

Women's Assets and Household Fuel Choice in Karnataka

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Abstract

The adverse health impact of solid fuel use such as firewood, coal and biomass is well established. Evidence from developing countries suggest that women disproportionately bear the health costs of using such fuel. Even though women stand to benefit immensely from a switch to cleaner fuel, few studies have examined women's role in enabling that change. Using individual level data on asset ownership in Karnataka households, we examine the link between women's asset ownership and the propensity of a household to use solid fuel. Along with improvements in child health outcomes and education, female ownership of assets has been shown to have a bearing on the intra-household status of women. We find that women's ownership of assets have a statistically significant, negative impact on the propensity of households to use solid fuel.

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1. Introduction

The adverse health impact of household solid fuel use such as firewood, coal, biomass and peat is well established. Smith and Mehta (2003) note that 4 to 5 percent of deaths from respiratory and cardiovascular diseases can be attributed to the use of solid fuels. It is predicted that existing patterns of solid fuel use in African countries will cause approximately 9.8 million premature deaths by 2030 (Bailis, Ezzati and Kammen 2005). Yet, the use of solid fuel to meet energy requirements remains high. According to the latest estimate in 2003, at 52 percent, more than half the world's population depended on solid fuel for their energy requirements (Bruce et.al, 2011). In the Indian context, firewood is the dominant household fuel; 75 percent of households in 2004-05 used firewood whereas the incidence of liquefied petroleum gas (LPG) was only 8.6 percent (NSSO, 2007).

One of the most pervasive problems associated with use of biomass fuels is the link to the incidence of indoor air pollution (IAP). Numerous studies have documented this link, stressing the high incidence of IAP related deaths in the developing world. This problem is further compounded by poor ventilation in the houses where solid fuel is most likely to be used. Indoor air pollution can cause acute respiratory infection in children and chronic lung disease in adults (WHO, 2002). It is also reported that in less developed countries, the occurrence of various diseases (respiratory infections, chronic obstructive pulmonary disease, tuberculosis, asthma, lung cancer, ischaemic heart disease, and blindness) can be attributed to solid fuel use (Smith and Mehta 2003). More recently, Duflo, Greenstone and Hanna (2008) find a strong association between usage of traditional stoves requiring solid fuel and symptoms of respiratory illness.

The adverse impacts of using solid fuel are disproportionately borne by women on several fronts. On the health front, women suffer the most from IAP exposure as they bear the primary responsibility for food preparation. According to WHO/UNDP, women comprise 60% of all adult deaths attributable to solid fuel (Kohlin et. al, 2011). Further, solid fuel collection is mainly done by women and increases their drudgery while diverting time away from leisure and other income-generating activities.

The interplay between gender and household fuel choice has received attention in international development policy. The ENERGIA/DfID Collaborative Research Group on Gender and Energy (CRGGE) in a recent report noted that that all seven Millennium Development Goals (MDGs) have an energy/gender component (CRGGE, 2006). To take just one example: two interrelated MDGs are the reduction of child mortality and maternal mortality. Considering the fact that most women in developing countries spend most of their time in the

kitchen preparing food, the choice of fuel (and therefore, the ambient indoor air pollution) can have a severely detrimental impact on the health of both women and children.

Even though women stand to benefit immensely from a switch to cleaner fuel, women's role in enabling that change is understudied. A notable, recent example is Kishore and Spears (2012). Using data on rural India from the nationally representative India Human Development Survey and the National Family Health Survey, the study examines the link between women's intra-household status and clean cooking fuel use. Their broad finding is that low intra-household status for women is associated with reduced usage of clean fuels. Further, using an instrumental variables strategy to tease out causal effects, they find that having a firstborn girl child is associated with three-fourths of a percentage point reduction in the likelihood of using clean fuel. Their argument is that the sex of the first-born – given widespread son preference in India – can serve as a suitably exogenous instrument for women's intra-household status. Other studies point to similar associations between women's intra-household status and the household choice of clean cooking fuel; Duflo, Greenstone and Hanna (2008) find that the presence of female savings account is positively associated with uptake of clean stoves, Israel (2002) finds a negative association between female earned income and firewood use, and Hoddinot and Haddad (1995) finds a positive association between wife's share of household income and the share of the household budget allocated to fuel.

