	(0.004)
R^2 Statistic	0.154	0.171	0.155	0.161	0.162	0.170	0.180
Number of Observations	363,618	196,920	361,785	196,920	363,618	196,920	363,618
Number of Schools	121,206	43,013	120,595	65,640	121,206	43,863	121,206

Notes: The dependent variable is the natural logarithm of enrollment plus one. These estimates correspond to those reported in Table 3, but instead use matching techniques to estimate the effect of a latrine (as noted in the column headings). Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 4. Effect of a School Latrine, Using Alternative Comparison Groups

	No Latrine From 2002 through 2005		Built Latrine Between 2003 and 2005		No Latrine Built Between 2002 and 2003	
	All Students	By Student Sex	All Students	By Student Sex	All Students	By Student Sex
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Upper-Primary Schools (6th-8th Grades)						
Built a Latrine	0.073**		0.045**		0.029**	
	(0.008)		(0.007)		(0.005)	
Built a Latrine * Females		0.063**		0.034**		0.027**
		(0.011)		(0.009)		(0.007)
Built a Latrine * Males		0.041**		0.025**		-0.004
		(0.011)		(0.009)		(0.007)
R^2 Statistic	0.343	0.238	0.335	0.226	0.236	0.135
Number of Observations	35,592	71,184	34,338	68,676	118,150	236,300
Number of Schools	17,796	17,796	17,169	17,169	59,075	59,075
Panel B. Primary Schools (1st-5th Grades)						
Built a Latrine	0.119**		0.054**		0.093**	
	(0.003)		(0.003)		(0.002)	
Built a Latrine * Females		0.110**		0.053**		0.085**
		(0.004)		(0.004)		(0.003)
Built a Latrine * Males		0.099**		0.041**		0.070**
		(0.004)		(0.004)		(0.003)
R^2 Statistic	0.153	0.134	0.165	0.140	0.128	0.109
Number of Observations	242,412	484,824	177,480	354,960	476,682	953,364
Number of Schools	121,206	121,206	88,740	88,740	238,341	238,341

Notes: This table reports the results using alternative comparison groups, on a sample of schools in AY 2002-03 and 2003-04. The comparison group in Columns 3 and 4 includes schools that did not have a latrine in AYs 2002-04 but that did have a latrine by AY 2005-06. In Columns 5 and 6, the comparison group includes schools that had a latrine every year between AYs 2002-06 and schools that never had a latrine between AYs 2002-06. The table reports the average enrollment effect in which the dependent variable for each school is regressed on presence of a latrine, year-by-district fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year. All right-hand-side variables in Columns 2, 4, and 6 are interacted with student sex.

The dependent variable is the natural logarithm of enrollment plus one. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 5. Effect of a School Latrine on Student Enrollment, Controlling for Changes in School Infrastructure

	Upper-Primary Schools (6th-8th)		Primary Schools (1st-5th)	
	All Students	By Student Sex	All Students	By Student Sex
	(1)	(2)	(3)	(4)
Built a Latrine	0.067**		0.100**	
	(0.008)		(0.003)	
Built a Latrine * Females		0.066**		0.095**
		(0.011)		(0.004)
Built a Latrine * Males		0.036**		0.077**
		(0.010)		(0.004)
p-value of the Difference		0.016		0.000
R^2 Statistic	0.331	0.247	0.164	0.135
Number of Observations	53,388	106,776	363,618	727,236
Number of Schools	17,796	17,796	121,206	121,206

Notes: The sample includes schools that first received a latrine in AY 2003-04 and schools that never received a latrine. Columns 1 and 3 report the average enrollment effect on all upper-primary-school and primary-school students respectively, in which the dependent variable for each school is regressed on a dichotomous variable for whether a school had a latrine, time-varying measures of the presence of each infrastructure type, year-by-district fixed effects, school fixed effects, a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). In Columns 2 and 4, all right-hand-side variables are interacted with student sex. Below the estimates by student sex, p-values are reported for the difference in estimated coefficients for girls and boys.

