The Role of Education and Attitudes in Cooking Fuel Choice: Evidence from two states in India*
Supporting Information

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*Replication code for this publication is available online at `https://doi.org/10.7910/DVN/G0HJLV` (Gould and Urpelainen, 2019).

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A1   Causal Theory and Diagram

Causal diagrams have been used formally and informally by different disciplines – but especially in epidemiology – to identify variables that must be measured and controlled to ascertain unconfounded effect estimates. Directed acyclic graphs (DAGs) visually represent causal assumptions and can be used to identify appropriate covariates to account for in statistical models. DAGs are graphs where all variables in the graph are connected by arrows, which themselves refer to the direct causal effect of one variable on another, and without loops. In this study, we use Figure A1 to diagram our assumptions about the relationship between education, perceptions about cooking, and LPG adoption. These are included in dotted lines because they will be subject to testing in this study. Then, we show covariates associated with both our dependent and independent variables. Importantly, these covariates show relatively little association between themselves, suggesting that there is unlikely to be multicollinearity between the variables when modeled (Figure A2).

A2   Survey Data

Table A1 shows state-level summary statistics from the Indian national census for Kerala and Rajasthan. Figure A3 shows that there are pronounced differences in the fraction of households owning LPG between Kerala and Rajasthan, as well as within study states.

A3   LPG use

Figure A4 shows the distribution of self-reported days to refill an LPG cylinder in each study state. Overall, distributions are similar.

A3.1   Education Categories

In this study we assess the associations of both CWE (largely male) and female educational attainment on LPG ownership and perceptions related to cooking. Table A2 shows the distribution of covariates by CWE educational level for both study states.
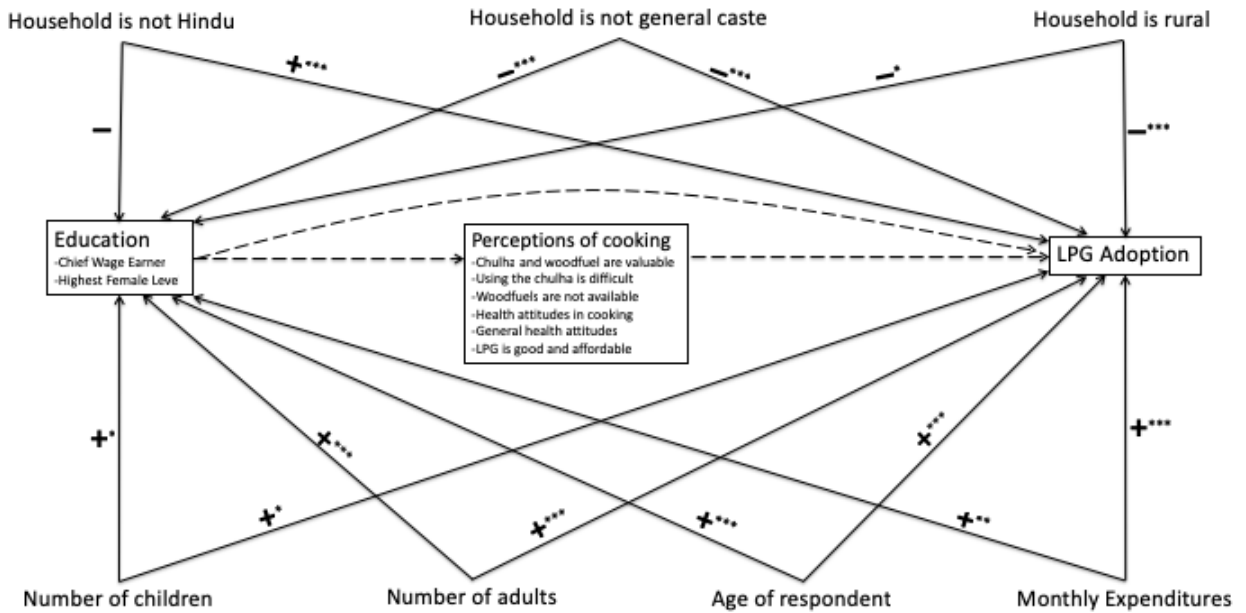
Figure A1: Directed acyclic graph (DAG) outlining *a priori* causal theory of the relationship of education with LPG adoption. Solid lines represent associations between control variables and the explanatory and outcome variables, including the direction of the association. Dotted lines represent the relationships to be tested through analyses in this study. The direction of association was determined in univariate logistic regressions and all variables were dichotomized to simplify analyses. Education was dichotomized to "Illiterate / No Formal Education" or "Greater than Illiterate / No Formal Education." Asterisks represent statistical significance with *** P<0.001, ** P<0.01, * P<0.05.
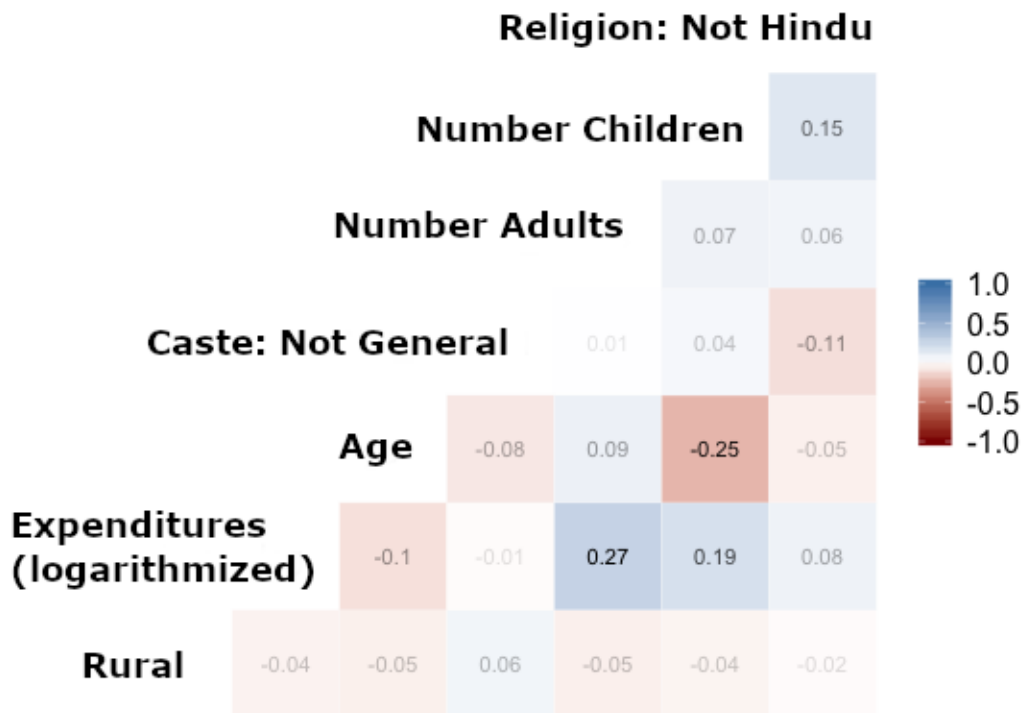
Figure A2: Correlation matrix between control variables demonstrating little association among covariates. Numbers are Spearman correlations and opacity increases as the correlations approach 0.

Variable	Kerala	Rajasthan	India
Population size	33 million	69 million	1,211 million
Households	7.7 million	12.6 million	247 million
Per capita income (Rupees, current prices)*	162,718	92,076	103,870
Fraction Rural	0.85	0.93	0.86
Literacy rate, 7+ years	0.94	0.66	0.73
Household size	4.33	5.45	4.91
Primary cooking fuel:			
Firewood	0.62	0.62	0.49
Crop residue	0.01	0.11	0.09
Dung cake	0.1	0.03	0.08
Charcoal	<0.01	0.01	0.01
Kerosene	<0.01	0.01	0.03
LPG/PNG	0.36	0.23	0.29
Other clean fuel (electricity, biogas)	0.01	<0.01	0.01
Main source of lighting:			
Electricity	0.94	0.67	0.67
Kerosene	0.05	0.31	0.31
Solar	<0.01	0.01	<0.01
No lighting	<0.01	0.01	<0.01
Religion:			
Hindu	0.55	0.88	0.8
Muslim	0.27	0.09	0.14
Christian	0.18	<0.01	0.02
Sikh	<0.01	0.01	0.02
Jain	<0.01	0.01	<0.01

Table A1: Summaries of Kerala and Rajasthan (Registrar General of India, 2015).
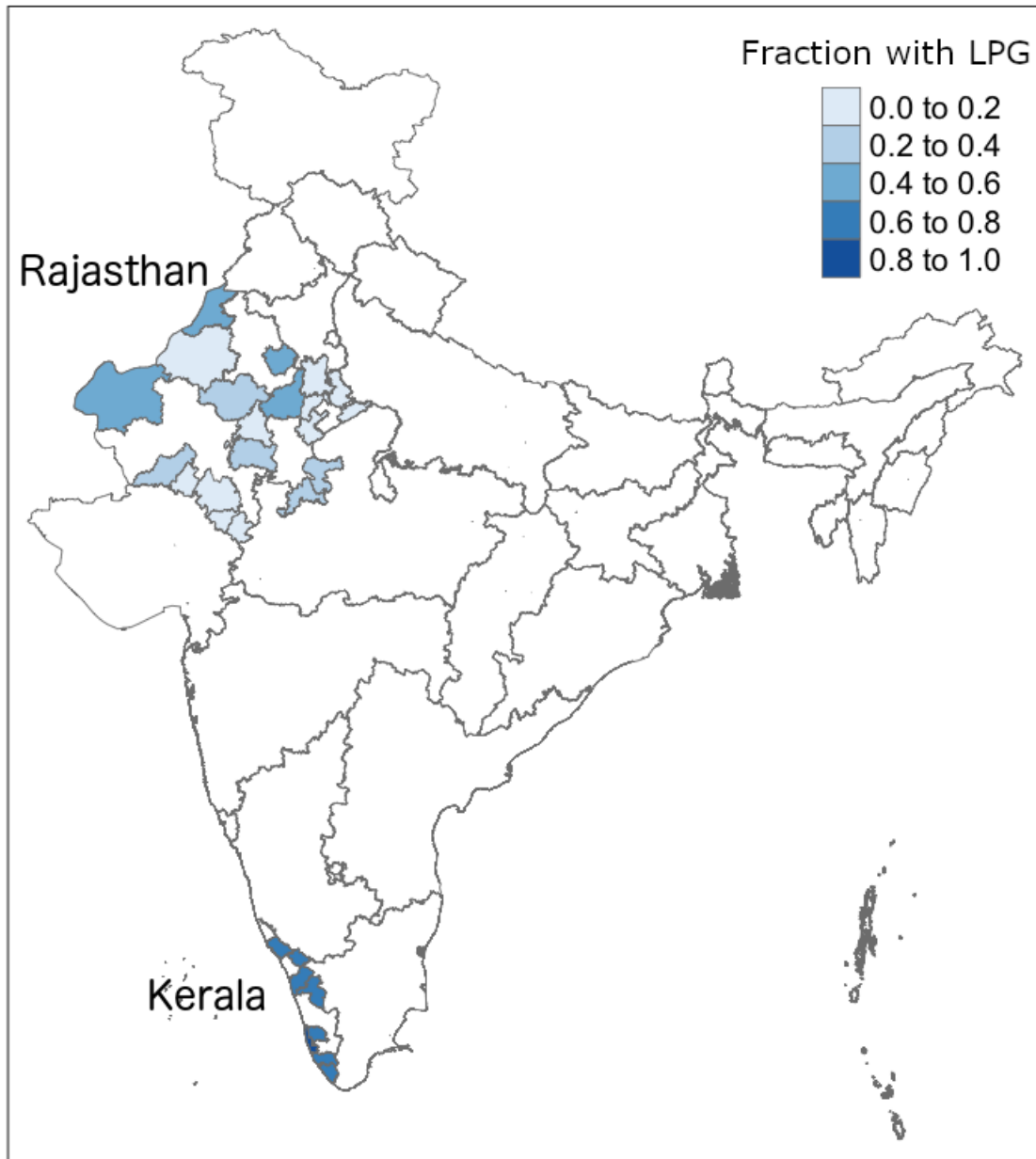*Reference: Central Statistical Organisation - Government of India (2018).

