

DHS data were analyzed for 11 countries (table G.1). DHS survey instruments are reasonably standardized across countries, allowing the same model specification to be used for different countries, albeit with some variations in variable definition. In each case only those households classified as rural were used. The sample size varied from 2,801 (child nutrition in Peru) to 17,165 (women in Indonesia).

Three different effects were examined using these data: first, how access to information from TV and radio influences health knowledge and so health behavior and health outcomes; second, how the availability of refrigerated storage improves nutrition; and third, how electricity affects schooling.

The causal chain for the first possible impact is as follows: (1) access to electricity increases time spent watching TV and listening to the radio; (2) increased access to media increases awareness of health issues; (3) this increased awareness results in changed health behavior; and (4) changed behavior improves health outcomes and reduces fertility. The empirical evidence relating to each of these points is discussed in turn.

Knowledge-Media Link

Two variables are used to measure health knowledge. The first is the response to the DHS question regarding knowledge of modern contraceptives. Women are asked to name modern contraceptive methods they know; the questionnaire records those they name against a list in the survey. The number of possible methods ranges from 0 to 12 (Ghana). The variable is simply the number of methods named. The coefficients are thus not comparable between the regressions.

The second knowledge variable is a simple average of four separate questions from the survey: (1) the contraceptive knowledge variable already mentioned, but scaled to be between 0 and 1; (2) knowledge of the timing of ovulation (0 = incorrect answer “do not know, any time, or middle of the periods,” 0.5 = “after period ends or before period starts,” and 1 = correct answer “middle of cycle”) (this question was not asked in Bangladesh, where instead a question was asked on knowledge of signs of a risky pregnancy); (3) knowledge of the symptoms of AIDS, scaled between 0 and 1; and (4) knowledge of oral rehydration salts.

The explanatory variables are the same in each case covering (1) household characteristics (housing index, education of household head, and whether the household has electricity); (2) individual characteristics (age, marital status, literacy, agency, and whether the women listen to the radio at least once a week and watch TV at least once a week); and (3) community characteristics (regional dummies and the share of women who have heard of family planning by family planning worker by cluster). The share of women visited by a family planning worker is a proxy for active health or family programs in the area. Most of these variables are self-explanatory, but some require a little discussion. A more general wealth index is not used, to avoid problems of endogeneity, and the housing index, together with education of the household head, may be regarded as an instrument for income.

Electricity appears as a variable in its own right, through the channels of affecting women’s access to TV directly and indirectly through someone else owning a TV (proxied by household electrification rate in the community). This channel is tested by

Table G.1: DHS Sample Sizes

Country	Survey year	Eligible women	Children under 5
Bangladesh	2004	7,536	4,835
Ghana	2003	3,317	2,801
Indonesia	2002–03	17,165	9,636
Morocco	2003–04	7,801	3,496
Nepal	2001	7,572	6,294
Nicaragua	2001	5,775	3,973
Peru	2000	10,749	7,467
Peru	2004	4,737	2,717
Philippines	1998	7,253	5,004
Philippines	2003	6,197	3,854
Senegal	2005	8,290	7,364

Source: DHS data.

running the regression with and without the variables capturing women’s access to TV (direct and indirect). If a TV channel is the only one through which electricity affects knowledge, then the household electricity variable will be significant when the access to TV variables are dropped but significant when they are included.

The estimation method used is as follows: The contraceptive knowledge equations are estimated using an ordered probit, an extension of the binary probit model that is used in cases with multiple and ranked discrete dependent variables. The ordered probit model is of the form:

$$\begin{aligned}
 p_1 &= \Phi(\alpha_1 + \beta'x) \\
 p_{i>1} &= \Phi(\alpha_i + \beta'x) - \Phi(\alpha_{i-1} + \beta'x) \\
 &\dots\dots\dots \\
 p_k &= 1 - \Phi(\alpha_{k-1} + \beta'x),
 \end{aligned}$$

where Φ denotes the cumulative standard normal distribution function and p_i is the probability of the event i occurring; in this case it would denote that probability that women know i contraceptive methods. The health knowledge equations are estimated using ordinary least square.

The estimates for Peru and the Philippines are calculated from two rounds of the DHS, and data are

pooled across surveys, so estimates become more precise as they are based on a larger sample. This results in a nine-country analysis for each variable.

Most of the conditioning variables have the expected sign (tables G.2 and G.3). The better off and literate women have more health knowledge, as do those with higher mobility, control over decisions affecting their lives (agency),¹ and some urban living. For both contraceptive knowledge and health knowledge variables, TV is significant for all nine countries. The electricity status, in its own right, significantly increases both contraceptive and health knowledge in the Philippines and Indonesia and health knowledge in Bangladesh as well. When the regressions are run dropping the variable capturing access to TV as the source of information, then the household electricity coefficient is positive and significant for most of the knowledge equations.

Taken as a whole, the regressions provide sufficient evidence that access to TV increases health and family planning knowledge and that it is this that is the channel through which electrification affects health knowledge.