    The dependent variable is the natural logarithm of enrollment plus one. The estimates are drawn from AY 2002-03, AY 2003-04, and AY 2005-06. The unit of observation in Columns 1 and 3 is school-year; thus, there are three observations per school. The unit of observation in Columns 2 and 4 is school-student sex-year; thus, there are six observations per school. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 6. Latrine Construction and Changes in Other School Infrastructure

	Upper-Primary Schools (1)	Primary Schools (2)
Blackboard	0.016**	0.008**
	(0.003)	(0.001)
Computer	0.024**	0.016**
	(0.004)	(0.001)
Electricity	0.093**	0.094**
	(0.006)	(0.002)
Library	0.051**	0.045**
	(0.006)	(0.002)
Medical Checkups	0.028**	0.030**
	(0.006)	(0.002)
Playground	0.067**	0.078**
	(0.007)	(0.003)
Ramps	0.042**	0.038**
	(0.005)	(0.002)
Pumped Water	0.025**	0.037**
	(0.006)	(0.002)
Tap Water	0.060**	0.050**
	(0.005)	(0.002)
Well Water	-0.002	-0.000
	(0.003)	(0.001)

Notes: This table reports the estimated relationship between latrine construction and changes in each type of other school infrastructure, from regressing the presence of each infrastructure measure on: latrine presence, district-by-year fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). Column 1 reports estimates for the upper-primary-school sample and Column 2 reports estimates for the primary-school sample. For each row, the sample includes schools that first received a latrine in AY 2003-04 and schools that never received a latrine, for which that particular infrastructure variable is observed. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 7. Interaction Effects between Latrines and Other Infrastructure

	Upper-Primary Schools	Primary Schools
	(1)	(2)
Built Latrine	0.066**	0.100**
	(0.008)	(0.003)
Built Latrine * Blackboard	0.012	-0.031*
	(0.031)	(0.014)
Built Latrine * Computer	0.039*	0.032**
	(0.019)	(0.012)
Built Latrine * Electricity	-0.007	0.023**
	(0.014)	(0.007)
Built Latrine * Library	0.016	0.000
	(0.010)	(0.004)
Built Latrine * Medical Checkups	0.001	0.007
	(0.011)	(0.004)
Built Latrine * Playground	0.004	-0.007+
	(0.011)	(0.004)
Built Latrine * Ramps	0.013	0.018**
	(0.013)	(0.005)
Built Latrine * Pumped Water	0.007	-0.034**
	(0.014)	(0.006)
Built Latrine * Tap Water	0.023	0.003
	(0.016)	(0.007)
Built Latrine * Well Water	-0.043	0.006
	(0.030)	(0.013)
R^2 Statistic	0.343	0.170
Number of Observations	51,476	348,416
Number of Schools	17,796	121,206

Notes: The sample includes schools that first received a latrine in AY 2003-04 and schools that never received a latrine, for which all infrastructure variables are observed. Columns 1 and 2 report the average enrollment effect on all upper-primary-school and primary-school students, respectively, in which log school enrollment (plus one) is regressed on a dichotomous variable for whether a school had a latrine, interaction terms between latrine presence and the presence of each other type of infrastructure (normalized to have mean zero), the presence of each other type of infrastructure, year-by-district fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 8. Effect of a Latrine on Total Enrollment, Further Robustness Checks

	Main Specification	Villages with Only One School	Coeducational Sample	Coed Sample: Log(Enrollment)	Baseline Controls Interacted with Linear Time Trend	Clustering Standard Errors at the District Level
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Upper-Primary Schools (6th-8th Grades)						
Built a Latrine	0.079**	0.076**	0.066**	0.068**	0.079**	0.079**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)
R^2 Statistic	0.326	0.338	0.313	0.317	0.326	0.326
Number of Observations	53,388	49,668	49,008	49,008	53,388	53,388
Number of Schools	17,796	16,556	16,336	16,336	17,796	17,796
Panel B: Primary Schools (1st-5th Grades)						
Built a Latrine	0.121**	0.124**	0.119**	0.122**	0.121**	0.121**
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.014)
R^2 Statistic	0.154	0.171	0.155	0.155	0.154	0.154
Number of Observations	363,618	276,588	351,261	351,261	363,618	363,618
Number of Schools	121,206	92,196	117,087	117,087	121,206	121,206