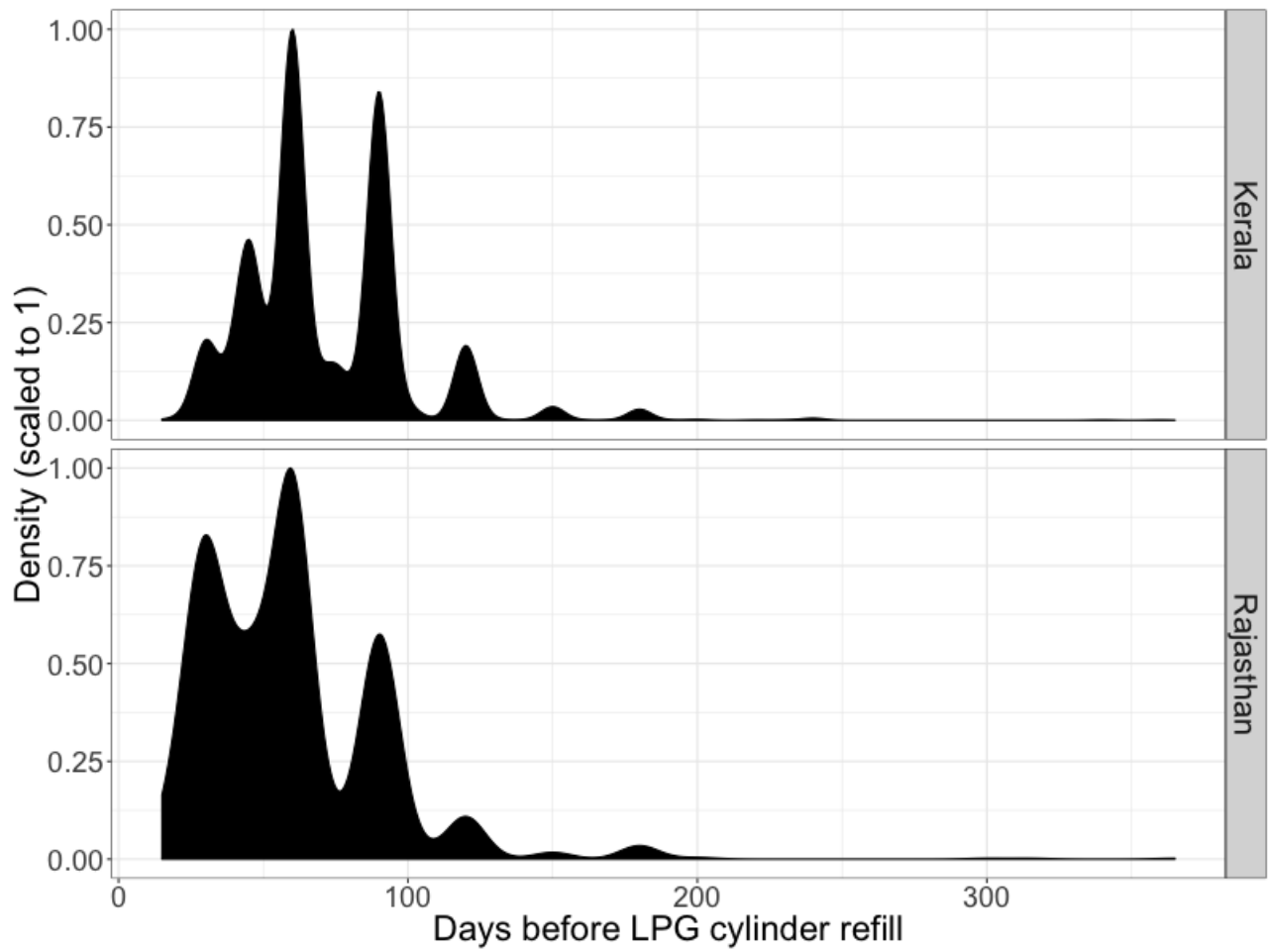Figure A3: Map of study districts showing the fraction of households owning LPG.

Figure A4: Density plot showing the distribution of self-reported days to refill an LPG cylinder in Kerala and Rajasthan LPG-owning households.

Covariate	Kerala				Rajasthan			
	Illiterate / No Formal	Primary	Middle / High	Greater than High	Illiterate / No Formal	Primary	Middle / High	Greater than High
Households (N)	173	718	2525	513	2917	955	1707	498
Has LPG	0.48	0.63	0.75	0.85	0.16	0.23	0.32	0.48
Fraction Rural	0.47	0.50	0.52	0.56	0.76	0.75	0.74	0.77
Age Respondent	46.91	47.79	42.84	41.93	38.20	36.26	34.07	33.76
Male Chief Wage Earner	0.69	0.85	0.93	0.95	0.95	0.99	0.99	0.99
Relationship of Respondent to CWE:								
CWE herself	0.21	0.12	0.06	0.04	0.04	0.01	0.01	0.01
Wife	0.53	0.75	0.80	0.69	0.86	0.91	0.90	0.91
Daughter/DIL	0.20	0.07	0.03	0.02	0.07	0.04	0.04	0.04
Other	0.06	0.06	0.11	0.25	0.03	0.04	0.05	0.04
Religion:								
Hindu	0.65	0.66	0.72	0.76	0.89	0.86	0.91	0.94
Muslim	0.24	0.23	0.16	0.11	0.10	0.12	0.08	0.05
Head of Household Caste:								
General	0.13	0.14	0.19	0.28	0.10	0.14	0.17	0.23
OBC	0.57	0.62	0.64	0.58	0.42	0.45	0.44	0.41
Scheduled Caste	0.14	0.15	0.12	0.09	0.30	0.26	0.26	0.23
Scheduled Tribe	0.12	0.05	0.02	0.01	0.17	0.15	0.13	0.13
Mean # Adults	3.65	3.38	3.10	3.18	3.02	3.03	3.02	3.20
Mean # Children (<18 yrs old)	1.12	0.93	1.10	0.98	2.22	2.26	2.27	2.05
Median Total Monthly Expenditure	5170	5337	5724	5880	5200	5500	5800	6400
Median Monthly Fuel Expenditures	340	500	500	500	250	300	300	300

Table A2: Summary statistics of dependent, explanatory, and control variables, by CWE education categories. At the time of data collection in October 2015 1 USD = 65.15 INR.

In Tables A3 and A4 we show that while CWE and female educational attainment is positively correlated – that is, when CWE education increases, so does female education in the household – there remains heterogeneity and the correlation is not perfect. In Rajasthan, especially, the CWE commonly has a higher education level than their female spouse.

Summary statistics for Kerala households by category of highest female education achieved are available in Table A5. The same summary statistics for Rajasthan households by category of the highest education level achieved by the CWE's spouse, when the CWE is male (97% of the sample) are in Table A6. Although both samples are somewhat different socioeconomically, in both cases with increasing educational level achieved, a greater fraction of households have LPG, are younger, have a male chief wage earner, and are better off socioeconomically in terms of more general caste households and greater monthly expenditures.

A3.2 Perceptions

Focus group discussions were carried out in both Kerala and Rajasthan during the formative research stage of the study. From discussions during these formative focus groups, a list of cooking- and health-related perceptions was developed. Owing to differences between the two states, emergent themes varied between the two states. As a result, perceptions that participants were asked to respond to also differed across the states, with only some overlap. In total, participants were asked 30 questions about their perceptions and attitudes towards cooking and fuel use. Responses

	Highest Education Level Achieved by a Female			
	Illiterate / No Formal Schooling	Primary School	Middle / High School	Greater than High School
CWE Education Level:				
Illiterate / No Formal Schooling	1.54	1.28	1.06	0.02
Primary School	2.53	6.47	8.01	0.83
Middle / High School	6.10	14.24	37.75	6.90
Greater than High School	1.14	2.72	5.75	3.75

Table A3: Distribution of the percent of households in each CWE education level and highest female education level attained pair in Kerala households.

	Highest Education Level Achieved by the CWE Female Spouse			
	Illiterate / No Formal Schooling	Primary School	Middle / High School	Greater than High School
CWE Education Level:				
Illiterate / No Formal Schooling	42.02	2.41	2.07	0.36
Primary School	11.86	2.68	1.37	0.12
Middle / High School	16.58	5.97	5.58	0.58
Greater than High School	3.19	1.36	2.48	1.36

Table A4: Distribution of the percent of households in each CWE education level and highest female spouse education level attained pair in Rajasthan households.

	Illiterate / No Formal Schooling	Primary School	Middle / High School	Greater than High School
Households (N)	425	927	1975	438
Has LPG	0.66	0.74	0.74	0.81
Fraction Rural	0.46	0.53	0.52	0.54
Age Respondent	43.5	45.44	43.29	39.61
Male Chief Wage Earner	0.92	0.95	0.96	0.91
Relationship of Respondent to CWE:				
CWE herself	0.06	0.03	0.03	0.08
Wife	0.68	0.74	0.84	0.84
Daughter/DIL	0.07	0.04	0.04	0.05
Other	0.19	0.19	0.09	0.04
Religion:				
Hindu	0.71	0.68	0.72	0.75
Muslim	0.22	0.2	0.16	0.11
Head of Household Caste:				
General	0.12	0.17	0.21	0.25
OBC	0.57	0.64	0.63	0.6
Scheduled Caste	0.22	0.12	0.11	0.1
Scheduled Tribe	0.06	0.02	0.02	0.02
Mean # Adults	3.85	3.63	3.07	2.76
Mean # Children (<18 yrs old)	1.21	1.14	1.04	1.01
Median Total Monthly Expenditure	6200	5740	5704	5630
Median Monthly Fuel Expenditures	550	500	500	500

Table A5: Summary statistics of dependent, explanatory, and control variables, by categories of the highest education level achieved by a female in Kerala households. At the time of data collection in October 2015 1 USD = 65.15 INR.

	Illiterate / No Formal Schooling	Primary School	Middle / High School	Greater than High School
Households (N)	4340	732	678	142
Has LPG	0.20	0.32	0.39	0.39
Fraction Rural	0.78	0.73	0.69	0.77
Age Respondent	38.35	32.17	29.11	27.32
Male Chief Wage Earner	1	1	1	1
Relationship of Respondent to CWE:				
CWE herself	0	0	0	0
Wife	0.93	0.92	0.82	0.69
Daughter/DIL	0.03	0.07	0.14	0.27
Other	0.04	0.02	0.03	0.04
Religion:				
Hindu	0.90	0.89	0.90	0.92
Muslim	0.09	0.10	0.09	0.04
Head of Household Caste:				
General	0.12	0.17	0.22	0.22
OBC	0.42	0.47	0.46	0.38
Scheduled Caste	0.29	0.261	0.22	0.20
Scheduled Tribe	0.17	0.10	0.10	0.20
Mean # Adults	3.05	2.93	3.16	3.60
Mean # Children (<18 yrs old)	2.28	2.20	2.13	1.91
Median Total Monthly Expenditure	5350	6000	6200	6625
Median Monthly Fuel Expenditures	250	300	300	300

Table A6: Summary statistics of dependent, explanatory, and control variables, by categories of the highest education level achieved by the CWE's female spouse in Rajasthan households. At the time of data collection in October 2015 1 USD = 65.15 INR.

were coded on a scale of 1 to 5 (1=Completely Disagree, 2=Disagree, 3=Neither Disagree or Agree, 4=Agree, 5=Completely Agree).

To average the effects of questions that were grouped thematically, we developed perception indices for Kerala and Rajasthan households. These groupings are described in the main text and outlined fully in Table A7. To develop the indices, we summed all perceptions within each index after numerical orientation in the same direction where higher number would indicate more positive feelings about LPG. Since indices had different numbers of perceptions contributing, we then normalized each perception index to have the minimum number be 0 and the maximum number be 1. The distribution of the perception indices is available in Figure A5.

A3.3   LPG costs

	Perceptions	
Indices	Kerala	Rajasthan
Chulha and woodfuel are valuable	One should definitely have a chulha at kitchen We have to start a day by lighting the chulha (traditional cookstove) for prosperity and wealth Smoke from chulha purifies the house I use firewood because cooking using firewood is part of our tradition and being used since generations Food tastes better if it has been prepared on chulha (traditional cookstove) specially fish, chicken and other non-veg items Elders / family members only prefer food cooked in Chulha	Few traditional dishes like dalbati can be cooked only in chulha, so we have to keep a chulha at home In case of large family it's important to have Chulha which allows simultaneous cooking of multiple dishes The food cooked in chulha is good for health Chapati / Roti tastes good when made on Chulha , hence, we have to use it to cook chapatti's for the family My in-laws / family members only like the food cooked on Chulha, they will not have food cooked in LPG
Woodfuels are unavailable, inconvenient	In times of scarcity we have to travel long distances to collect wood Continuous monitoring is required while cooking on firewood or else the fire extinguishes During rains we don't get firewood, we have to pay more for getting it Firewood is easily available, one can easily collect firewood from the premises / neighborhood (-) While using firewood kitchen walls and utensils get spoiled completely I get free firewood that is the reason I'm using firewood (-)	In times of scarcity we have to travel long distances to collect wood We walk a very long distance to collect firewood; we often get back pain, shoulder and leg pain. During rains we don't get firewood, we have to pay more for getting it We get wood for free from nearby available places (-) More time is spent on lighting the Chulha than even cooking food on it While using chulha / sigri kitchen walls and utensils turn black completely, we spent time in cleaning
Using the chulha is difficult	Time taken to cook food in chulha is too much, we have to start our day early Cleaning chulha every morning is difficult we have to collect the ash Lighting the chulha (traditional cookstove) is the most difficult part of the cooking	
LPG is good and affordable / LPG is desirable, but expensive (Rajasthan)	Cooking on LPG is easy, food gets prepared soon, we could save time Future generation will adopt LPG automatically If we have money, it is better to buy LPG instead of wood I can not afford LPG cylinder/Induction stove at all (-) I can not afford regular cooking on LPG cylinder/Induction stove (-)	My family can not afford LPG cylinder/Induction stove at all If my family allows, I would definitely go for other type of fuel which are fast and efficient Given an option of paying initial down payment amount in installment, I may plan to go for a LPG I use a chulha because I just don't have any other alternative (-)
LPG is good quality cooking and beneficial		Women who uses LPG get more time for themselves Future generation will adopt LPG / other clean cooking options automatically There is not much variation in cooking time for chulha / sigri / LPG People who can afford it will obviously buy LPG stove as it is very easy to cook food using LPG
General health attitudes are progressive	I prefer not to tell my husband or anyone in family, even if I am not well (-) When children are not well, it is better to visit the doctors/health care professional immediately. We can always rely on the advices given by doctors/medical professionals	
Cooking fuel choices affect health	We inhale a lot of smoke, sometimes we feel like suffocating due to smoke We also get irritations in eyes, headache, backache because of using firewood Our child's health get affected due to smoke We don't face the issue of smoke while cooking on LPG/induction	Cooking using LPG is a much cleaner and healthier method of cooking Using a chulha is extremely harmful for my eyes as well as for other family members The smoke from the chulha affect the health of my kids.