This paper adds to this literature by examining the link between women's asset ownership and household fuel choice and the mediating role of household decision-making processes. Using data from the Karnataka Household Asset Survey 2010 – 2011, we find that female ownership of immovable property in the form of dwelling and agricultural land is negatively associated with the use of solid fuels. Further, this results holds after controlling for indicators of female's intra-household status and decision-making and a variety of other controls. This suggests that assets might have a role to play in determining fuel choice, independent of its contribution to female decision-making. Moreover, the paper suggests that uptake of clean fuel by households may not be a decision that is governed only by price, ease of use, etc. Women's ability to influence these choices may also play a role. As policies seek to increase the uptake of clean cooking fuels, they would benefit from viewing women as enabling agents and not just beneficiaries and look to a broader set of initiatives to promote women's status within the household.

In this study, we present additional evidence on the impact of women's intra-household status on household fuel choice. In contrast to other studies, which have used earned income, we examine female ownership of immovable property such as agricultural land and dwelling, as a

proxy for intra-household status. Given the fact that assets are accumulated income, they provide a more accurate picture of the underlying household level well-being. Further, given the potential of generating income through rents, interest on savings and business profits, income streams derived from asset ownership can also impact the day-to-day expenditure patterns of the household. Although the broad importance of assets to structural well-being is well known, the *distribution* of asset ownership within the household could also have important ramifications for women's welfare. Deere and Doss (2006) note, "... a large body of evidence suggests that when women have more bargaining power within the household, the outcomes of household decisions are different. Since bargaining power is often measured as income or wealth, this suggests that the gender patterns of wealth ownership are important, even within households. Frequently, researchers look at the effects of non-labor income, rather than wage income, since non-labor income should not affect the relative prices of home produced and consumed goods. Much of non-labor income – such as interest, rents and dividends, as well as pension income – flows from assets." (Deere and Doss, 2006: 36)

Several studies have shown that when women own property it improves child health and educational outcomes (e.g. Park, 2007) and protects against the risk of violence (Bhattacharya et al, 2011; Friedemann-Sanchez, 2006; Panda and Agarwal, 2005) and increases female decision-making (e.g. Agarwal, 1994; Allendorf, 2007). Using this same data set (KHAS), Swaminathan et al (2012) find that ownership of their residence or a plot of agricultural land is associated with an increase in women's ability to travel to the market, health center and places outside of their immediate community. Further, ownership of immovable property is also positively associated with women's ability to independently make decisions about their employment, health and use of money.

Given the importance of the distribution of assets within the household, many studies have examined its impact on female decision-making (e.g. Agarwal, 1994; Allendorf, 2007). In the Indian context, using data from Karnataka, Swaminathan et. al (2012) find that ownership of a household or a plot of agricultural land is associated with an increase in women's ability to travel to the market, health center and places outside of their immediate community. Further, ownership of immovable property is also positively associated with women's ability to independently make decisions about their employment, health and use of money.

The remainder of the paper is organized as follows. The next section discusses the data and presents the descriptive statistics. Section 3 describes the methods, empirical strategy and the results. Section 4 concludes.

2. Data and Descriptive Statistics

The data used in the analysis come from the Karnataka Household Asset Survey (KHAS) 2010 – 2011. This is a state-representative survey containing detailed information about individual asset ownership within households. In contrast to traditional household asset survey protocols, which collect asset information at an aggregate household level by interviewing only one respondent, KHAS detailed asset ownership data for *all* members of the household. Two respondents were interviewed within each household, termed the primary and secondary respondents. The former was the person identified by household members as being most knowledgeable about the general economic position of the household. The secondary respondent was the spouse of the primary. In the event that the primary respondent happened to be single, another individual of the opposite sex was selected. Further, for the primary and secondary respondents, the survey collected detailed information about transaction and use rights over assets owned. Additional information on the liabilities of the household, decision-making, experience of shocks and general demographics of the household were also collected.

Our dependent variable is the answer to the household-level question: “What is main source of cooking fuel in your household?” Choices range from solid fuels such as coke, coal, lignite and firewood to liquid fuels such as LPG, natural gas, and kerosene¹. It is a binary variable, which is coded as zero if the household picked modern fuels or electricity as the choice of the household and coded as one if the household chose a solid fuel such as firewood, coke, charcoal, straw or agricultural crop waste. Table 1 presents descriptive statistics for household fuel choice across urban and rural areas in our sample.