The next step is to examine the extent to which knowledge affects practice. Two health practice variables are examined: (1) use of modern

Table G.2: Health Knowledge [Range 0–1]

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	0.01 ^a	0.00	0.03 ^b	0.07 ^b	-0.01	0.02 ^a	0.08 ^b	0.02 ^b	0.03 ^b
Education of the head (0–1.7)	0.03 ^b	0.05 ^b	0.09 ^b	0.03 ^b	0.03 ^b	0.05 ^b	0.07 ^b	0.05 ^b	0.06 ^b
Household has electricity	0.01 ^c	0.02	0.02 ^b	0.00	0.00	0.01	0.01	0.02 ^b	0.00
Woman can read and write	0.04 ^b	0.07 ^b	0.09 ^b	0.06 ^b	0.07 ^b	0.05 ^b	0.12 ^b	0.07 ^b	0.07 ^b
Woman's current age	0.09 ^b	0.24 ^b	0.11 ^b	0.16 ^b	0.10 ^b	0.10 ^b	0.31 ^b	0.21 ^b	0.34 ^b
Woman's age square	-1.39 ^b	-3.32 ^b	-1.76 ^b	-2.20 ^b	-1.54 ^b	-1.25 ^b	-4.39 ^b	-2.97 ^b	-4.73 ^b
Woman is head of household	0.00	0.03 ^c	0.01	0.00	0.01	0.01 ^a	0.00	-0.02	0.02 ^a
Woman is divorced/widowed/not living together	-0.03 ^b	-0.01	-0.01	-0.02 ^c	-0.03 ^b	-0.02 ^b	-0.01	0.00	-0.04 ^b
Woman never married		-0.05 ^b		0.07 ^b		-0.06 ^b	-0.02 ^b	-0.07 ^b	-0.07 ^b
Some urban living	0.04 ^b	0.01		0.03 ^b	0.02 ^c	0.01	0.04 ^b	0.01 ^c	0.04 ^b
Getting medical help is small problem	0.02 ^b	0.01 ^c	0.01 ^b	0.01 ^b		0.00 ^c	0.01 ^b		0.01 ^c
Woman alone has the final say	0.00 ^c	0.00	0.00	0.00	0.01 ^b	0.00	0.01 ^b		0.01 ^a
Reads paper at least once a week	0.04 ^b	0.01	0.08 ^b	0.04 ^b	0.04 ^b	0.05 ^b	0.04 ^b	0.04 ^b	0.03 ^a
Listens to radio at least once a week	0.02 ^b	0.08 ^b	0.03 ^b	0.02 ^b	0.04 ^b	0.03 ^b	0.03 ^b	0.01 ^a	0.05 ^b
Watches TV at least once a week	0.04 ^b	0.04 ^b	0.04 ^b	0.02 ^c	0.03 ^b	0.02 ^b	0.05 ^b	0.02 ^b	0.03 ^b
Share of women visited by family planning worker by cluster	0.01	-0.01	0.02	-0.13 ^b	0.06	0.12 ^b	0.00	0.09 ^b	0.06
Cluster probably has electricity	0.01 ^c	0.01	0.02	0.00	0.00	0.01	0.01	0.00	-0.01
Survey							0.09 ^b	-0.10 ^b	
Constant	0.19 ^b	-0.02	-0.02	0.18 ^b	0.33 ^b	0.19 ^b	-0.40 ^b	0.02	-0.32 ^b
Observations	7,535	3,312	17,073	7,778	7,550	5,762	15,470	13,413	8,262
R-squared	0.23	0.27	0.28	0.16	0.20	0.25	0.31	0.19	0.27
F-stat	80.30	34.15	83.52	25.99	38.06	49.34	162.64	85.06	110.40

Sources: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 10 percent.

b. Significant at 1 percent.

c. Significant at 5 percent.

Table G.3: Knowledge of Modern Contraceptives [Range 0–12]