Table A7: Summary of perceptions and indices in Kerala and Rajasthan.

(A) Kerala Perception Indices
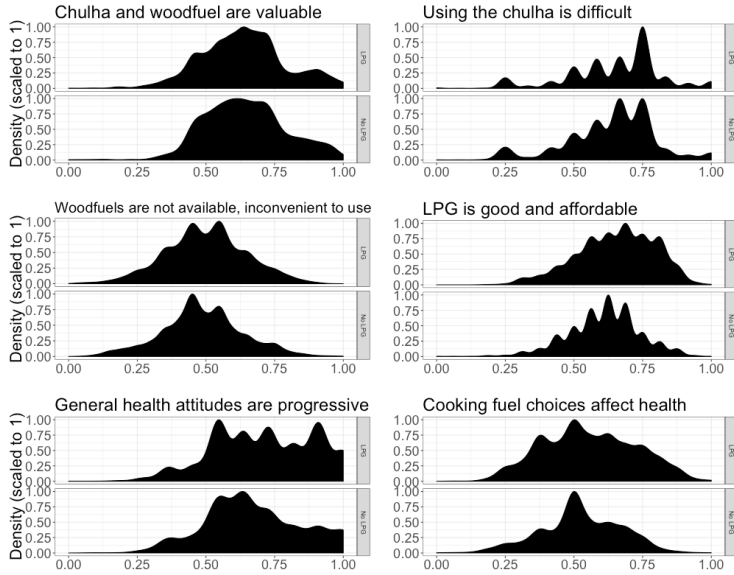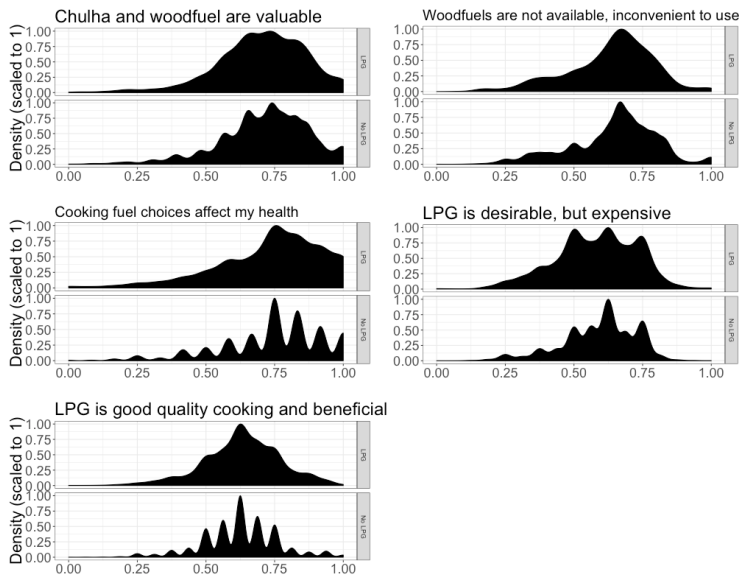

(B) Rajasthan Perception Indices

Figure A5: Density plots showing the distribution of perception indices in LPG and non-LPG owning households in the Kerala and Rajasthan study samples.
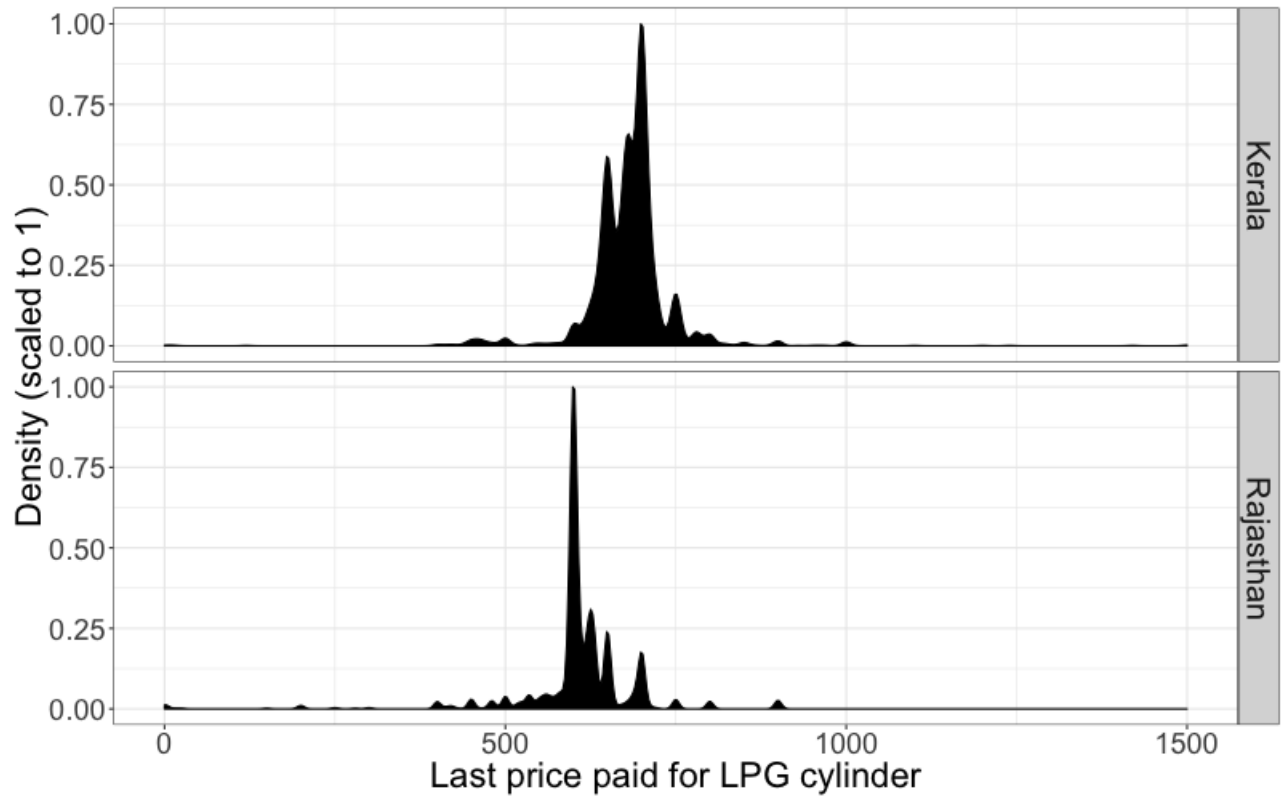
Figure A6: Density plots showing the distribution of the price (in rupees) paid by households for their most recent LPG cylinder purchase in the Kerala and Rajasthan study samples. Prices above 1,500 rupees were removed due to implausibility.
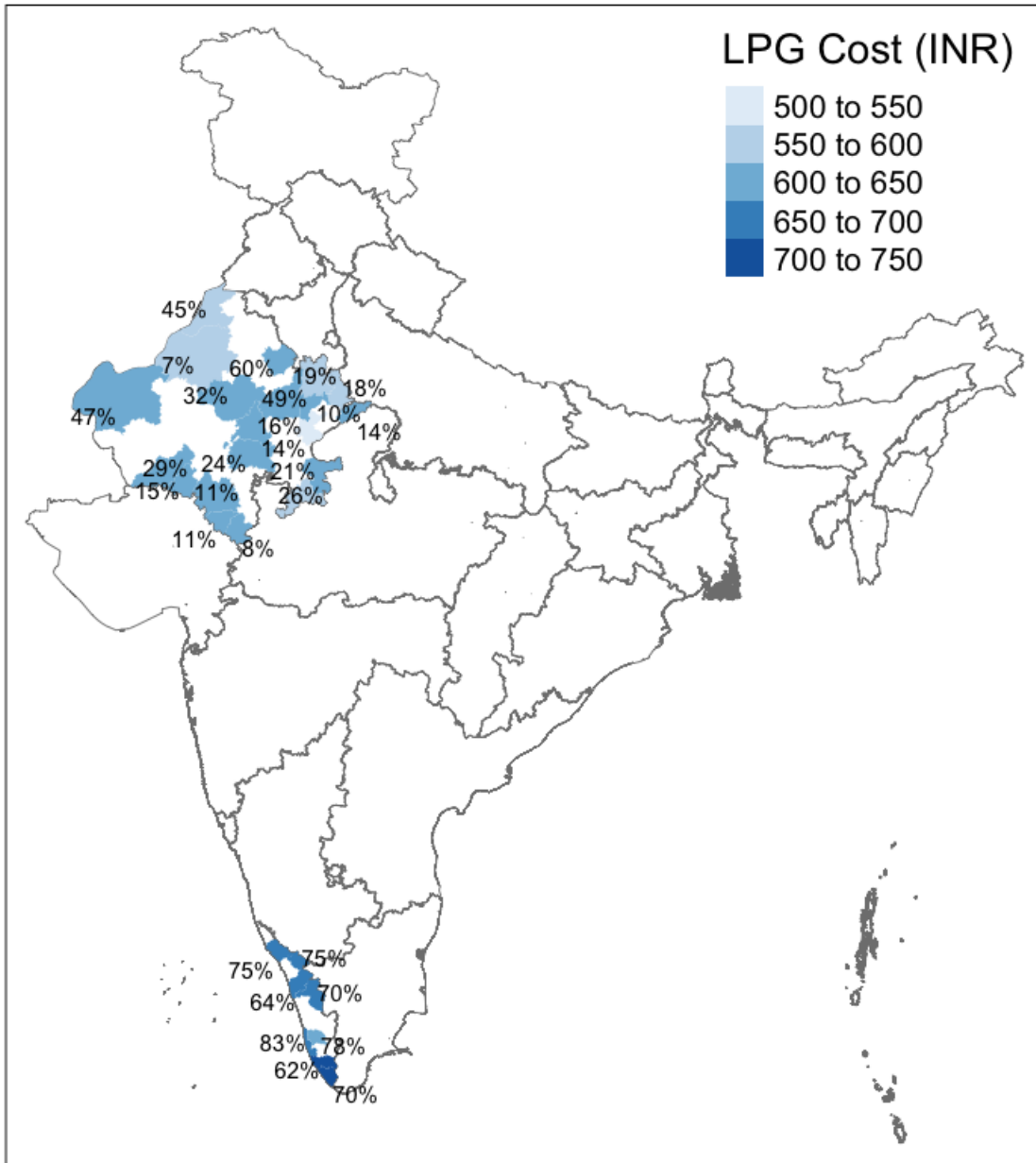
Figure A7: Map showing the geographic distribution of the average price (in rupees) paid by households for their most recent LPG cylinder purchase at the district-level. The percent of study participants in that district with LPG is overlaid. Prices above 1,500 rupees were removed due to implausibility.

A4 Supporting Analyses

In this section we present additional results in support of our robust analysis of the association between education and LPG adoption. First, we show alternative model specifications – conditional logistic regressions instead of utilizing fixed effects and then the utilization of individual perceptions rather than indices. Second, we repeat analysis among distinct sub-samples of the Kerala and Rajasthan households along key covariates of clean cooking adoption.