The results indicate that the main source of cooking fuel in urban areas is LPG (approximately 49 percent of households) closely followed by firewood (approximately 39 percent). On the other hand, the overwhelming majority of households in rural areas rely on firewood as their primary source of cooking fuel (approximately 93 percent). The remaining fuels have much smaller incidences of usage in rural and urban households.

These descriptive statistics are close to the results found in the 2011 Indian Census (**Census, 2011**). According to the Census, 64 percent of urban households in Karnataka use LPG whereas firewood is used by 21 percent of urban households. In rural areas in Karnataka, 82 percent of households use firewood where as LPG is used by 11 percent of households.

¹ The full set of options presented to the respondent are: Electricity, LPG/Natural Gas, Biogas, Kerosene, Coke/Coal/lignite, Charcoal, Firewood, Straw/shrub/grass, Agricultural crop waste and respondent specified.

The KHAS data constrains us to look at the primary mode of cooking fuel in households. Recent evidence suggest that developing country households usually consume a portfolio of energy sources – the so-called fuel stacking hypothesis – switching from one fuel to another depending on needs, budget and preferences (Heltberg, 2004). For instance, Heltberg (2004) in analyzing fuel usage, spending and switching patterns in Guatemala notes that fuelwood demand will not necessarily be totally diminished due to the presence of LPG subsidies. Thus, to take into account the fact that households might be maintaining a portfolio of fuels and using each fuel selectively, one requires a comprehensive list of the full set of fuel types maintained by the household. However, we note that the primary motivation of our study is to trace the association between asset ownership and fuel choice motivated in large part by the substantial evidence linking solid fuel with indoor air pollution and respiratory diseases (e.g. Smith and Mehta, 2003; Chay and Greenstone, 1999). Thus, it is critical to consider the fuel that is used most often (thus, contributing most to indoor air pollution) and that is what our survey instrument addresses.

Our key explanatory variable is based on individual-level data on ownership of agricultural land and dwellings. More specifically, we construct a dummy variable indicating female ownership of immovable property in the form of agricultural land and/or dwelling. While KHAS collects data on a wide variety of assets ranging from agricultural land to consumer durables, we restrict our asset ownership indicator to land and dwelling due to their contribution to overall household wealth. In Karnataka, land accounts for 62 percent and dwellings, 25 percent of the total asset base of a household (Swaminathan et. al, 2012). Table 2 below presents cross-tabulations between female asset ownership and household choice of fuel by type of area.

In urban areas, a small minority (approximately 7 percent) of women, in households using solid fuel, report ownership of dwelling or agricultural land. In rural areas, this proportion increases to about 20 percent. This pattern might be a result of the near complete absence of agricultural land ownership in urban areas. Importantly, the cross tabulations show that in our data, the split is heavily weighed against a positive link between female asset ownership and clean fuel. Relatively more households use solid fuel and a relative minority of women report ownership of immovable property.

While assets are an important determinant of female decision making, we also wish to explicitly incorporate an indicator of female decision making as a proxy for her status within the household. Following Swaminathan et al. (2012), we include an indicator a female's ability to independently travel to the market. Women's mobility, it can be argued, serves as an indicator of her autonomy and also her economic opportunities. Further, by including an indicator for

decision-making (women’s mobility), we can test the impact of asset ownership on fuel choice, independent of the (possibly) mediating role of decision-making. Table 4 presents cross tabulations for female ability to independently travel to the market and household fuel choice. We see a wider spread in the link between these two variables than we did for asset ownership and fuel choice; in urban areas, 28 percent of households, which report mobility to the market place, also report using solid fuel. This pattern also holds for rural areas where approximately 54 percent of women report being able to travel to the market and using a solid fuel for cooking purposes.

3. Empirical Methods and Results

3.1. Methods

Logistic regression models are used to estimate the probability of a given household using a solid fuel. Consequently, our dependent variable is coded as one if the household reported using solid fuel and zero otherwise. Our key explanatory variable takes the form of a binary variable, which is one if females own immovable property (agricultural land and/or dwelling) and zero otherwise. Formally, our estimating equation is

$$HF_i = \alpha + FemAsset_i + X_i + \varepsilon_i, \quad (1)$$

where i indexes households. HF_i denote the fuel choice of the household, $FemAsset_i$ is the indicator of female ownership of immovable property and X_i represents a vector of control variables. ε_i is the error term.