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	-0.04	0.12	0.11	0.35 ^a	-0.02	0.28 ^a	0.42 ^a	0.11 ^a	0.16 ^a
Education of the head	0.23 ^a	0.21 ^a	0.60 ^a	0.03	0.32 ^a	0.37 ^a	0.30 ^a	0.32 ^a	0.21 ^a
Household has electricity	-0.11 ^b	0.00	0.11 ^a	-0.09	0.09	0.04	-0.03	0.09 ^a	0.04
Woman can read and write	0.10 ^c	0.17 ^a	0.43 ^a	0.42 ^a	0.65 ^a	0.35 ^a	0.58 ^a	0.42 ^a	0.32 ^a
Woman's current age	1.80 ^a	1.05 ^a	0.91 ^a	1.06 ^a	0.77 ^a	0.93 ^a	1.47 ^a	1.18 ^a	1.62 ^a
Woman's age square	-25.87 ^a	-14.44 ^a	-13.04 ^a	-13.96 ^a	-12.35 ^a	-12.31 ^a	-22.68 ^a	-15.70 ^a	-23.01 ^a
Woman is head of household	0.00	0.09	0.14	0.01	0.08	0.06	0.05	-0.06	0.08
Woman divorced/widowed/not living together	-0.36 ^a	0.01	-0.14 ^b	-0.19 ^a	-0.23 ^a	-0.05	-0.05	-0.09	-0.18 ^a
Woman never married		-0.34 ^a		-0.42 ^a		-0.53 ^a	-0.25 ^a	-0.25 ^a	-0.41 ^a
Some urban living	0.07	0.09 ^c		0.12 ^b	0.37 ^a	0.09 ^c	0.22 ^a	0.11 ^a	0.31 ^a
Getting medical help is small problem	0.25 ^a	0.04 ^b	0.09 ^a	0.07 ^a		0.03 ^b	0.07 ^a		0.05 ^a
Woman alone has the final say	0.04 ^a	0.03 ^b	0.01	0.02	0.07 ^a	0.03	0.05 ^a		0.00
Reads paper at least once a week	0.13 ^c	0.19 ^c	0.52 ^a	0.34 ^a	0.53 ^a	0.34 ^a	0.20 ^a	0.29 ^a	0.18 ^c
Listens to radio at least once a week	0.17 ^a	0.41 ^a	0.18 ^a	0.12 ^a	0.55 ^a	0.27 ^a	0.18 ^a	0.16 ^a	0.29 ^a
Watches TV at least once a week	0.14 ^a	0.33 ^a	0.38 ^a	0.20 ^a	0.21 ^a	0.18 ^a	0.28 ^a	0.19 ^a	0.20 ^a
Percent women visited by family planning worker by cluster	0.21	0.32 ^c	0.01	-0.53 ^a	0.16	0.72 ^b	-0.01	0.65 ^a	1.18 ^a
Cluster probably has electricity	0.16 ^a	-0.03	0.09	0.01	0.05	0.12 ^c	0.09	0.07	-0.17 ^b
Survey							2.01 ^a	1.32 ^a	
Observations	7,535	3,312	17,073	7,778	7,550	5,762	15,470	13,413	8,262
F-stat	40.81	33.85	71.62	41.2	50.82	45.92	199.63	199.68	77.01

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 5 percent.

c. Significant at 10 percent.

contraceptives by women who have had at least one intercourse and (2) child immunization for children older than 18 months. Contraceptive practice is a dichotomous variable of whether a woman has ever used modern contraception. Immunization is similarly defined, corresponding to the child's status for BCG (for tuberculosis), DPT (for diphtheria, pertussis, and tetanus), measles, and polio vaccinations, and two variables corresponding to having all vaccines or no vaccines at all, respectively. Hence, for immunization, six separate regressions were estimated for each of the nine countries for which data were available, making 54 equations in all.

The right-hand side variables for contraceptive practice are similar to those used for the knowledge regressions, plus the knowledge variable, information capturing children, and partner's education (see table G.4). The general determinants are as expected and are similar to those for knowledge. Of interest here is the knowledge variable, which is significantly positive in all equations (table G.4). For immunization status, the knowledge variable was positive and significant in 44 of the 45 "have vaccination" regressions. For "no vaccination," knowledge was, as expected, significantly negative in all but one case (table G.6). The link between knowledge and practice is thus firmly established (see table G.5).

Some surveys interviewed men, and for four of the nine countries, men's knowledge variable was also included as a regressor in the contraceptive practice equation.² In three of the four cases, the knowledge variable is significantly positive.

Fertility outcomes are measured as total children ever born as a ratio to the total fertility rate for that age group of women, using 5-year age ranges starting at age 20. In five of the nine cases, the health knowledge variable has a significant negative impact on fertility. The household electricity variable is also significant and negative in eight of the nine cases (table G.7). What are the possible reasons for this latter finding?

A possible explanation is that electricity reduces coital frequency by increasing waking hours, both

because there is more light and because TV and radio provide an "alternative to sex" for recreation. However, the data do not support this point of view. TV watching only significantly affects sexual activity in one of the eight cases, and household electricity is not significant. On the contrary, electrification indirectly increases sexual activity, as coital frequency is higher for those women with higher contraceptive knowledge.

These results can be used to estimate the impact electrification has on fertility (table G.8). The total effect is the combination of the direct impact from the fertility equation and the indirect impact via higher knowledge (which is the knowledge coefficient from the fertility equation multiplied by how electricity affects knowledge, taken as the coefficient on the household electricity variable in the absence of the TV variables). These calculations show an impact on fertility reduction from a low of 0.04 in Nicaragua to about 2.00 in Senegal as result of electrification.

The health outcomes used are nutrition and under-five mortality. Electricity may positively affect nutrition directly by allowing refrigerated food storage and indirectly through knowledge. Two nutrition measures are used: the height for age z score (HAZ) and the weight for age z score (WAZ). The z-score is a standardized measure; being more than two z scores below the reference value constitutes being undernourished and more than three, severely undernourished. HAZ is taken as a measure of long-run nutritional status; WAZ indicates short-run status.