A4.1 Alternative Model Specifications

We account for potential uncontrolled spatial confounding in our primary analyses using fixed effects for districts. An alternative method is to use a conditional logistic regression model with district-level strata. Figure A8 shows the results for conditional logistic regressions assessing the association between CWE education and LPG ownership in Kerala and Rajasthan households. This is analogous to Figure 2 in the main text of this study. We show here that results are consistent across model specification. Further conditional logistic regression figures are not shown.
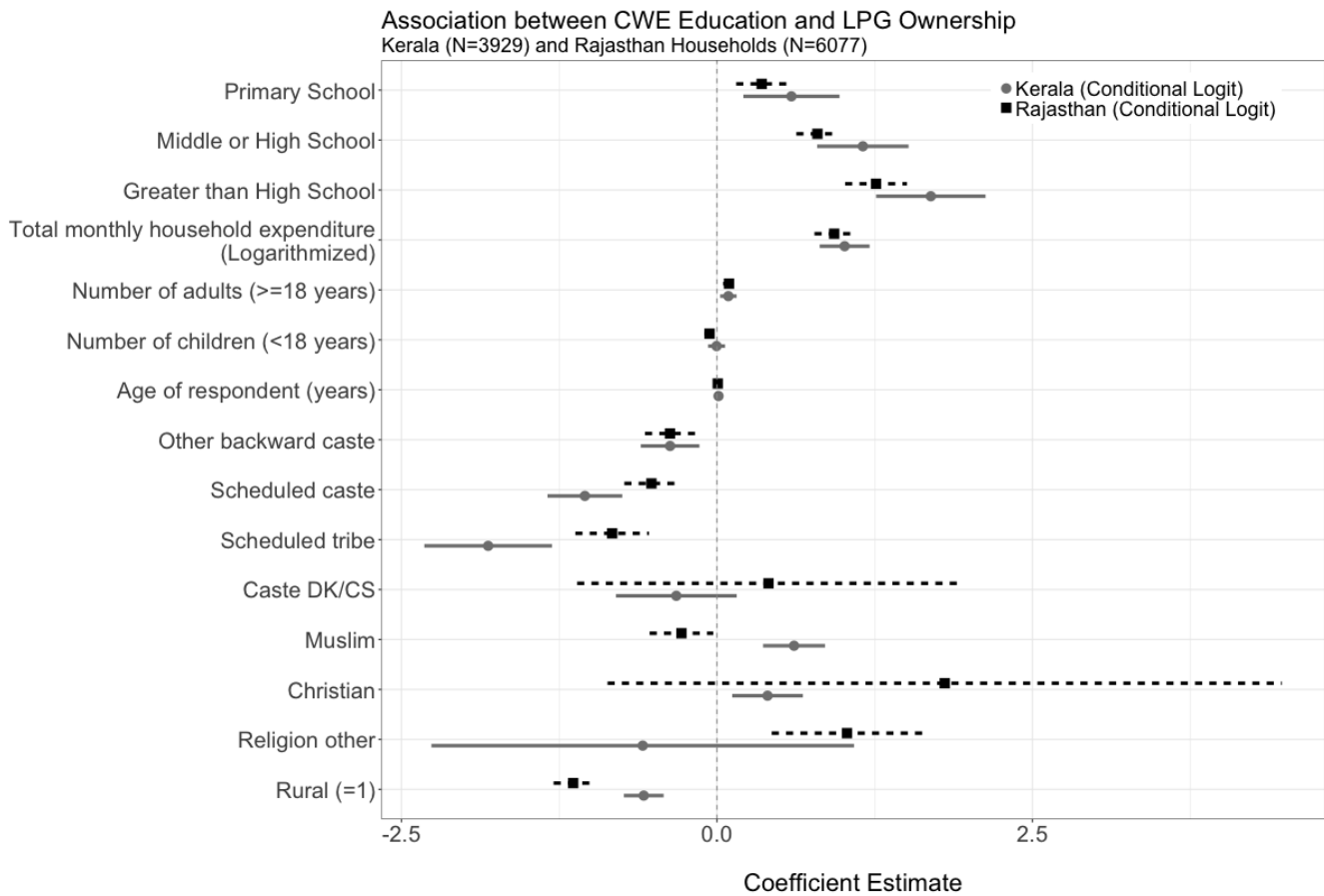
Figure A8: Coefficient plot for conditional logistic regression showing the associations between CWE education and LPG ownership in Kerala and Rajasthan households. Regressions use districts as strata to account potential uncontrolled spatial confounding. Coefficients are not exponentiated. Caste DK/CS means that the respondent either "didn't know" or "couldn't say" their caste. Whiskers show 95% confidence intervals.

A4.2 Results for Analyses with Individual Perceptions

Here, we repeat our analyses with individual perceptions rather than indices. First, Figures A9 and A10 show that several individual perceptions are strongly associated with LPG ownership in both the Kerala and Rajasthan samples. These findings demonstrate that there is indeed heterogeneity in the association between perceptions within indices. At the same time, using perception indices allows multiple perceptions to contribute holistically to a single index. For example, among perceptions associated with health and cooking, few reach statistical significance. However, with the cooking and health index, the association with LPG ownership is clear. We account for False Discovery Rate using the Benjamini-Hochberg method and an FDR of 0.10.

Next, we show the association between educational achievement levels for both chief wage earners and females in Kerala and individual perceptions (Figures A11 and A12). We see relatively few strong associations or clear patterns. One exception is among the general health related perceptions where we see the perception "I don't tell people if I'm sick" is strongly negatively associated with female educational achievement. An important takeaway here, though, is that perceptions are not always associated (significantly or not) with CWE and female education in the same direction.
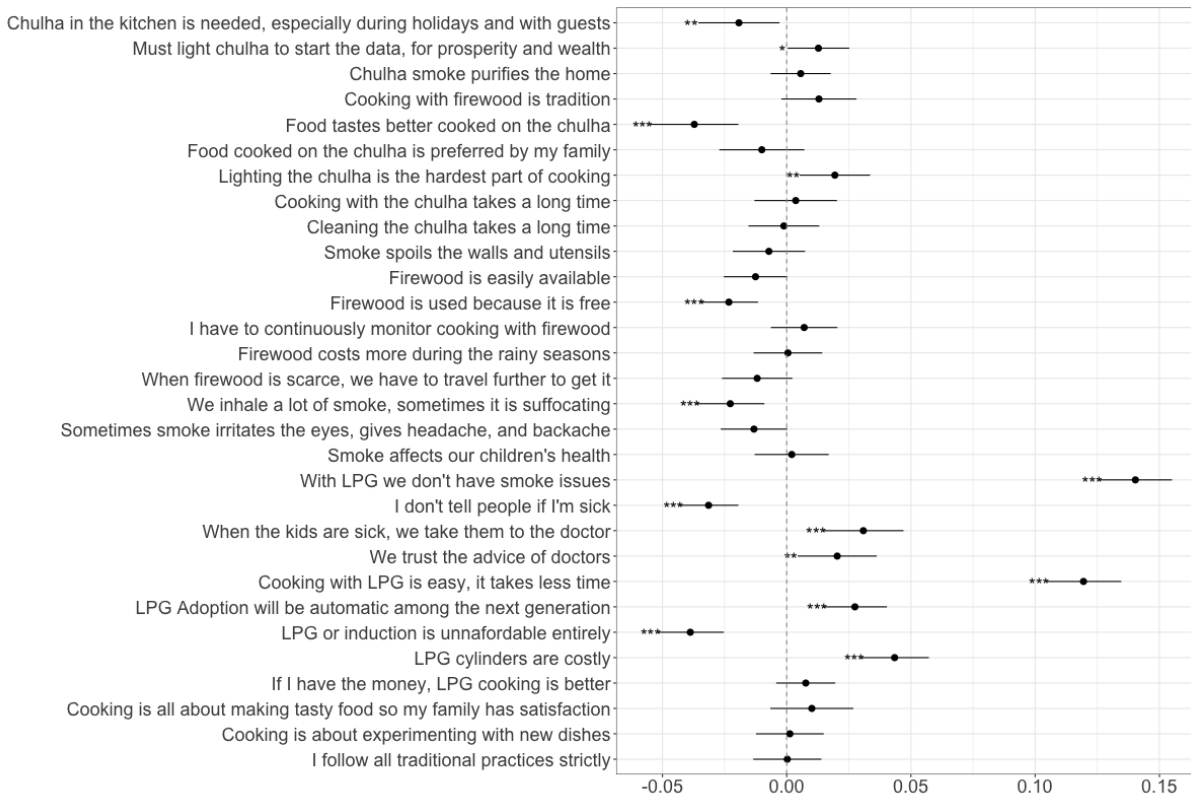
Figure A9: Coefficient plot for linear regressions showing the associations between perceptions and LPG ownership in individual regressions in Kerala households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Stars show statistical significance after Benjamini-Hochberg method for controlling for false discovery rate: * P<0.10, ** P<0.05, *** P<0.01.

Figures/supp_r_lpg_perceptions.png

Figure A10: Coefficient plot for linear regressions showing the associations between perceptions and LPG ownership in individual regressions in Rajasthan households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Stars show statistical significance after Benjamini-Hochberg method for controlling for false discovery rate: * P<0.10, ** P<0.05, *** P<0.01.
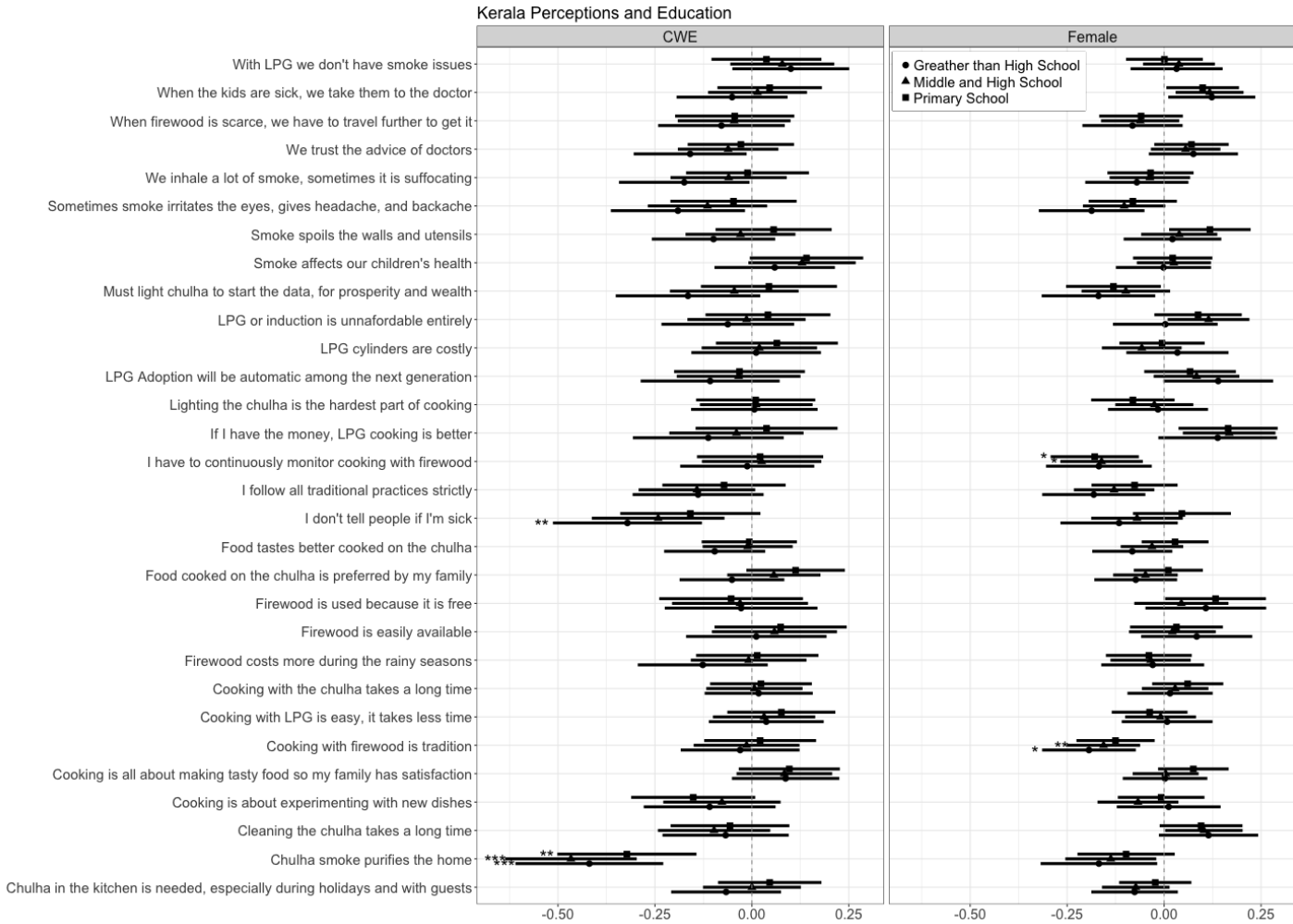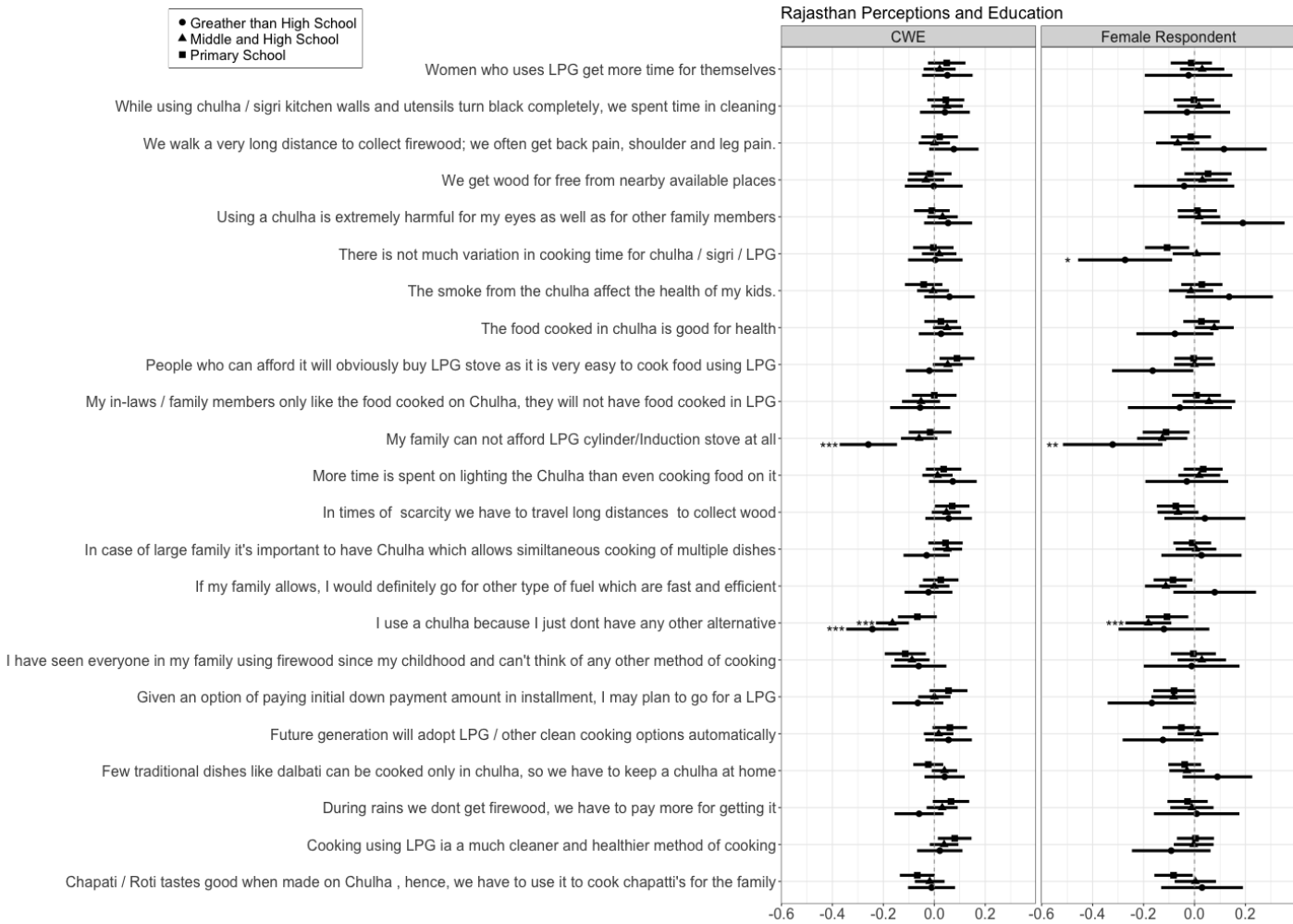
Figure A11: Coefficient plot for linear regressions showing the associations between education level achieved for both the chief wage earner and females and individual perceptions in Kerala households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Stars show statistical significance after Benjamini-Hochberg method for controlling for false discovery rate: * P<0.10, ** P<0.05, *** P<0.01.