We estimate (1) restricted to the sub-sample of married primary and secondary respondents (a sample size of 2,789 across rural and urban areas which drops to 2,444 when we include the decision-making variables in the regressions). We expect property ownership by women to influence household choices so as to be mindful of women’s interests and welfare. Thus, we hypothesize that increased property ownership would reduce solid fuel usage by the household. While our focus is on the link between female asset ownership and household fuel choice, a significant mediating role is that of female decision-making, specifically the positive association between asset-ownership and decision-making. Consequently, restricting our sample to only consider married couples brings into sharper relief the decision-making dynamics that play a role between the principal couple of the household.

In our specifications, we use a wide set of control variables that might affect a household’s fuel choice. Educational controls include indicators for the level of education achieved by the husband and wife. Occupational controls include indicators for the occupational status of husband and wife. Demographic indicators include age of partners, religion and caste.

Household level controls include an indicator for the presence of a below poverty line card, quintile classification of household wealth, the number of boys and girls and adult men and women in the household. To control for the idiosyncratic effects of location on fuel choice, we also include district level and rural/urban dummy variables.

Further, we control for the decision-making power of women in the household since we wish to test the impact of asset-ownership on fuel choice *controlling* for the level of female decision-making autonomy. Women’s autonomy to travel to the market is defined as a binary variable that takes on a value of one if she reported that she could travel alone to the market and zero, otherwise. Table 4a and 4b presents the descriptive statistics of our full set of variables for urban and rural areas, respectively.

We begin by estimating a baseline model for the combined rural and urban sample with ownership of immovable property by the woman. Then a second specification is estimated where the ability to travel to the market enters independently and in the final model, we estimate the effect of asset ownership controlling for her mobility. This is then repeated for the urban and rural sub-samples separately.

3.2. Results

We begin by presenting odds ratios for the combined rural and urban sample in Table 5. Our key variable of interest – female ownership of agricultural land and dwelling – displays a similar trend across the three specifications: female asset ownership has a negative and statistically significant impact (at the 10 percent level) on the odds of the household using solid fuel as their primary fuel for cooking purposes. Further, in terms of the decision-making variables, women’s mobility also seems to negatively impact the odds of using solid fuels. However, when we move from to the specification where asset ownership and decision-making are both included, the point estimate on the decision-making coefficient is weakened, though still significant.

In terms of the control variables, when compared to being illiterate, both husband’s education and wife’s education decreases the odds of the household using solid fuel. This could be driven by the fact that more education might play an informational role in terms of bringing salience to the ill effects of solid fuel usage. However, occupational status shows counter intuitive results. Both male (compared to casual labor) and female (compared to homemakers and contributing family workers) employment increases the odds of using solid fuel.

While the household’s below poverty line classification expectedly raises the odds of using solid fuel, household wealth does not show an impact. In terms of the demographic structure of the household, the numbers of men, women and boys have a positive impact on the

odds of using solid fuel. This might reflect the fact that larger households may find it cheaper to use solid fuel. The positive impact of the girls could also reflect the availability of labor to collect firewood. Further, the coefficient on rural dummy is positive indicating the high incidence of solid fuel usage in rural areas.

Table 6 presents results only for the rural sub-sample, which show a different picture than the overall sample. Although female asset ownership decreases the odds of solid fuel usage, it is not significant. This is due to the fact that there is very little variation in our dependent variable with more than 90 percent of the households using solid fuel. Much like the combined sample estimation, female access to market still displays a negative and statistically significant impact on solid fuel choice. This could be driven by the fact that access-to-market is more common for females in rural areas than their ownership of immovable property. Thus, the conclusion that female decision-making has a negative impact on the propensity of a household to use fuel choice still holds for rural areas. One of the concerns is that high firewood usage could be symptomatic of a lack of access to more modern (liquid) fuels in rural areas. In such cases, any estimation, which does not adequately account for supply constraints, will overestimate the impact of female asset ownership (or decision-making) on fuel choice.

Table 7 presents estimates of equation (1) for the urban sub-sample. This is a key sub-sample to support our broader conclusion for the following reason: if our results are being driven by liquid fuel (namely, LPG) supply-constraints, then these are much less likely to have an impact in urban areas.² Consequently, if the impact of female asset-ownership is still negative in the urban sub-sample then we have confidence that supply-constraints are not entirely driving our results. The impact of asset ownership is negative and highly significant across the specifications. However women's mobility is insignificant both by itself and together with asset ownership.