Notes: The dependent variable is the natural logarithm of enrollment plus one. The main specifications report the average enrollment effect on all upper-primary-school and primary-school students respectively, in which the dependent variable for each school is regressed on a dichotomous variable for whether a school had a latrine, year-by-district fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). Column 1 shows the estimates from the main specification. Column 2 limits the sample to schools that are in villages with only one school. Columns 3 and 4 limit the sample to schools with positive enrollments of boys and girls with the logarithm of enrollment as the dependent variable in column 4. In Column 5, the controls are interacted with a linear time trend instead of a flexible time trend. In Column 6, the standard errors are clustered at the district level instead of at the school level. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 9. Baseline Upper-Primary-School Characteristics in 2002, by Type of Latrine Built

	Treatment Group:			Main Control Group:		Within-District Differences:		
	Built Latrines for Both Sexes Between 02-03 and 03-04	Built Only Unisex Latrine Between 02-03 and 03-04	Built Only Girls' Latrine Between 02-03 and 03-04	No Latrine From 02-03 through 05-06	(1) - (4)	(2) - (4)	(3) - (4)	(1) - (2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Schools	3,822	2,954	849	10,171				
Total Enrollment	117.553	107.106	173.509	88.633	15.365**	0.249	32.321**	8.790**
	(1.926)	(1.997)	(5.938)	(0.809)	(2.110)	(2.118)	(5.278)	(2.672)
Female Enrollment	50.730	43.152	87.400	35.592	8.296**	-3.243**	25.508**	7.805**
	(0.944)	(0.858)	(3.415)	(0.369)	(1.053)	(0.967)	(3.017)	(1.271)
Male Enrollment	66.823	63.954	86.108	53.041	7.069**	3.492*	6.813+	0.985
	(1.230)	(1.528)	(3.728)	(0.559)	(1.457)	(1.638)	(3.632)	(1.973)
Presence of:								
Blackboard	0.949	0.961	0.965	0.953	-0.002	0.006	-0.010	-0.007
Computer	0.064	0.052	0.119	0.075	0.014**	-0.013**	0.039**	0.021**
Electricity	0.316	0.339	0.559	0.196	0.037**	0.016+	0.084**	0.016
Library	0.372	0.405	0.469	0.446	0.017*	-0.005	0.018	0.025*
Medical Checkups	0.594	0.685	0.734	0.610	-0.019*	0.038**	-0.014	-0.040**
Playground	0.588	0.544	0.619	0.466	0.054**	0.012	0.036*	0.024+
Ramps	0.037	0.046	0.047	0.058	0.004	0.011*	0.002	-0.004
Water Source: Pump	0.467	0.454	0.324	0.542	-0.003	0.028**	-0.008	-0.022*
Water Source: Tap	0.221	0.223	0.335	0.109	0.041**	0.004	0.006	0.028**
Water Source: Well	0.042	0.043	0.073	0.066	0.002	-0.007+	0.015	0.008

Notes: In Column 1, I report the average characteristics in AY 2002-03 of the treatment schools that built latrines for both boys and girls between AY 2002-03 and AY 2003-04. In Column 2, I report the average characteristics in AY 2002-03 of the treatment schools that built only unisex latrines between AY 2002-03 and AY 2003-04. In Column 3, I report the average characteristics in AY 2002-03 of the treatment schools that built only girls' latrines between AY 2002-03 and AY 2003-04. In Column 4, I report the average characteristics in AY 2002-03 of the comparison schools that had no latrine between AY 2002-03 and AY 2005-06. In Columns 5 - 7, I report the estimated within-district difference between the average baseline characteristics of schools in columns 1 -- 3 and comparison schools in Column 4. Robust standard errors are reported with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 10. Baseline Primary-School Characteristics in 2002, by Type of Latrine Built