The explanatory variables are similar for the two equations, which in turn are similar to those used throughout this analysis but with more demographic variables because there is possible competition for resources between siblings. In each case the variables cover (1) household characteristics (housing index, education in years of household head, number of young children, and whether the household has electricity and a refrigerator); (2) mother's characteristics (age, height, marital status, literacy and knowledge, mother is head of household, mobility, and agency); (3) child's characteristics (gender, birth order, gap between own

Table G.4: Practice of Modern Contraceptives

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	0.17	0.07	0.14	0.26	0.16	0.07	0.42 ^a	0.05	0.17 ^a
Education of the head	0.08	0.16 ^b	0.18 ^a	0.21 ^c	0.25 ^a	0.19	0.05	0.21 ^a	0.33 ^a
Household has electricity	0.15 ^a	-0.04	0.11 ^b	-0.20 ^b	0.08	0.09	-0.04	0.11 ^a	0.20 ^a
Women's health knowledge	2.30 ^a	1.35 ^a	0.69 ^a	1.36 ^a	1.69 ^a	2.04 ^a	0.85 ^a	1.10 ^a	1.34 ^a
Woman can read and write	-0.20 ^b	0.09	0.20 ^a	-0.06	0.22 ^a	0.13 ^b	0.06	0.07	0.19 ^a
Couple is uneducated	-0.15 ^a	-0.32 ^a	-0.02	-0.17 ^b	-0.11 ^b	-0.15 ^b	-0.17	-0.62 ^a	-0.36 ^a
Woman's current age	2.31 ^a	0.43 ^c	2.05 ^a	2.29 ^a	2.62 ^a	1.52 ^a	1.32 ^a	1.91 ^a	0.97 ^a
Woman's age square	-35.92 ^a	-7.37 ^c	-29.75 ^a	-31.15 ^a	-35.16 ^a	-25.17 ^a	-23.05 ^a	-27.48 ^a	-13.21 ^a
Woman divorced/widowed/not living together	-0.69 ^a	-0.02	-0.33	-1.69 ^a	-0.86 ^a	-0.54 ^a	-0.55 ^a	-0.54 ^a	-0.13
Woman never married	-0.03	-0.03	-0.16	-0.09	-0.16 ^c	-1.42 ^a	-1.17 ^a	-1.69 ^a	0.21
Woman is head of household	-0.30 ^a	-0.07	0.04 ^b	0.05 ^c	0.05 ^a	0.01	0.05	-0.05	-0.05
Woman alone has the final say	0.03 ^c	0.00	0.01	0.02	0.02 ^c	0.02	0.07 ^a		0.05 ^b
Getting medical help is small problem	0.20 ^a	0.03 ^c	0.01	0.02	0.02 ^c	0.02	0.01		0.01
Some urban living	0.03	0.20 ^a		-0.15	0.19 ^b	-0.03	0.11 ^a	0.07 ^c	0.19 ^a
Woman has only living girls	-0.12	-0.05	0.11	-0.02	-0.38 ^a	-0.17	-0.24 ^a	-0.37 ^a	-0.14
Number of children born—only girls	-0.03	-0.01	0.03	0.09	-0.10 ^a	0.11 ^b	0.06 ^c	0.13 ^a	0.01
Muslim	0.02	-0.14	0.22 ^a	-0.04	-0.81 ^a			-1.08 ^a	-0.04
Source of FP method by cluster	0.99 ^a	0.91 ^a	1.33 ^a	-0.04	0.72 ^a	0.41 ^b	0.65 ^a	0.47 ^a	0.15
Share of women accessing health care by cluster	0.34	0.25 ^c	0.18	0.23	0.50 ^b	0.37 ^b	0.89 ^a	0.12	0.74 ^a
Cluster probably has electricity	-0.02	-0.13	-0.07	0.12	0.12	0.05	-0.09	0.11 ^c	-0.19 ^b
Survey							-0.10 ^b	-0.07	
Constant	-4.56 ^a	-2.43 ^a	-4.89 ^a	-3.58 ^a	-6.40 ^a	-3.07 ^a	-2.81 ^a	-4.14 ^a	-3.89 ^a
Observations	7,098	2,963	16,287	4,533	7,549	4,641	12,789	9,843	6,717
F-stat	36.94	14.71	25.86	18.16	39.84	22.17	56.38	42.22	28.03

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 5 percent.

c. Significant at 10 percent.