4. Conclusion

Broadly our results suggest that female ownership of immovable property in the form of dwelling and agricultural land has a strong negative impact on the propensity to use solid fuel by the household. Further, this impact holds *after* controlling for the mediating impact of decision-making. This implies that assets have an independent role to play in determining fuel choice independent of its role in affecting decision-making within the household. The analysis presented in the paper suggests that uptake of clean fuel by households may not be a decision

² The 2011 India Census reports 64.3 percent of households in urban areas in Karnataka use LPG as a cooking fuel further supporting the notion that supply constraints are much less pervasive in urban areas.

that is governed only by price, ease of use, etc. Women's ability to influence these choices may also play a role. As policy makers attempt to increase the uptake of clean cooking fuels they should also view women as enabling agents and not just beneficiaries and look to a broader set of initiatives to promote women's status within the household.

A few caveats, which will also serve as future extensions, to the analysis are worth mentioning. The measure of decision-making used in the analysis can be improved upon. The KHAS data offers information across several domains of decision-making. One could examine these separately or construct an index to more comprehensively measure women's engagement in household decision-making. For a couple of domains, an individual's perception of their own and their spouse's participation in decision making was obtained, i.e., the husband (wife) reported on how involved (s) he perceived the wife (husband) to be in a particular decision. Accounting for the spouse's perception would presumably better reflect household reality than just the individual's reporting of his or her own involvement. Further, it might well be the case that both fuel choice and decision-making are driven by an unobserved factor. This might lead to omitted variable bias in the estimates obtained in our specifications. A clear next step would be to implement an instrumental variables approach to account for such bias.

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Table 1: Household Fuel Choice in Karnataka

	Urban	Rural
Electricity	0.49%	0.09%
LPG/Natural Gas	48.44%	5.16%
Biogas	0.57%	0.36%
Kerosene	11.76%	1.16%
Coke/Coal/Lignite	0.03%	0.18%
Charcoal	0.15%	0.40%
Firewood	38.56%	92.56%
Straw/Shrub/Grass		0.06%
Agricultural Crop Waste		0.04%

Source: Karnataka Household Asset Survey, 2010 – 2011

Table 2: Cross Tabulation of Solid Fuel and Asset Ownership

		Female owns dwelling or agricultural land			
		Urban		Rural	
		No	Yes	No	Yes
Household Uses a solid fuel	No	52.75%	8.23%	5.36%	1.35%
	Yes	32.35%	6.68%	72.83%	20.47%

Source: Karnataka Household Asset Survey, 2010 - 2011

Table 3: Cross Tabulation of Solid Fuel and Women's Mobility

		Female can travel to the market			
		Urban		Rural	
		No	Yes	No	Yes
Household Uses a solid fuel	No	14.34%	44.25%	2.00%	4.62%
	Yes	13.39%	28.02%	39.22%	54.16%

Source: Karnataka Household Asset Survey, 2010 - 2011

Table 4a: Summary Statistics for Urban Areas

	Observations	Mean	Std. Dev	Min	Max
Solid Fuel Use by the Household	824	42.48%	0.49	0	1
Women allowed to travel to the market	713	70.69%	0.46	0	1
Women own Agricultural Land and/or dwelling	824	6.67%	0.25	0	1
Husband's Education - Illiterate	824	17.23%	0.38	0	1
Husband's Education - Upto Higher Primary	824	29.13%	0.45	0	1
Husband's Education - Secondary & Above	824	53.64%	0.50	0	1
Wife's Education – Illiterate	824	26.33%	0.44	0	1
Wife's Education - Upto Higher Primary	824	27.67%	0.45	0	1
Wife's Education - Secondary & Above	824	46.00%	0.50	0	1
Husband's Occupation - Casual Labor	824	28.52%	0.45	0	1
Husband's Occupation - Wage Employed	824	29.73%	0.46	0	1
Husband's Occupation - Self Employed	824	30.58%	0.46	0	1
Husband's Education - Old, retired & others	824	11.17%	0.32	0	1
Wife's Occupation - Contributing & others	824	7.28%	0.26	0	1
Wife's Occupation - Wage Employed	824	4.98%	0.22	0	1
Wife's Occupation - Self Employed	824	16.99%	0.38	0	1
Wife's Occupation - Casual Labor	824	70.75%	0.46	0	1
Wife's Age	824	38.91	11.47	18	72
Husband's Age	824	46.51	12.43	20	95
Religion - Others	824	4.61%	0.21	0	1
Religion - Hindu	824	69.66%	0.46	0	1
Religion - Islam	824	25.73%	0.44	0	1
Caste - Scheduled and Scheduled Tribe	824	17.23%	0.38	0	1
Caste - Forward	824	36.17%	0.48	0	1
Caste - Backward and Other Backward	824	46.60%	0.50	0	1
Below Poverty Line Card	824	50.12%	0.50	0	1
District - Bidar	824	15.78%	0.36	0	1
District - Dakshin Kannada	824	9.22%	0.29	0	1
District - Gadag	824	14.44%	0.35	0	1
District - Gulbarga	824	16.87%	0.37	0	1
District - Mysore	824	13.47%	0.34	0	1
District - Tumkur	824	13.83%	0.35	0	1
District - Shimoga	824	16.38%	0.37	0	1
Number of Boys	824	0.90	1.01	0	7
Number of Girls	824	0.77	0.96	0	7
Number of Adult Men	824	1.66	0.98	1	7
Number of Adult Women	824	1.63	0.95	1	9
Household Wealth - Bottom 20 %	824	29.98%	0.46	0	1
Household Wealth - Middle 40%	824	31.55%	0.47	0	1
Household Wealth - Top 40 %	824	38.47%	0.49	0	1