	Treatment Group:			Main Control Group:		Within-District		
	Built Latrines for Both Sexes Between 02-03 and 03-04	Built Only Unisex Latrine Between 02-03 and 03-04	Built Only Girls' Latrine Between 02-03 and 03-04	No Latrine From 02-03 through 05-06		Differences:		
	(1)	(2)	(3)	(4)	(1) - (4) (5)	(2) - (4) (6)	(3) - (4) (7)	(1) - (2) (8)
Number of Schools	15,102	15,725	1,993	88,386				
Total Enrollment	153.692	134.873	137.649	100.590	28.008**	18.083**	26.938**	7.384**
	(0.914)	(0.800)	(2.406)	(0.267)	(0.981)	(0.843)	(2.308)	(1.237)
Female Enrollment	74.443	64.625	69.962	48.169	13.953**	7.927**	16.516**	4.806**
	(0.465)	(0.398)	(1.337)	(0.136)	(0.505)	(0.420)	(1.304)	(0.633)
Male Enrollment	79.249	70.248	67.687	52.422	14.055**	10.156**	10.422**	2.578**
	(0.498)	(0.445)	(1.339)	(0.150)	(0.540)	(0.480)	(1.294)	(0.695)
Presence of:								
Blackboard	0.959	0.965	0.972	0.946	0.003	0.012**	-0.003	-0.007**
Computer	0.036	0.035	0.055	0.040	0.009**	0.000	0.022**	0.009**
Electricity	0.140	0.163	0.337	0.076	0.053**	0.039**	0.113**	0.017**
Library	0.545	0.495	0.482	0.487	0.012**	0.025**	-0.029**	-0.007
Medical Checkups	0.619	0.657	0.739	0.616	0.011**	0.021**	-0.013+	-0.011*
Playground	0.547	0.452	0.531	0.393	0.064**	0.028**	0.046**	0.032**
Ramps	0.043	0.043	0.059	0.059	0.010**	0.001	0.014**	0.007**
Water Source: Pump	0.623	0.520	0.356	0.520	0.015**	0.033**	0.001	-0.010*
Water Source: Tap	0.123	0.159	0.287	0.082	0.033**	0.018**	0.041**	0.015**
Water Source: Well	0.031	0.042	0.058	0.049	0.004*	-0.000	0.011*	0.005+

Notes: In Column 1, I report the average characteristics in AY 2002-03 of the treatment schools that built latrines for both boys and girls between AY 2002-03 and AY 2003-04. In Column 2, I report the average characteristics in AY 2002-03 of the treatment schools that built only unisex latrines between AY 2002-03 and AY 2003-04. In Column 3, I report the average characteristics in AY 2002-03 of the treatment schools that built only girls' latrines between AY 2002-03 and AY 2003-04. In Column 4, I report the average characteristics in AY 2002-03 of the comparison schools that had no latrine between AY 2002-03 and AY 2005-06. In Columns 5 - 7, I report the estimated within-district difference between the average baseline characteristics of schools in Columns 1 -- 3 and comparison schools in Column 4. Robust standard errors are reported with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 11. Effect of a School Latrine by Latrine Type, by Student Age