Figure A12: Coefficient plot for linear regressions showing the associations between education level achieved for both the chief wage earner and females and individual perceptions in Rajasthan households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Stars show statistical significance after Benjamini-Hochberg method for controlling for false discovery rate: * P<0.10, ** P<0.05, *** P<0.01.

A4.3 Mediation of Education and LPG Ownership Association by Perceptions

In our causal diagram we posit that education leads to LPG adoption at least in part through shifts in attitudes related to LPG and cooking. To test this theory we built a logistic regression model with the outcome LPG ownership and both perceptions and educational variables as covariates. We ran sepearte regressions for all combinations of perceptions (indices and individual perceptions) and educational achievement (CWE and female). In these models, if the effect size for the association between education and LPG ownership decreases when perceptions are included, then we can suggest that part of the association between education and LPG ownership may be explained by changes in perceptions. Similarly, if the associations between perceptions and LPG ownership reduce when included in the same regressions with education, these perceptions may in fact be explained by education.

In Figures A13 and A14 we show the results from regressions with CWE and female educational attainment and individual perceptions in Kerala and Rajasthan. The results show remarkably consistent effect sizes for CWE and female education in both study samples and across all individual perceptions. Therefore, we do not see evidence of the associations between education and perceptions and LPG ownership being along the same pathway.

A4.4 Assessment of the Potential for Reverse Causation in the Relationship Between Perceptions and LPG Ownership

In our diagrammed theory we suggest that shifts in attitudes or perceptions relating to cooking, traditions, and health may lead to LPG adoption. In our previous analyses we see some associations between perceptions and LPG ownership. However, our study design does not allow us to assess causality. In this analysis, then, we use categorical variables for the years of LPG ownership to assess the association between LPG ownership and changes in perceptions. Here, we expect that if attitudes shift after LPG adoption, they may continue shifting and evolving in the same direction with increasing years of LPG ownership. Figures A15 and A16 show the full results from these analyses. The baseline category in analyses is 1-2 Years ownership.
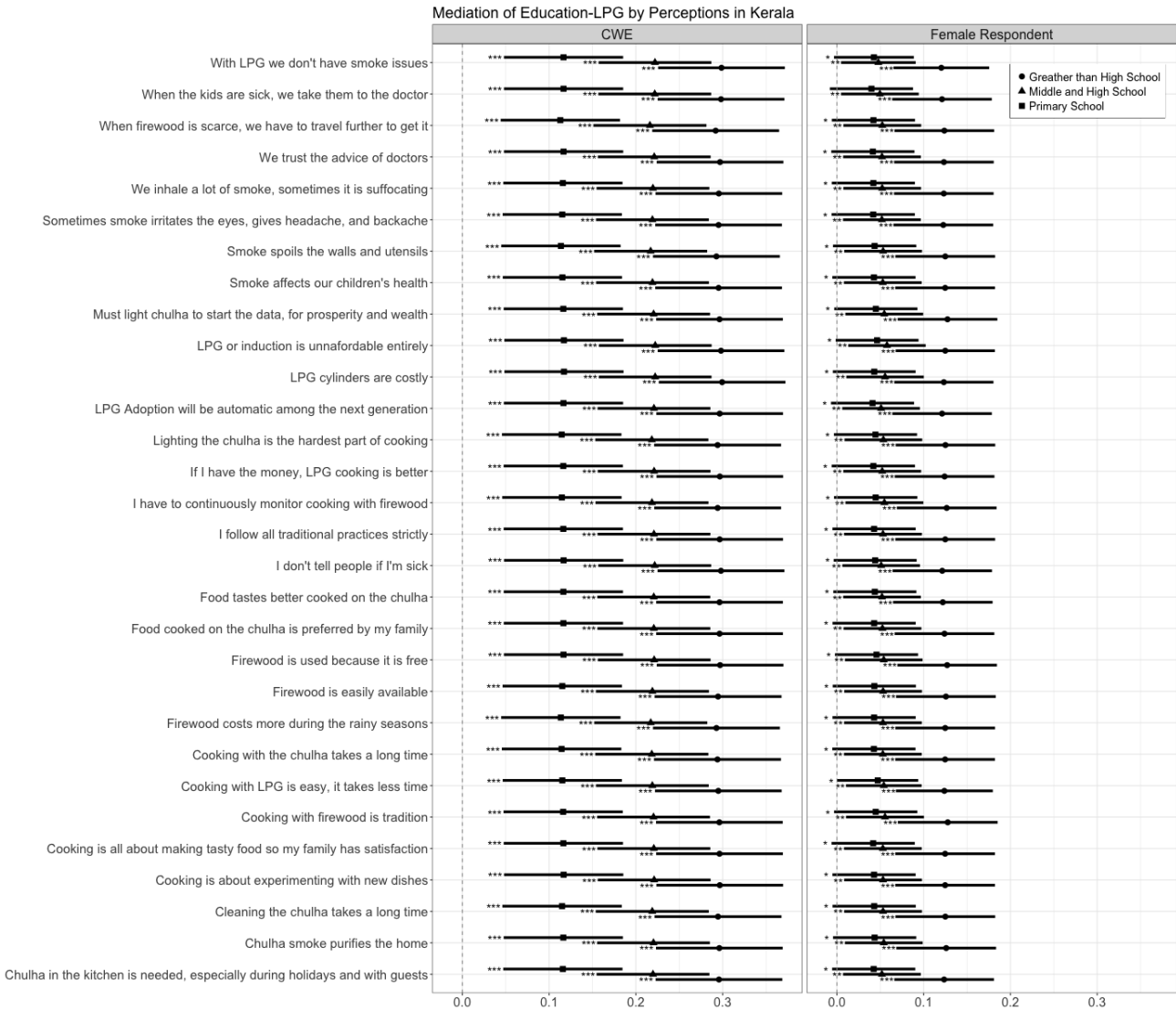
Figure A13: Coefficient plot for linear regressions showing the associations between (A) CWE and (B) female education and LPG ownership, with and without including all individual perceptions in Kerala households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals and stars show statistical significance using Benjamini-Hochberg method for controlling for False Discovery Rate.
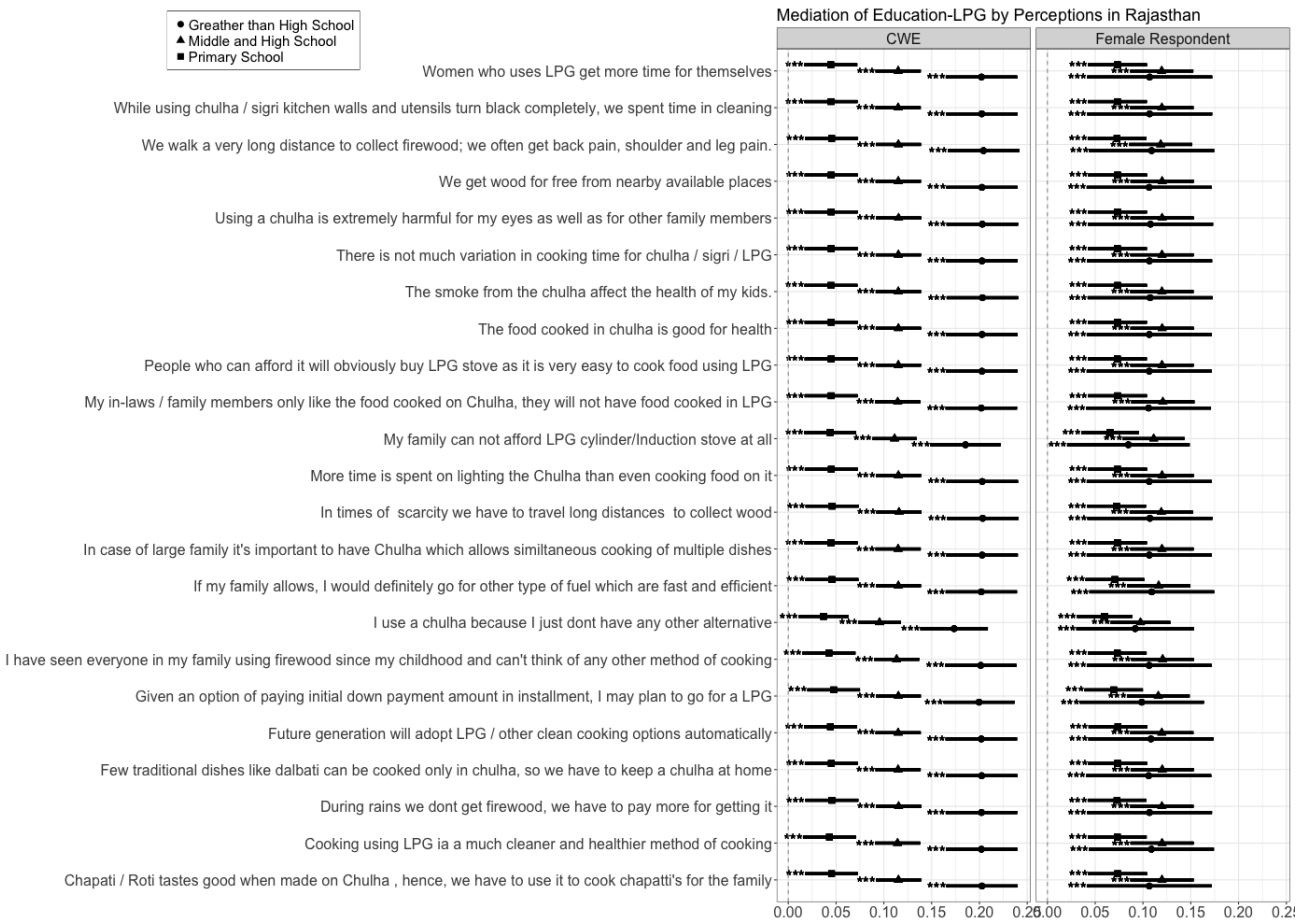
Figure A14: Coefficient plot for linear regressions showing the associations between (A) CWE and (B) female education and LPG ownership, with and without including all individual perceptions in Rajasthan households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals and stars show statistical significance using Benjamini-Hochberg method for controlling for False Discovery Rate.
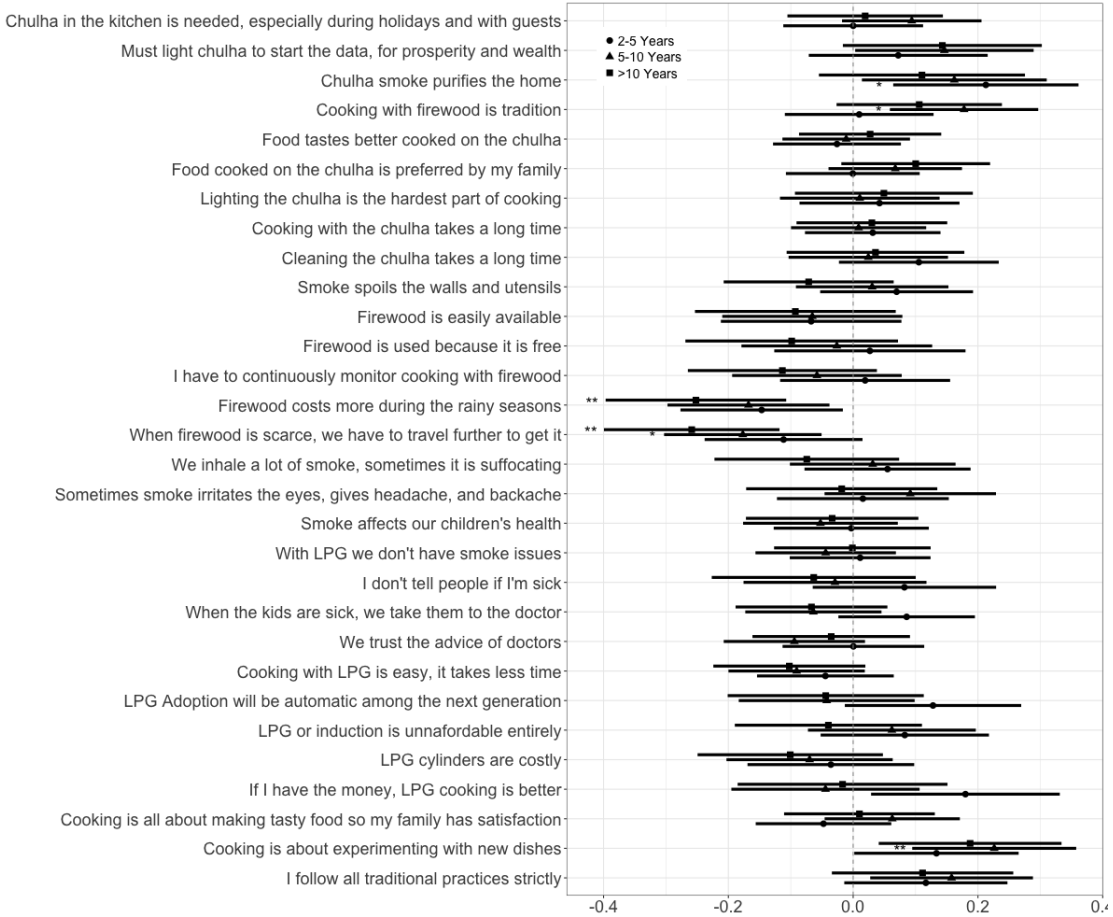
Figure A15: Coefficient plot for linear regressions showing the associations between number of years owning LPG and individual perceptions in Kerala households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals and stars show statistical significance using Benjamini-Hochberg method for controlling for False Discovery Rate.