Source: Karnataka Household Asset Survey, 2010 – 2011

Table 4b: Summary Statistics for Rural Areas

	Observations	Mean	Std. Dev	Min	Max
Solid Fuel Use by the Household	1965	93.18%	0.25	0	1
Women allowed to travel to the market	1732	57.56%	0.49	0	1
Women own Agricultural Land and/or dwelling	1966	12.61%	0.33	0	1
Husband's Education - Illiterate	1966	36.78%	0.48	0	1
Husband's Education - Upto Higher Primary	1966	36.01%	0.48	0	1
Husband's Education - Secondary & Above	1966	27.21%	0.45	0	1
Wife's Education - Illiterate	1966	55.80%	0.50	0	1
Wife's Education - Upto Higher Primary	1966	27.82%	0.45	0	1
Wife's Education - Secondary & Above	1966	16.38%	0.37	0	1
Husband's Occupation - Casual Labor	1966	5.85%	0.23	0	1
Husband's Occupation - Wage Employed	1966	46.85%	0.50	0	1
Husband's Occupation - Self Employed	1966	42.68%	0.49	0	1
Husband's Education - Old, retired & others	1966	4.63%	0.21	0	1
Wife's Occupation - Contributing & others	1966	1.63%	0.13	0	1
Wife's Occupation - Wage Employed	1966	5.29%	0.22	0	1
Wife's Occupation - Self Employed	1966	38.20%	0.49	0	1
Wife's Occupation - Casual Labor	1966	54.88%	0.50	0	1
Wife's Age	1966	38.74	11.83	18	80
Husband's Age	1966	46.63	12.84	21	90
Religion - Others	1966	2.34%	0.15	0	1
Religion - Hindu	1966	88.30%	0.32	0	1
Religion - Islam	1966	9.36%	0.29	0	1
Caste - Scheduled and Scheduled Tribe	1966	28.43%	0.45	0	1
Caste - Forward	1966	12.31%	0.33	0	1
Caste - Backward and Other Backward	1966	59.26%	0.49	0	1
Below Poverty Line Card	1965	70.03%	0.46	0	1
District - Bidar	1966	15.01%	0.36	0	1
District - Dakshin Kannada	1966	11.65%	0.32	0	1
District - Gadag	1966	15.26%	0.36	0	1
District - Gulbarga	1966	13.94%	0.35	0	1
District - Mysore	1966	15.11%	0.36	0	1
District - Tumkur	1966	14.24%	0.35	0	1
District - Shimoga	1966	14.80%	0.36	0	1
Number of Boys	1966	0.96	1.01	0	6
Number of Girls	1966	0.89	1.02	0	8
Number of Adult Men	1966	1.70	0.95	1	10
Number of Adult Women	1966	1.67	0.85	1	6
Household Wealth - Bottom 20 %	1966	0.11	0.32	0	1
Household Wealth - Middle 40%	1966	0.44	0.50	0	1
Household Wealth - Top 40 %	1966	0.44	0.50	0	1