Table G.5: Immunization: Child Received All Vaccinations

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	-0.08	-0.02	-0.06	0.04	-0.04	0.01	0.02	0.10	0.05
Education of the head	0.19 ^a	0.11	0.18 ^b	0.07	0.14 ^c	-0.10	0.10 ^c	0.20 ^a	0.04
Household has electricity	0.05	0.12	0.00	0.07	0.05	0.01	0.02	0.11 ^b	0.11
Women's health knowledge	1.02 ^a	1.00 ^a	1.24 ^a	0.78 ^a	1.21 ^a	0.77 ^a	0.32 ^a	0.82 ^a	0.61 ^a
Woman can read and write	-0.04	0.12	0.26 ^b	-0.02	0.32 ^a	0.00	0.03	0.19 ^a	0.15 ^b
Woman's current age	0.80 ^a	-0.24	0.70 ^b	0.66 ^b	0.89 ^a	0.38	0.26	0.94 ^a	0.22
Woman's age square	-11.78 ^b	6.09	-11.11 ^b	-8.80 ^c	-13.44 ^a	-3.93	-1.66	-13.34 ^a	-2.57
Woman has married more than once	-0.26 ^b	-0.18 ^b	-0.28 ^b	0.07	-0.13 ^c	0.04	0.09	-0.20 ^b	-0.05
Woman is head of household	-0.06	0.10	-0.23	-0.16	0.05	-0.11	0.04	0.19	-0.07
Woman alone has the final say	0.03	-0.02	-0.03	0.08 ^b	0.04 ^c	0.00	0.01		-0.04 ^c
Getting medical help is small problem	0.06	0.02	0.07 ^a	0.04 ^b	0.05 ^b	0.04 ^b	0.02		-0.02
Some urban living	-0.02	-0.14 ^c		-0.09	0.01	-0.05	-0.07 ^c	-0.04	-0.02
Muslim	0.42 ^c	0.25 ^c	0.03		-0.36			-0.59 ^a	-0.23 ^b
Hindu	0.66 ^a				-0.05				
Christian		0.28 ^b	0.09					-0.06	
Share of women accessing health care by cluster	0.58 ^c	0.63 ^a	0.62 ^a	0.37 ^a	0.39	0.36 ^b	0.23 ^c	0.31 ^a	0.32 ^c
Percent women visited by family planning worker by cluster	0.52 ^b	0.17	0.80 ^b	0.31	1.10 ^a	-0.29	-0.11	0.27 ^c	0.30
Cluster probably has electricity	0.01	0.02	-0.03	0.08	-0.05	-0.10	-0.03	0.09	0.00
Survey							-0.06	-0.12 ^a	
Constant	-2.16 ^a	-0.95	-2.91 ^a	-1.44 ^a	-2.30 ^a	-1.07 ^a	-1.03 ^a	-2.21 ^a	-0.77 ^b
Observations	3,475	2,032	6,924	2,408	4,454	2,817	7,001	6,333	5,428
F-stat	4.53	4.93	9.95	2.99	8.08	5.79	4.5	20.4	4.71

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 5 percent.

c. Significant at 10 percent.

Table G.6: Immunization: Child Received No Vaccinations

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	0.04	0.16	0.07	-0.19	0.28	0.08	-0.05	-0.09	-0.22 ^c
Education of the head	-0.26 ^a	-0.30 ^a	-0.28 ^a	-0.61 ^b	-0.17	-0.08	0.05	-0.19 ^a	0.06
Household has electricity	0.05	-0.09	0.01	-0.16	0.48 ^c	0.34 ^a	-0.41 ^a	-0.26 ^c	-0.18
Women's health knowledge	-1.01 ^b	-0.79 ^c	-1.06 ^c	-1.05 ^a	-1.41 ^c	-0.47	-1.27 ^c	-1.13 ^c	-1.04 ^c
Woman can read and write	0.31 ^a	-0.08	-0.17	-0.47 ^b	-0.21 ^a	-0.07	-0.11	-0.22 ^c	-0.41 ^c
Woman's current age	-0.73	0.58	-0.34	-0.69	-0.39	-0.77	0.14	-0.65 ^a	0.27
Woman's age square	12.57	-8.80	5.51	10.39	4.08	12.58	-3.45	11.01 ^a	-5.07
Woman has married more than once	0.20	0.05	0.10	0.19	0.01	-0.10	0.17	0.17 ^b	0.02
Woman is head of household	0.11	0.04	0.45	0.11	-0.28	-0.25	-0.19	0.04	0.05
Woman alone has the final say	0.00	0.00	-0.02	-0.15	-0.04	-0.07	0.01		0.02
Getting medical help is small problem	-0.15	-0.08 ^a	-0.05 ^b	-0.05	-0.04	-0.03	-0.03		-0.05 ^a
Some urban living	0.17	0.01		0.11	-0.34	0.02	0.12	-0.10	-0.01
Muslim	4.17 ^c	-0.35 ^b	-0.27		0.18			0.58 ^c	
Hindu	4.01 ^c				-0.10				
Christian		-0.30 ^a	-0.17					-0.09	
Share of women accessing health care by cluster	-1.24 ^c	-1.01 ^c	-0.75 ^c	-0.44	-0.72	-1.36 ^c	-1.07 ^c	-0.97 ^c	-0.26
Percent women visited by family planning worker by cluster	-1.12 ^b	0.03	-1.20 ^c	-0.07	-0.23	-0.12	-0.82 ^b	-0.69 ^c	0.11
Community has electricity	-0.08	0.19	0.09	-0.25	-0.30 ^b	-0.01	-0.03	-0.12	-0.17
Survey							-0.22 ^a	0.03	
Constant	-4.20	-1.30	0.95	0.21	0.28	0.14	-0.96	1.29 ^c	-0.99 ^b
Observations	3,475	2,032	6,924	2,408	4,454	2,817	7,001	6,333	5,428
F-stat	184.15	2.49	3.68	2.12	4.75	6.06	7.37	18.34	6.96

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 5 percent.

b. Significant at 10 percent.

c. Significant at 1 percent.