Figure A16: Coefficient plot for linear regressions showing the associations between number of years owning LPG and individual perceptions in Rajasthan households. Regressions control for covariates and district fixed effects (not shown). Coefficients are not exponentiated. Whiskers show 95% confidence intervals and stars show statistical significance using Benjamini-Hochberg method for controlling for False Discovery Rate.
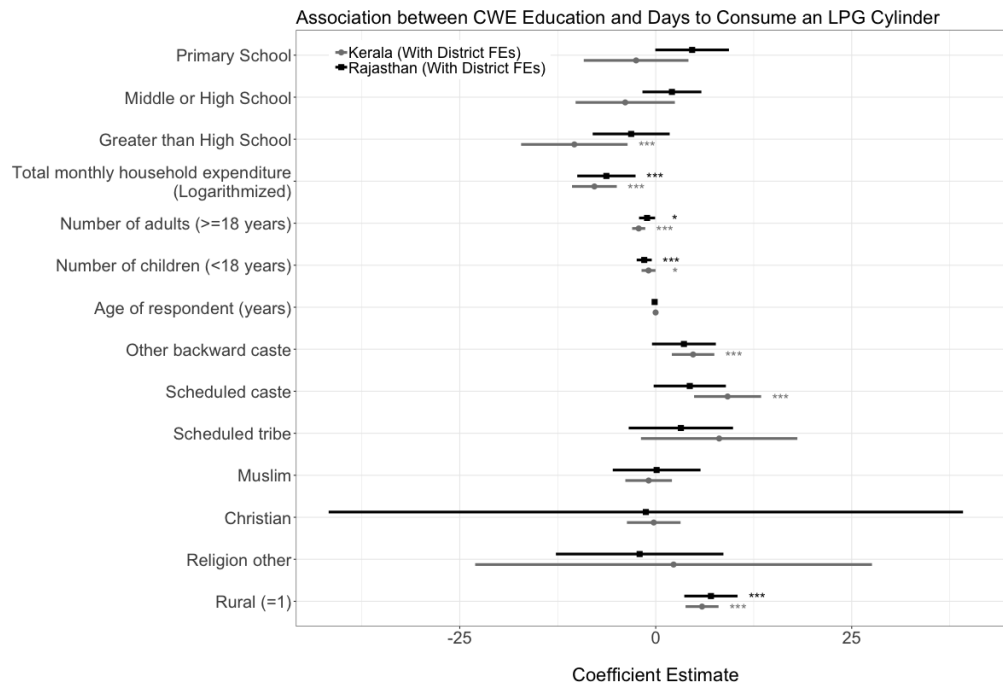
Figure A17: Coefficient plot for logistic regressions showing the association between CWE education and self-reported number of days to consume an LPG cylinder in Kerala and Rajasthan. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Negative coefficients suggest that LPG is consumed faster and that over the course of a year a household consumes more LPG.

A4.5 The Association Between Education Level and LPG Use
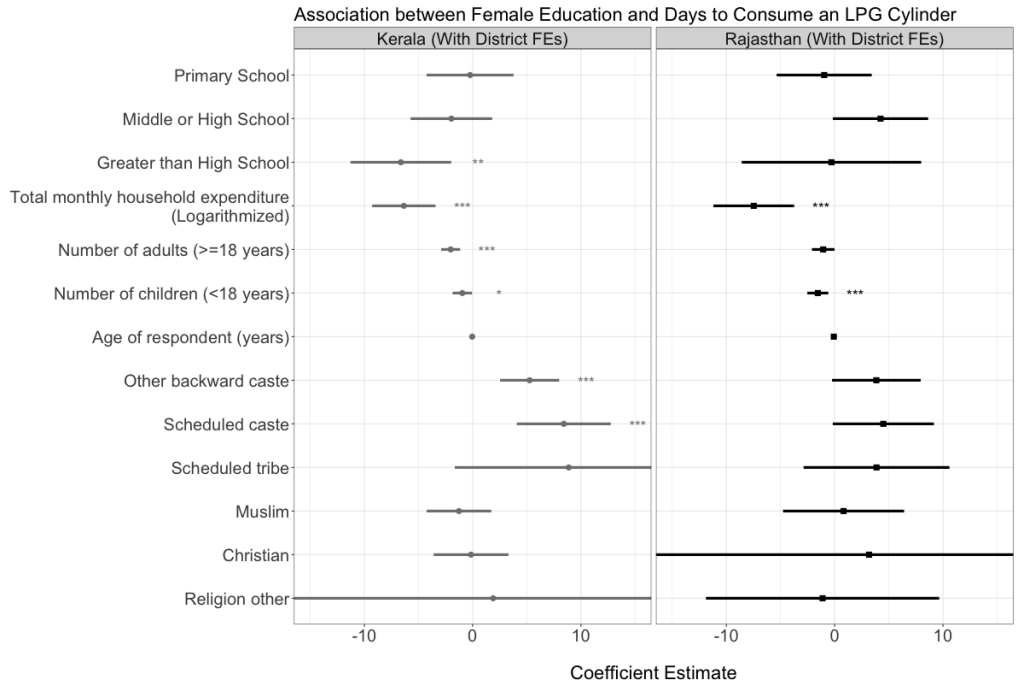
A4.6 Accounting for the cost of LPG cylinders

Figure A18: Coefficient plot for logistic regressions showing the association between female education and self-reported number of days to consume an LPG cylinder in Kerala and Rajasthan. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Negative coefficients suggest that LPG is consumed faster and that over the course of a year a household consumes more LPG.
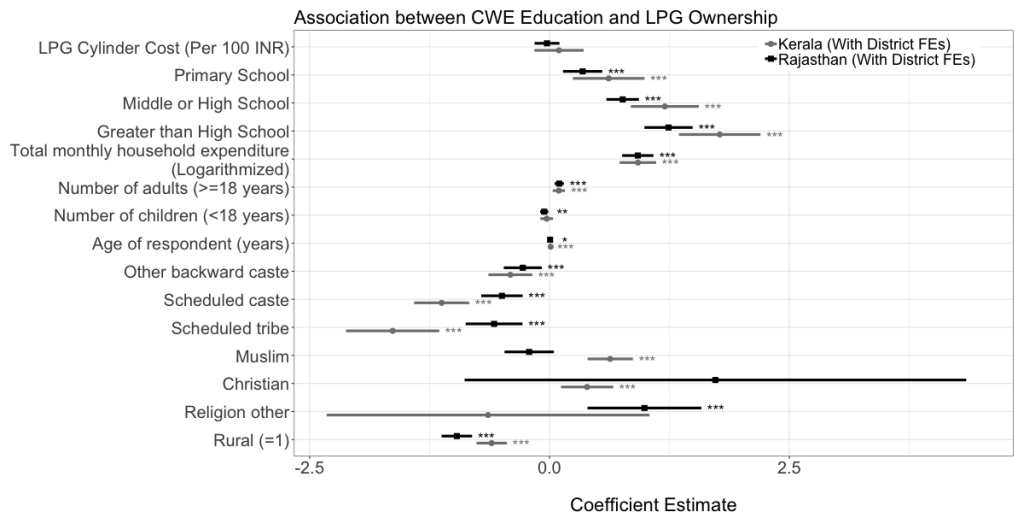

Figure A19: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership n Kerala and Rajasthan, with the inclusion of district-level average LPG cylinder prices paid. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
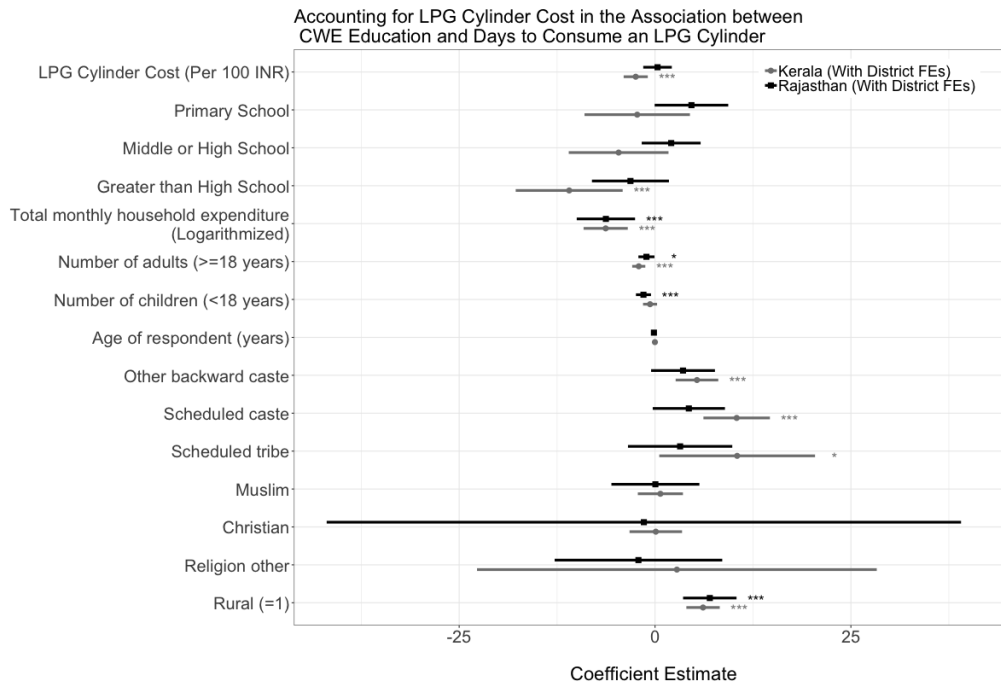
Figure A20: Coefficient plot for logistic regressions showing the association between CWE education and self-reported number of days to consume an LPG cylinder in Kerala and Rajasthan, after accounting for self-reported prices paid for the most recent LPG cylinder. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Negative coefficients suggest that LPG is consumed faster and that over the course of a year a household consumes more LPG.
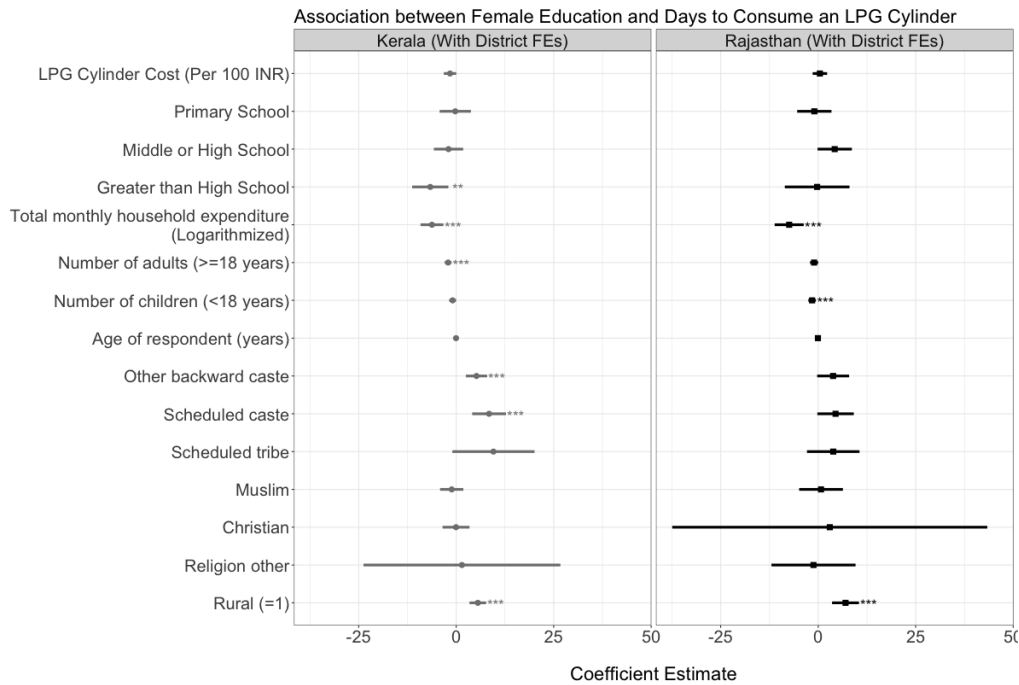
Figure A21: Coefficient plot for logistic regressions showing the association between female education and self-reported number of days to consume an LPG cylinder in Kerala and Rajasthan, after accounting for self-reported prices paid for the most recent LPG cylinder. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals. Negative coefficients suggest that LPG is consumed faster and that over the course of a year a household consumes more LPG.