Source: Karnataka Household Asset Survey, 2010 - 2011

Table 5: Fuel Choice and Asset Ownership (Rural and Urban Areas): Odds Ratios

Wife's ownership of Dwelling/Ag Land	0.643*		0.641*
	(0.154)		(0.163)
Wife's Mobility		0.691**	0.702**
		(0.113)	(0.116)
Wife's Education (Base: Illiterate)			
Up to Higher Primary	0.724	0.606**	0.610**
	(0.143)	(0.129)	(0.130)
Secondary & Above	0.247***	0.222***	0.220***
	(0.0534)	(0.0519)	(0.0516)
Wife's Occupation (Base: Contributing and Others)			
Wage Employed	3.250***	2.492*	2.624**
	(1.429)	(1.172)	(1.239)
Self Employed	2.966***	2.368**	2.330*
	(1.191)	(1.035)	(1.019)
Casual Labor	1.760	1.335	1.326
	(0.609)	(0.504)	(0.501)
Wife's Age	0.988	0.992	0.992
	(0.0169)	(0.0179)	(0.0179)
Husband's Education (Base: Illiterate)			
Up to Higher Primary	0.574**	0.599**	0.615*
	(0.132)	(0.149)	(0.153)
Secondary & Above	0.390***	0.404***	0.414***
	(0.0943)	(0.105)	(0.108)
Husband's Occupation (Base: Casual Labor)			
Wage Employed	2.085***	2.106***	2.107***
	(0.432)	(0.460)	(0.460)
Self Employed	3.077***	3.140***	3.219***
	(0.723)	(0.789)	(0.810)
Old/Retired & Other	1.861*	1.620	1.626
	(0.610)	(0.568)	(0.569)
Husband's Age	0.992	0.989	0.990
	(0.0156)	(0.0165)	(0.0165)
Below Poverty Line Card	2.440***	2.395***	2.411***
	(0.365)	(0.383)	(0.386)
Number of Boys	1.290***	1.308***	1.311***
	(0.105)	(0.115)	(0.115)
Number of Girls	1.206**	1.254**	1.253**
	(0.0992)	(0.115)	(0.115)
Number of Adult Men	1.227**	1.233**	1.235**
	(0.109)	(0.119)	(0.119)
Number of Adult Women	1.064	1.031	1.021

	(0.0948)	(0.0992)	(0.0983)
Household Wealth (Base: Bottom 20 %)			
Middle 40%	1.285	1.261	1.284
	(0.264)	(0.282)	(0.287)
Top 40%	1.127	1.043	1.076
	(0.237)	(0.237)	(0.245)
Religion (Base: Others)			
Hindu	0.675	0.765	0.752
	(0.294)	(0.351)	(0.346)
Islam	2.202*	2.198	2.177
	(1.004)	(1.062)	(1.054)
Caste (Base: Scheduled Caste and Tribe)			
Forward Caste	0.152***	0.174***	0.171***
	(0.0505)	(0.0607)	(0.0599)
Backward and Other Backward Caste	0.488***	0.536***	0.530***
	(0.104)	(0.123)	(0.122)
Rural Area	20.76***	17.56***	18.12***
	(3.623)	(3.249)	(3.384)
Constant	2.342	2.978	2.825
	(1.668)	(2.325)	(2.209)
Pseudo R2	0.5279	0.5229	0.5241
LR	1543.94	1331.11	1334.09
Prob > Chi2	0.000	0.000	0.000
Observations	2,789	2,444	2,444

Notes: Standard errors in parenthesis. All specifications include Karnataka District level fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Fuel Choice and Asset Ownership (Rural Areas): Odds Ratios

Wife's ownership of Dwelling/Ag Land	0.766 (0.241)		0.888 (0.306)
Wife's Mobility		0.579** (0.145)	0.583** (0.147)
Wife's Education (Base: Illiterate)			
Up to Higher Primary	0.825 (0.255)	0.750 (0.254)	0.750 (0.254)
Secondary & Above	0.250*** (0.0861)	0.214*** (0.0798)	0.212** * (0.0795)
Wife's Occupation (Base: Contributing and Others)			
Wage Employed	5.483** (3.644)	3.635* (2.673)	3.716* (2.740)
Self Employed	6.453*** (4.029)	4.338** (3.058)	4.349** (3.059)
Casual Labor	4.022*** (2.163)	2.291 (1.399)	2.305 (1.404)
Wife's Age	0.997 (0.0281)	1.005 (0.0312)	1.005 (0.0312)
Husband's Education (Base: Illiterate)			
Up to Higher Primary	0.416** (0.166)	0.349** (0.154)	0.352** (0.155)
Secondary & Above	0.235*** (0.0961)	0.226*** (0.102)	0.227** * (0.102)
Husband's Occupation (Base: Casual Labor)			
Wage Employed	3.841*** (1.249)	4.458*** (1.533)	4.444** * (1.527)
Self Employed	5.409*** (2.125)	6.292*** (2.667)	6.306** * (2.673)
Old/Retired & Other	2.284 (1.323)	2.497 (1.601)	2.508 (1.605)
Husband's Age	0.983 (0.0261)	0.981 (0.0283)	0.981 (0.0284)
Below Poverty Line Card	1.620** (0.374)	1.731** (0.433)	1.732** (0.433)
Number of Boys	1.264* (0.171)	1.374** (0.207)	1.371** (0.207)
Number of Girls	1.165 (0.156)	1.188 (0.175)	1.187 (0.175)
Number of Adult Men	1.043	1.067	1.067