Table G.7: Fertility Rate

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	-0.24 ^a	-0.12	-0.10 ^c	-0.63 ^a	-0.11 ^b	-0.38 ^a	-0.35 ^a	-0.22 ^a	-0.11 ^a
Education of the head	-0.11 ^a	-0.13 ^c	-0.07 ^a	0.17	-0.02	-0.22 ^a	-0.03	-0.33 ^a	-0.03
Household has electricity	-0.07 ^b	-0.16 ^c	-0.11 ^a	-0.19 ^b	-0.15 ^a	-0.07	-0.08 ^b	-0.31 ^a	-0.27 ^a
Women's health knowledge	-0.34 ^b	-0.19	-0.23 ^a	-0.36	0.17 ^b	-0.26 ^c	-0.46 ^a	-0.42 ^a	0.04
Couple is uneducated	0.02	-0.1	0.02	-0.42 ^a	0.05 ^b	0.04	-0.09 ^c	-0.25	-0.03
Woman divorced/widowed/not living together	-0.24 ^a	0.07	-0.1	-1.03 ^a	-0.04	-0.04	-0.09 ^b	-0.38 ^a	-0.31 ^a
Woman has married more than once	-0.16 ^a	-0.01	-0.07 ^c	-0.48 ^a	-0.12 ^a	-0.01	-0.02	-0.15 ^a	-0.18 ^a
Woman is head of household	-0.05	-0.18 ^b	-0.17 ^a	-0.03	-0.03	-0.03	-0.15 ^a	-0.04	-0.09 ^b
Getting medical help is small problem		-0.03 ^c	-0.03 ^a	-0.05 ^a	-0.01	-0.01			0.01
Woman alone has the final say	0.03 ^a	0.00	0.01	-0.07 ^a	-0.01	-0.03	-0.02 ^b		0.00
Woman is working	-0.05 ^b	-0.19	-0.13 ^a	0.09	-0.05		-0.15 ^a	-0.32 ^a	-0.06 ^c
Some urban living		-0.02		-0.13	-0.03	0.01	-0.09 ^a	-0.08	-0.04
Christian		0.00	0.08					-0.01	
Hindu	0.04				-0.01				
Muslim	0.20 ^a	-0.06	0.18 ^a		0.08			0.01	0.23 ^a
Source of family planning method by cluster	-0.23	0.07	-0.12 ^c	0.49 ^c	-0.13	-0.23 ^b	-0.01	0.13	0.03
Child mortality rate by cluster	0.69 ^b	0.5	0.26	1.3	0.39 ^c	0.43	0.07	0.79 ^c	1.32 ^a
Survey							0.01	-0.07	
Constant	1.23 ^a	1.71 ^a	1.51 ^a	2.65 ^a	1.15 ^a	1.77 ^a	1.52 ^a	2.32 ^a	1.07 ^a
Observations	7,098	2,963	16,287	4,533	7,549	4,641	12,789	9843	6717
F-stat	19.23	1.99	16.38	15.66	8.1	9.61	26.67	21.46	10.27

Source: DHS Data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 5 percent.

c. Significant at 10 percent.

Table G.8: Impact of Electrification on Fertility Rate

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
TFR at age 50	5.83	6.35	4.63	6.32	5.98	7.25	6.57	5.54	7.42
Knowledge equation									
Electrification status	0.02	0.04	0.03	0.00	0.01	0.02	0.03	0.02	0.01
Child ever born: TFR equation									
Electrification status	-0.07	-0.16	-0.11	-0.19	-0.15	-0.07	-0.08	-0.31	-0.27
Health knowledge	-0.34	-0.19	-0.23	-0.36	0.17	-0.26	-0.46	-0.42	0.04
Reduction	-0.45	-1.06	-0.54	-1.20	-0.89	-0.55	-0.62	-1.76	-2.00
Reduction (only significant variables)	-0.45	-1.06	-0.54	-1.20	-0.89	-0.04	-0.62	-1.76	-2.00

Note: TFR = total fertility rate.

birth and birth of previous sibling); and (4) community characteristics (regional dummies, share of households with electricity).

Most of the child conditioning variables have the expected sign. The relationship between birth order and nutrition is as expected, decreasing with increase in birth order, reflecting food availability for older children. Similarly, children born at short intervals show a smaller HAZ. Taller women have taller children and so do women who are literate and with higher agency. The contraceptive knowledge variable affects HAZ in four of the six countries for which data are available, and WAZ in two of the six. Data on the household owning a fridge were available for four countries; the coefficient was significantly positive on HAZ and WAZ in three of the four countries. The household electricity variable is also significant and positive in four of the six cases.

In two countries, a possible reason can be refrigerator ownership. However, what are other possible channels for this finding in two countries with significant household electricity impact and the presence of a refrigerator? There is evidence that electrification improves child nutritional status, but the channels are not fully explained in all countries (table G.9).

Separate equations are estimated for neonatal mortality (death in first month), infant mortality (death in first year), and child mortality (death be-

tween first and fifth birthdays), so there are 27 mortality regressions. Although DHS includes questions on self-reported sickness, there are well-known biases in such variables, so they are not used in this analysis. The explanatory variables for the three mortality equations are similar to those used in the nutrition equations.