A4.7 The Association Between Education Level and LPG Ownership in Sub-Samples

A4.7.1 Kerala Sub-Samples

Table A8 shows summary statistics for Kerala households, subset by above and below the median monthly household expenditures.

Figures A22 and A23 show that the relationship of CWE educational achievement and LPG ownership is unchanged when households are separated into above and below the median monthly expenditure and by urban or rural status.

Figure A24 shows that the association between female education achievement and LPG ownership remains largely consistent when analyzed in subsets of Kerala households above and below median monthly expenditure. However, analyses among subsets by urban and rural households show that while increasing female education is positively associated with LPG ownership in urban households, there is no association in rural households (Figure A25).

A4.7.2 Rajasthan Sub-Samples

Table A9 shows summary statistics for Rajasthan households, subset by above and below the median monthly household expenditures.

Figures A26 and A27 show regressions testing the association of CWE and female educational achievement and LPG adoption in Rajasthan household subsets by above and below median (logarithmized) monthly expenditures.

Figures A28 A29 and show regressions testing the association of CWE and female educational achievement and LPG adoption in Rajasthan household subsets by urban and rural.

	Below Median Income Households	Above Median Income Households
Households (N)	1965	1964
Has LPG	0.66	0.79
Fraction Rural	0.53	0.501
Age Respondent	44.73	42.87
Male Chief Wage Earner	0.86	0.95
Relationship of Respondent to CWE:		
CWE herself	0.101	0.04
Wife	0.73	0.81
Daughter/DIL	0.05	0.04
Other	0.12	0.12
Religion:		
Hindu	0.74	0.69
Muslim	0.15	0.20
Head of Household Caste:		
General	0.18	0.20
OBC	0.60	0.64
Scheduled Caste	0.13	0.12
Scheduled Tribe	0.03	0.02
Mean # Adults	2.89	3.49
Mean # Children (<18 yrs old)	0.86	1.25
Median Total Monthly Expenditure	4315	7220.5
Median Monthly Fuel Expenditures	355	630

Table A8: Summary statistics of dependent, explanatory, and control variables in Kerala households, by above and below the median (logarithmized) monthly household expenditures. At the time of data collection in October 2015 1 USD = 65.15 INR.

Association between CWE Education and LPG Ownership
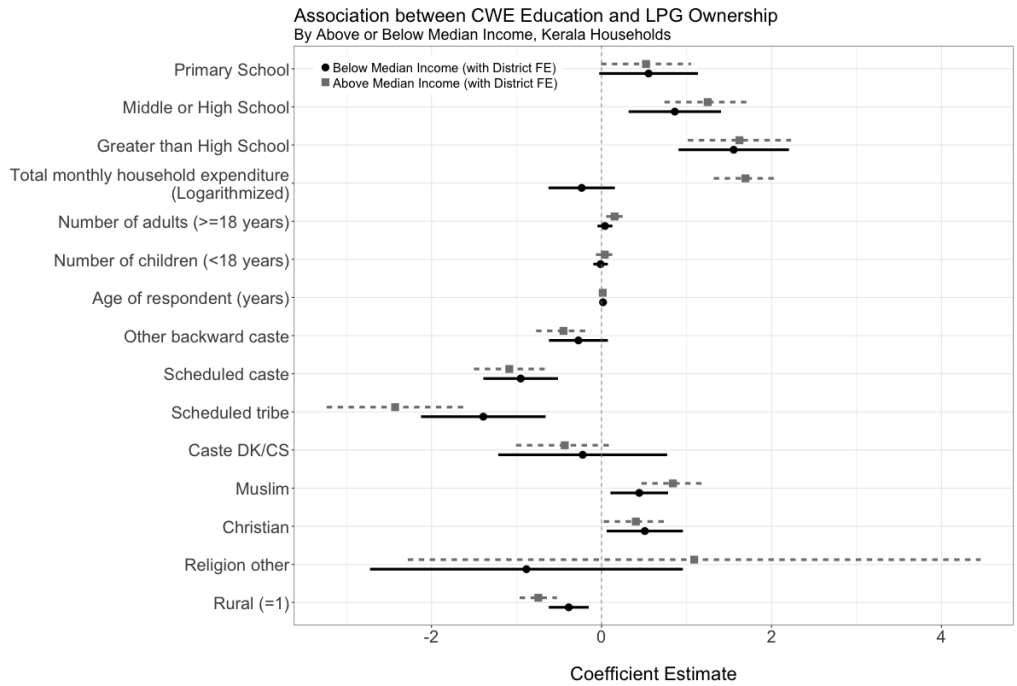By Above or Below Median Income, Kerala Households

Figure A22: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership in Kerala, below and above median logarithmized monthly expenditure households. Median monthly logarithmized montly expenditure in Kerala households was 8.64, which is equivalent to 5657 INR (86.83 USD). Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
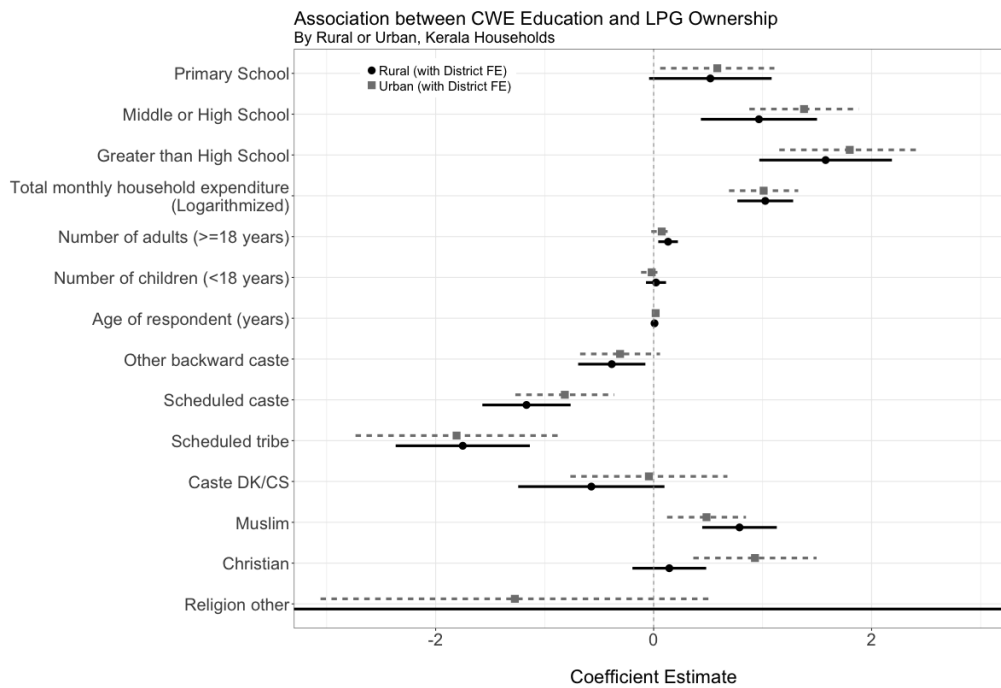
Figure A23: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership in Kerala households, separated by urban and rural households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
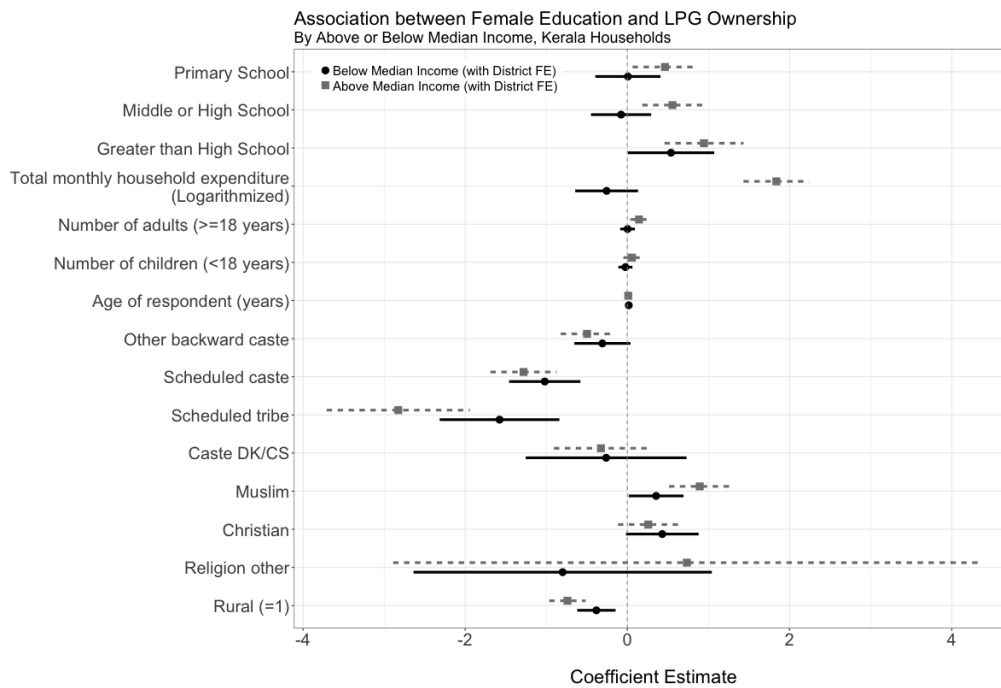
Figure A24: Coefficient plot for logistic regressions showing the association between female education level achieved and LPG ownership in Kerala households, separated by below and above median income households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
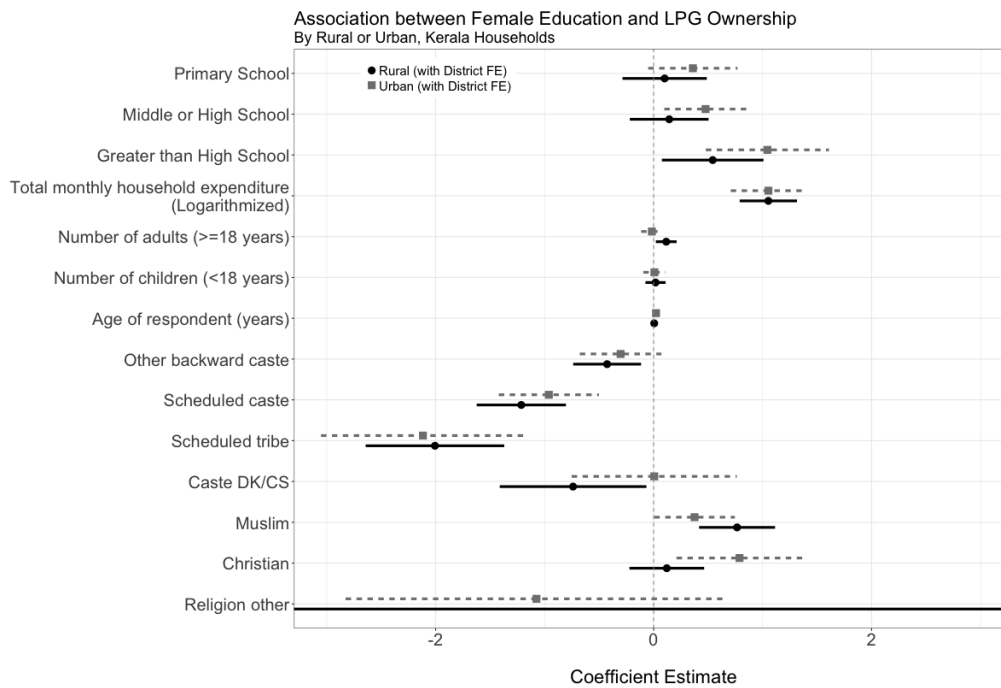
Figure A25: Coefficient plot for logistic regressions showing the association between female education level achieved and LPG ownership in Kerala households, separated by urban and rural households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.