	Children between the Ages of 10 to 16				Children between the Ages of 5 to 9			
		Changes by Student Sex				Changes by Student Sex		
	All	Females	Males	(2) – (3)	All	Females	Males	(6) – (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Built separate latrines for both boys and girls	0.090**	0.089**	0.047**	0.042**	0.122**	0.113**	0.095**	0.018**
	(0.009)	(0.011)	(0.011)	(0.014)	(0.005)	(0.005)	(0.005)	(0.005)
Only built a female-only latrine	0.085**	0.098**	0.008	0.090**	0.146**	0.149**	0.083**	0.066**
	(0.011)	(0.016)	(0.017)	(0.021)	(0.009)	(0.010)	(0.011)	(0.010)
Only built a unisex latrine	0.055**	0.023+	0.039**	-0.016	0.105**	0.089**	0.093**	-0.004
	(0.009)	(0.012)	(0.011)	(0.014)	(0.004)	(0.005)	(0.005)	(0.004)
p-value (Row 1 - Row 3)	0.000	0.000	0.455	0.000	0.000	0.000	0.640	0.000
p-value (Row 1 - Row 2)	0.641	0.549	0.012	0.016	0.009	0.000	0.252	0.000
p-value (Row 2 - Row 3)	0.005	0.000	0.050	0.000	0.000	0.000	0.351	0.000
R^2 Statistic	0.279	0.210			0.159	0.138		
Number of Observations	53,321	106,642			363,258	726,516		
Number of Schools	17,796	17,796			121,206	121,206		

Notes: Reported estimates are analogous to those reported in Table 6, but separated by student age group rather than by upper-primary schools and primary schools. The dependent variable is the natural logarithm of enrollment plus one. Columns 1 - 4 report results from the sample of children between the ages of 10 to 16, and Columns 5 - 8 report results from the sample of children between the ages of 10 to 16. Columns 1 and 5 report the average enrollment effect on all students, in which the dependent variable for each school is regressed on the presence of a female-only latrine and no unisex latrine, the presence of a unisex latrine and no female-only latrine, the presence of separate sex-specific latrines, year-by-district fixed effects, school fixed effects, and the baseline school characteristics interacted with year. Columns 2 and 3 represent a single regression, and columns 6 and 7 represent a single regression. They report the average effect on females and males, in which all right-hand-side variables are interacted with student sex. Columns 4 and 8 report the difference in the estimated effect for females and males. Below the estimates, p-values are reported for the indicated difference in estimated coefficients across rows. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 12. Effect of a School Latrine by Latrine Type, Controlling for Changes in School Infrastructure

	Upper-Primary Schools (6th-8th)				Primary Schools (1st-5th)			
		Changes by Student Sex				Changes by Student Sex		
	All	Females	Males	(2) – (3)	All	Females	Males	(6) – (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Built separate latrines for both boys and girls	0.083**	0.094**	0.046**	0.048**	0.106**	0.104**	0.077**	0.027**
	(0.009)	(0.012)	(0.011)	(0.014)	(0.004)	(0.004)	(0.004)	(0.005)
Only built a female-only latrine	0.078**	0.106**	0.001	0.105**	0.126**	0.136**	0.058**	0.078**
	(0.012)	(0.016)	(0.017)	(0.022)	(0.007)	(0.008)	(0.009)	(0.011)
Only built a unisex latrine	0.044**	0.019	0.036**	-0.017	0.092**	0.082**	0.079**	0.003
	(0.009)	(0.013)	(0.011)	(0.014)	(0.004)	(0.004)	(0.004)	(0.004)
p-value (Row 1 - Row 3)	0.000	0.000	0.326	0.000	0.000	0.000	0.633	0.000
p-value (Row 1 - Row 2)	0.660	0.417	0.003	0.005	0.002	0.000	0.031	0.000
p-value (Row 2 - Row 3)	0.002	0.000	0.028	0.000	0.000	0.000	0.015	0.000
R^2 Statistic	0.331	0.248			0.164	0.135		
Number of Observations	53,388	106,776			363,618	727,236		
Number of Schools	17,796	17,796			121,206	121,206		

Notes: Reported estimates are analogous to those reported in Table 6, but control for time-varying measures of other school infrastructure. The dependent variable is the natural logarithm of enrollment plus one. Columns 1-4 represent the results from the upper-primary-school sample. Columns 5-8 represent the results from the primary-school sample. Columns 1 and 5 report the average enrollment effect on all students, in which the dependent variable for each school is regressed on the presence of a female-only latrine and no unisex latrine, the presence of a unisex latrine and no female-only latrine, the presence of separate sex-specific latrines, year-by-district fixed effects, school fixed effects, and the baseline school characteristics interacted with year, . Columns 2 and 3 represent a single regression, and columns 6 and 7 represent a single regression. They report the average effect on females and males, in which all right-hand-side variables are interacted with student sex. Columns 4 and 8 report the difference in the estimated effect for females and males. Below the estimates, p-values are reported for the indicated difference in estimated coefficients across rows. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 13. Interaction Effect between Latrines and the Initial Share of Female Teachers