Most of the child-conditioning variables have the expected sign. A female child is more likely to survive in infancy than at an older age. For biological reasons, males have a higher natural risk of death at all ages. However, preference for boys over girls, especially in Asia, overrides biological factors at later stages in infancy. The relationship between birth order and mortality risk is convex (U-shaped) as expected, reflecting mother's age, social preferences, and food availability for older children.

Similarly, children born at short intervals and twins/triplets show a higher risk of mortality. Women's factors send a mixed message with the mortality regressions. Although cluster averages show expected signs, the household variables do not behave as expected. The results in general are not that good. Immunization and knowledge are both significant in some cases but are not overwhelming, as earlier links in the chain were.

Electricity and Education

A Cox hazards model (where the hazard for a child between the ages of 6 and 15 is dropping out

of school) was estimated to see the impact of electrification, if any, on the propensity of a child to stay in school. Although the model takes care of the censoring problem, the DHS data do not provide much information on education-specific information for children.

Nevertheless, a simple model was estimated with largely time-invariant variables as the independent variables. The estimated model indicates that RE indirectly improves the propensity of child to stay in school via increase in the mother's knowledge and education. Moreover, electricity itself is significant in seven of the nine regressions (table G.10). This might be capturing an increase in reading/studying hours due to illumination after dawn. However, because of lack of time-use data,

it is not possible to confirm the impact through this channel.

Time use

Electrification was found to increase the reading time of both adults and children in the household once the adult and/or child decides to read. Multivariate regressions of the effect of electrification on adult reading and children's studying—controlling for factors such as housing index, education, and age of the head of household—showed that the availability of electricity in the household had no significant effect on adults' and children's propensity to read and study, respectively. However, once individuals choose to read or study, electricity was also found to increase the time the children spend studying by 77 minutes

Table G.9: HAZ

	Bangladesh	Ghana	Morocco	Nepal	Nicaragua	Peru
House quality index	0.52 ^a	-0.09	0.73 ^a	0.07	0.33 ^a	0.32 ^a
Education of the head	0.13 ^a	0.03	0.05	0.07	0.10	0.14 ^a
Household has electricity	0.20 ^a	0.27 ^c	0.08	0.20 ^a	0.04	0.10 ^c
Household owns refrigerator		0.24	0.35 ^a		0.38 ^a	0.38 ^a
Number of household members age 0 – < 5	-0.10 ^a	-0.02	-0.05	-0.03	-0.02	-0.10 ^a
Contraceptive knowledge	0.02	0.03 ^a	0.04 ^b	0.03 ^c	0.03 ^c	0.00
Woman can read and write	0.18 ^a	0.06	0.00	0.19 ^a	0.04	0.08 ^c
Woman divorced/widowed/not living together	0.04	-0.18	0.01	-0.16	-0.05	-0.04
Woman's current age	0.02	-0.10	0.00	-0.05	0.06	0.11 ^a
Woman is head of household	0.16 ^b	-0.17 ^b	-0.29 ^b	0.01	-0.05	0.04
Woman alone has the final say	-0.01	0.04 ^c	0.08 ^c	0.00	-0.03	-0.01
Getting medical help is small problem	0.01	0.01	-0.02	0.00	0.00	0.00
Log of woman's height (cm)	6.25 ^a	4.10 ^a	5.96 ^a	5.51 ^a	7.15 ^a	7.14 ^a
Female child	0.06 ^b	0.22 ^a	0.22 ^a	0.02	0.08 ^b	0.09 ^a
Order of birth	-0.07 ^b	0.00	-0.06	-0.06 ^c	-0.09 ^a	-0.16 ^a
Birth order	0.01	0.00	0.00	0.01 ^c	0.00 ^c	0.01 ^a
= 1 if < 24 months gap with preceding sibling	-0.14 ^a	-0.11	-0.10	-0.14 ^a	-0.08 ^b	-0.12 ^a
Cluster probably has electricity	-0.13 ^a	-0.21 ^c	-0.12	0.02	0.01	0.01
Constant	-33.23 ^a	-22.30 ^a	-31.61 ^a	-29.63 ^a	-37.58 ^a	-37.32 ^a
Observations	4,002	2,302	3,000	5,196	3,453	8,794
F-stat	22.08	5.25	8.38	18.08	16.07	33.1

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 10 percent.

c. Significant at 5 percent.

(1.28×60) and the time adults spent reading by 27 minutes per electrified household per day, compared with nonelectrified households (table G.11).

The ESMAP report (2000) conducted a Heckman procedure using child-level information to study the effect of electrification on children's reading and studying—controlling for factors such as income, parents' education, type of dwelling, and price of fuel. The analysis concluded that the availability of electricity in the household had a negative effect on children's propensity to read or study—which in turn is presumed to be caused by more time spent watching TV and other forms of entertainment. Nevertheless, once a child made

the choice to study, electricity was found to increase the time he or she spent reading or studying by 48 minutes per day, compared with nonelectrified households. For adults, the study found an increase in time spent reading of close to 15 minutes per day.

The study and reading time was found to be significantly higher for the children and adults of electrified households in electrified villages than for both children and adults in the nonelectrified households in nonelectrified villages and nonelectrified households in electrified villages using the nearest neighbor matching technique (see table G.12). The nearest match was based on education (in years) of the head of the household.