	Below Median Income Households	Above Median Income Households
Households (N)	2999	3078
Has LPG	0.14	0.33
Fraction Rural	0.80	0.70
Age Respondent	35.96	36.77
Male Chief Wage Earner	0.96	0.98
Relationship of Respondent to CWE:		
CWE herself	0.03	0.02
Wife	0.89	0.88
Daughter/DIL	0.04	0.07
Other	0.04	0.03
Religion:		
Hindu	0.91	0.88
Muslim	0.09	0.10
Head of Household Caste:		
General	0.11	0.16
OBC	0.41	0.44
Scheduled Caste	0.30	0.26
Scheduled Tribe	0.18	0.13
Mean # Adults	2.67	3.40
Mean # Children (<18 yrs old)	2.11	2.35
Median Total Monthly Expenditure	4100	7700
Median Monthly Fuel Expenditures	200	500

Table A9: Summary statistics of dependent, explanatory, and control variables in Rajasthan households, by above and below the median (logarithmized) monthly household expenditures. At the time of data collection in October 2015 1 USD = 65.15 INR.
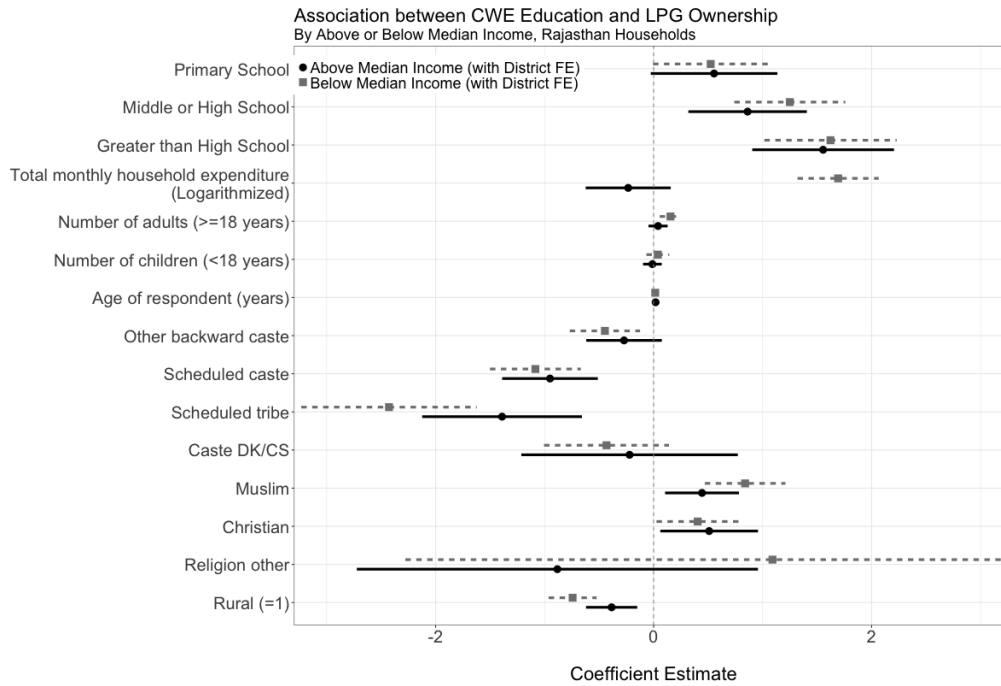
Figure A26: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership in Rajasthan households, separated by above and below median (logarithmized) monthly household expenditures. Median household expenditure was 5450 INR (83.65 USD). Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
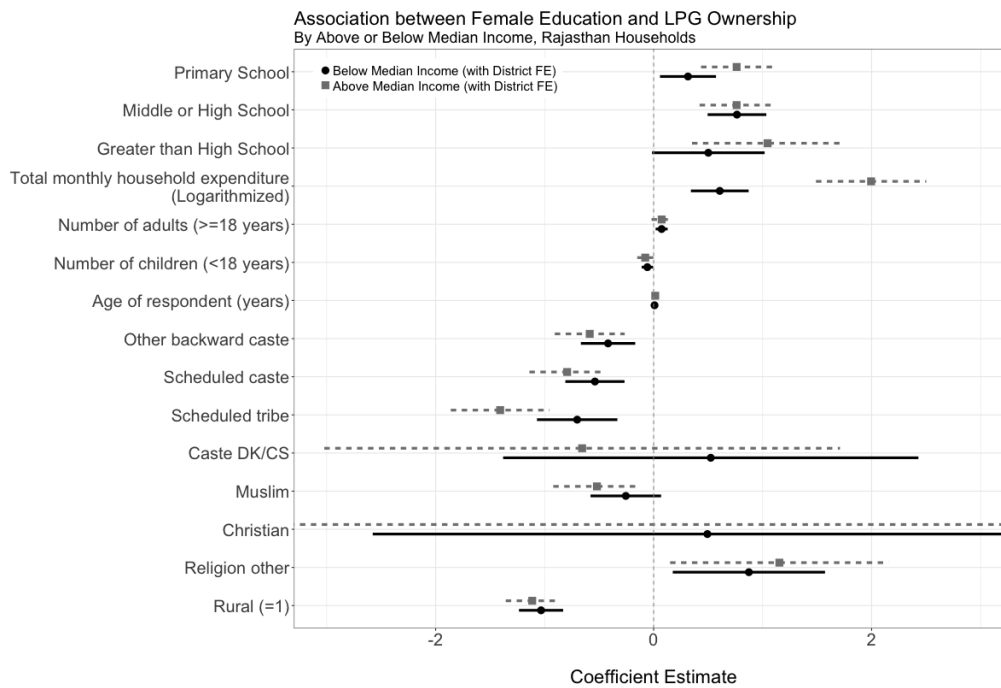
Figure A27: Coefficient plot for logistic regressions showing the association between female education and LPG ownership in Rajasthan households, separated by above and below median income households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
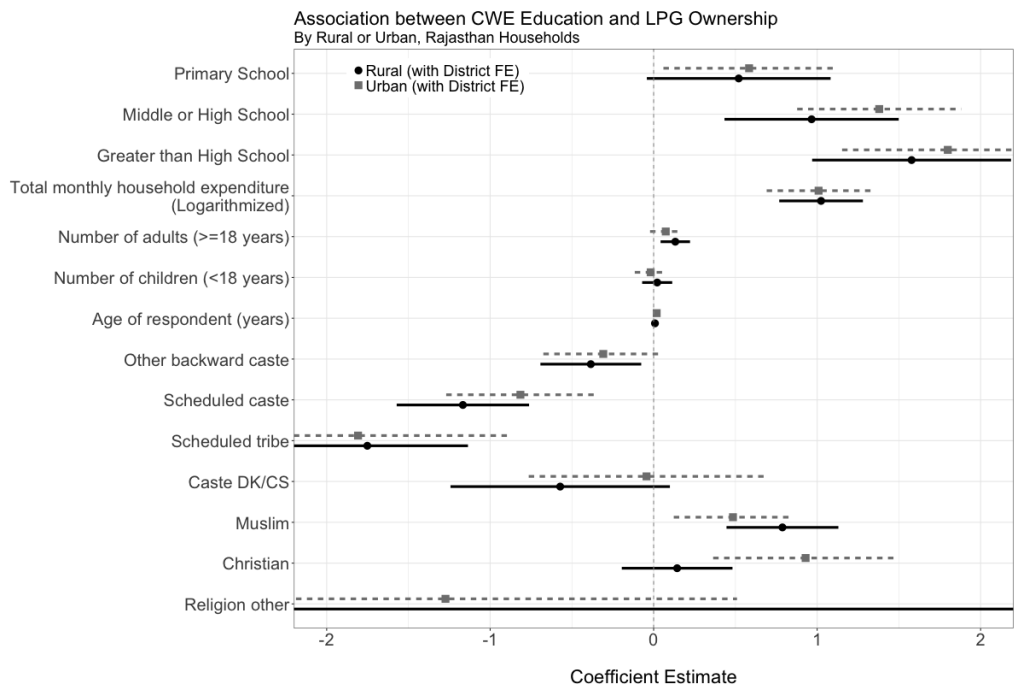
Figure A28: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership in Rajasthan households, separated by urban and rural households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
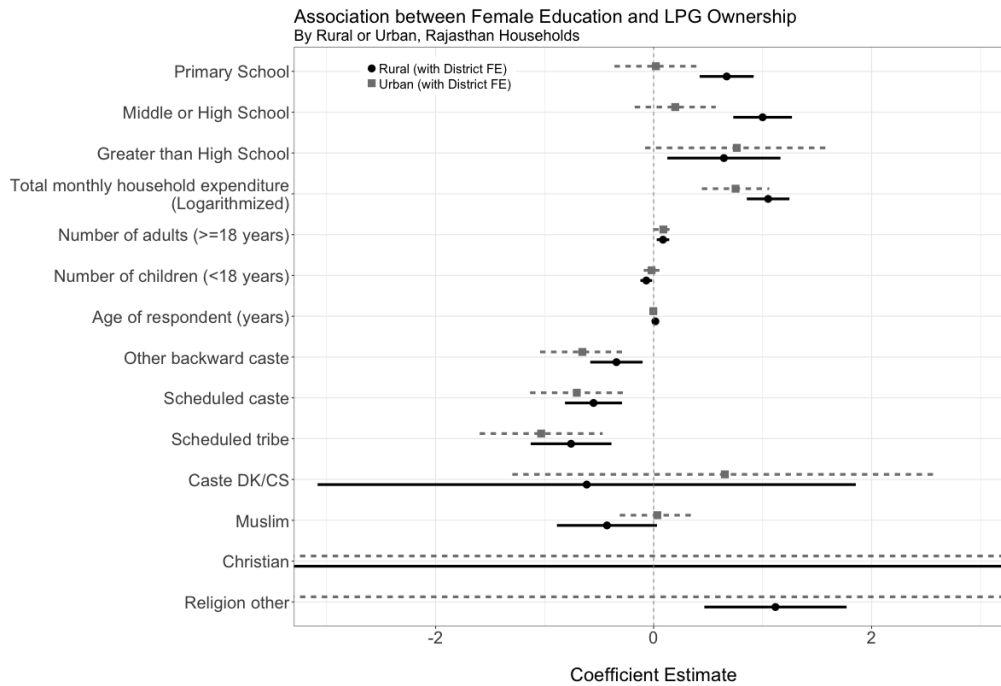
Figure A29: Coefficient plot for logistic regressions showing the association between female education and LPG ownership in Rajasthan households, separated by urban and rural households. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.
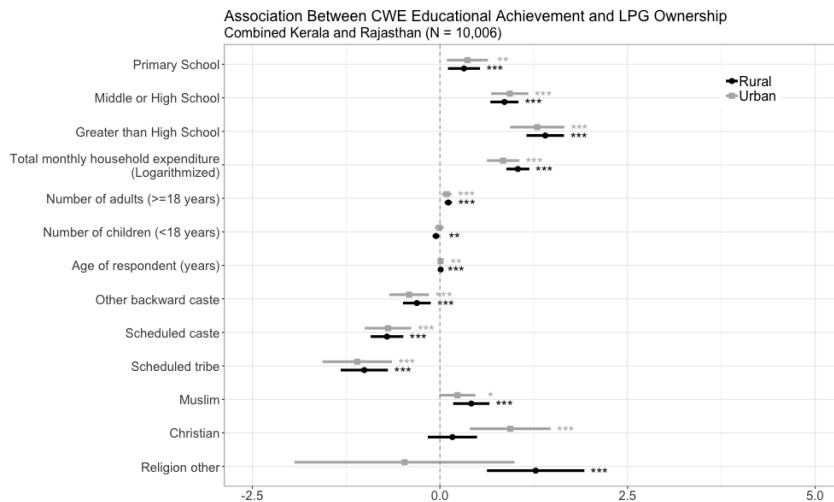

Figure A30: Coefficient plot for logistic regressions showing the association between CWE education and LPG ownership in a combined dataset of Kerala and Rajasathan households, separated by urban or rural. Regressions control for covariates and district fixed effects. Coefficients are not exponentiated. Whiskers show 95% confidence intervals.

Supporting Information: References

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