	Upper-Primary Schools (6th-8th)			Primary Schools (1st-5th)		
	All	Females	Males	All	Females	Males
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent Variable: Log (Enrollment + 1)						
Built any Latrine * Initial Share of Female Teachers	-0.087	0.036	-0.233+	0.004	0.046	-0.039
	(0.066)	(0.107)	(0.134)	(0.029)	(0.045)	(0.051)
Built any Latrine	0.120**	0.010	0.134*	0.077**	0.069**	0.025
	(0.037)	(0.069)	(0.056)	(0.015)	(0.020)	(0.021)
R^2 Statistic	0.371		0.255	0.122		0.088
Number of Observations	1,270		2,540	6,087		12,174
Number of Schools	1,270		1,270	6,087		6,087
Panel B. Dependent Variable: Enrollment Levels						
Built any Latrine * Initial Share of Female Teachers	-3.890	0.405	-5.515+	-0.514	2.118	-3.356+
	(5.023)	(3.630)	(3.267)	(3.153)	(2.282)	(1.828)
Built any Latrine	6.416*	-0.165	6.456**	6.685**	4.051**	2.279*
	(2.892)	(1.551)	(2.405)	(1.536)	(0.883)	(1.015)
R^2 Statistic	0.170		0.168	0.105		0.095
Number of Observations	1,270		2,540	6,087		12,174
Number of Schools	1,270		1,270	6,087		6,087

Notes: Columns 1 and 4 report the average enrollment effect on all upper-primary-school and primary-school students respectively, in which the dependent variable for each school is regressed on presence of a latrine, the presence of a latrine interacted with the initial share of female teachers in 2002, year-by-district fixed effects, school fixed effects, and a vector of controls of baseline school characteristics interacted with academic year (including initial enrollment, presence of electricity, a school library, water by source, ramps, regular medical checkups, and a playground in AY 2002-03). Columns 2&3 and 5&6 report the average effect on females and males from upper-primary school and -primary school respectively, estimated from a single regression. In these regressions, all right-hand-side variables are interacted with student sex.

The dependent variable is the natural logarithm of enrollment plus one. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.

Appendix Table 14. Re-weighting Sample Districts based on District Income Distribution

	Main Specification No weight (1)	Imputing High Income Quintile (2)	Imputing Low Income Quintile (3)
Panel A: Upper-Primary Schools			
Built Latrine	0.079**	0.086**	0.073**
	(0.008)	(0.010)	(0.010)
R^2 Statistic	0.326	0.326	0.309
Number of Observations	53,388	53,388	53,388
Number of Schools	17,796	17,796	17,796
Panel B: Primary Schools			
Built Latrine	0.121**	0.146**	0.133**
	(0.003)	(0.004)	(0.004)
R^2 Statistic	0.154	0.164	0.140
Number of Observations	363,618	363,618	363,618
Number of Schools	121,206	121,206	121,206

Notes: This table reports estimated impacts of latrines, as in Table 3, but re-weighting sample districts to reflect the national distribution of district per capita income. The dependent variable is the natural logarithm of enrollment plus one. Column 1 reports the main results using no weight. In Columns 2 and 3, I report estimates from imputing income information for districts with missing income information. Column 2 assumes that districts with missing income information are from the highest income quintile. Column 3 assumes that districts with missing income information are from the lowest income quintile. Robust standard errors clustered by school are reported in parentheses with ** denoting statistical significance at the 1 percent level, * at the 5 percent level, and + at the 10 percent level.