Table G.10: Education

	Bangladesh	Ghana	Indonesia	Morocco	Nepal	Nicaragua	Peru	Philippines	Senegal
House quality index	-0.95 ^a	-0.23 ^c	-0.55 ^a	-0.70 ^a	-1.14 ^a	-0.60 ^a	0.26	-0.60 ^a	-0.07 ^a
Education of the head	-0.89 ^a	-0.34 ^a	-0.58 ^a	-0.20	-0.72 ^a	-0.64 ^a	-1.17 ^a	-1.25 ^a	-0.37 ^a
Household has electricity	-0.55 ^a	-0.18	-0.15 ^c	-0.30 ^a	-0.33 ^a	-0.37 ^a	-0.30	-0.49 ^a	-0.10 ^c
Household size	0.02 ^b	0.01 ^b	0.03 ^c	0.01	0.01	0.03 ^a	0.03	0.09 ^a	0.00
Women's health knowledge	-1.26 ^a	-0.32 ^a	-1.11 ^a	-0.58 ^a	-0.97 ^a	-0.87 ^a	-1.16 ^a	-0.71 ^c	-0.18 ^a
Woman's age (in log)	0.36 ^c	-0.29 ^c	-1.09 ^a	0.01	0.33 ^a	-0.53 ^a	-0.91 ^c	-0.56 ^c	0.04
Some urban living	-0.24	-0.10 ^b		-0.42 ^a	-0.23	-0.14 ^b	0.11	-0.12	-0.08 ^b
Couple is uneducated	0.41 ^a	-0.06	0.19 ^b	0.22 ^a	0.25 ^a	0.28 ^a	0.12	-0.04	0.27 ^a
Female child	-0.46 ^a	-0.02	-0.06	0.26 ^a	0.25 ^a	-0.14 ^a	-0.11	-0.28 ^a	0.02
Muslim	0.41 ^c	-0.10	-0.12		0.21 ^c			0.31 ^b	0.57
Hindu	0.36 ^b				0.00				
Christian	-1.10	-0.17 ^a	-0.21 ^b					-0.16	0.01
Distance to school	-0.03								
Cluster probably has electricity	0.08	0.13	0.03	0.17 ^c	0.04	0.12 ^b	-0.69 ^a	0.00	0.08 ^c
Share of women accessing HC by cluster	0.00	-0.05	-0.26 ^c	-0.46 ^a	-0.63 ^a	-0.16	0.47	-0.05	-0.07
Share of children in school by cluster	-2.50 ^a	-2.91 ^a	-2.76 ^a	-2.67 ^a	-2.62 ^a	-2.29 ^a	-3.49 ^a	-3.15 ^a	-2.06 ^a
Observations	7,334	3,053	15,805	6,096	8,722	6,925	5,126	6,481	7,119
Wald Chi	1,193.06	1,188.31	1,578.32	1,178.15	2,623.88	1,667.93	473.73	1,328.13	1,463.64

Source: DHS data; IEG calculations.

Note: Regional dummies suppressed.

a. Significant at 1 percent.

b. Significant at 10 percent.

c. Significant at 5 percent.

Table G.11: Reading and Studying Time

	Children		Adult	
	Study time	Propensity to study	Read time	Propensity to read
Housing index	0.37	-0.03	0.41	0.15
Education (no. of years) of head of household	0.12 ^a	0.01	0.07 ^a	0.07 ^a
Age of the head (log) of household		0.03		0.10
Occupation of head of household				
Farmer	0.30	0.01	-0.36 ^b	0.00
Home business	0.33	0.11	0.01	0.18 ^c
Children in the household				
Number	0.66 ^a		-0.16 ^a	
Child of more than 10 years age (0/1)	2.56 ^a			
Children in school (0/1)		0.97 ^a		
Household size				0.04 ^a
Source of light:				
Grid	1.28 ^a	0.11	0.45 ^b	0.06
Kerosene	-0.37		-0.30	
Candle	-0.34		-0.17	
Others	0.02		0.26	
Regional dummies suppressed				
Share of households with electricity (cluster average)		0.14		0.26
Constant	-4.18 ^a	-0.80 ^b	2.14 ^a	-1.27 ^b
Observations	1,152	1,992	1,204	1,992
Wald Chi		10.50		4.76

Sources: ESMAP 2000, 2003.

Note: Ideally this equation should be estimated at the child level. Given data limitation (missing household roster and time-use section), the model uses household-level information and total study time per household. The analysis is based on data collected from 2,000 households in four regions of the island of Luzon.

a. Significant at 1 percent.

b. Significant at 5 percent.

c. Significant at 10 percent.

Table G.12: Reading and Studying Time (Propensity Score Matching)

	Electrified household in electrified villages	Nonelectrified household in electrified villages	Regression coefficient	Nonelectrified household in nonelectrified villages	ATT
Study time	1,366	260	1.405 ^a	346	1.374 ^a
Reading time	1,366	224	0.950 ^a	298	0.960 ^a

a. Significant at 1 percent.