	(0.148)	(0.166)	(0.166)
Number of Adult Women	1.216	1.166	1.165
	(0.188)	(0.193)	(0.193)
Household Wealth (Base: Bottom 20 %)			
Middle 40%	1.591	1.292	1.289
	(0.621)	(0.563)	(0.560)
Top 40%	1.545	1.303	1.310
	(0.611)	(0.574)	(0.577)
Religion (Base: Others)			
Hindu	1.273	1.526	1.519
	(0.836)	(1.019)	(1.016)
Islam	1.660	1.831	1.811
	(1.139)	(1.292)	(1.282)
Caste (Base: Scheduled Caste and Tribe)			
Forward Caste	0.111***	0.108***	0.109**
	(0.0584)	(0.0611)	* (0.0615)
Backward and Other Backward Caste	0.419**	0.384**	0.383**
	(0.156)	(0.155)	(0.155)
Constant	40.70***	53.17***	53.35**
	(51.98)	(75.77)	* (75.94)
Pseudo R2	0.3478	0.3636	0.3637
LR	340.28	317.03	317.15
Prob > Chi2	0.000	0.000	0.000
Observations	1,965	1,731	1,731

Notes: Standard errors in parenthesis. All specifications included Karnataka District level fixed effects.

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Fuel Choice and Asset Ownership (Urban Areas): Odds Ratios

Wife's ownership of Dwelling/Ag Land	0.427*		0.338**
	(0.191)		(0.163)
Wife's Mobility		0.978	0.974
		(0.235)	(0.236)
Wife's Education (Base: Illiterate)			
Up to Higher Primary	0.617*	0.464***	0.478**
	(0.169)	(0.136)	(0.141)
Secondary & Above	0.246***	0.217***	0.215***
	(0.0737)	(0.0696)	(0.0694)
Wife's Occupation (Base: Contributing and Others)			
Wage Employed	2.010	1.898	2.096
	(1.200)	(1.180)	(1.312)
Self Employed	1.793	1.846	1.717
	(0.933)	(1.008)	(0.943)
Casual Labor	0.875	0.923	0.867
	(0.373)	(0.411)	(0.390)
Wife's Age	0.993	0.992	0.998
	(0.0238)	(0.0246)	(0.0251)
Husband's Education (Base: Illiterate)			
Up to Higher Primary	0.685	0.843	0.887
	(0.221)	(0.292)	(0.307)
Secondary & Above	0.518*	0.593	0.628
	(0.178)	(0.219)	(0.233)
Husband's Occupation (Base: Casual Labor)			
Wage Employed	1.244	1.177	1.187
	(0.346)	(0.344)	(0.349)
Self Employed	2.639***	2.409***	2.585***
	(0.799)	(0.770)	(0.837)
Old/Retired & Other	2.020*	1.579	1.535
	(0.861)	(0.716)	(0.704)
Husband's Age	0.981	0.980	0.979
	(0.0210)	(0.0219)	(0.0221)
Below Poverty Line Card	3.479***	3.135***	3.227***
	(0.748)	(0.710)	(0.739)
Number of Boys	1.353***	1.331**	1.347***
	(0.144)	(0.151)	(0.153)
Number of Girls	1.198	1.276**	1.274*
	(0.132)	(0.157)	(0.158)
Number of Adult Men	1.326**	1.330**	1.354**
	(0.161)	(0.174)	(0.180)
Number of Adult Women	1.065	1.070	1.028

Household Wealth (Base: Bottom 20 %)	(0.124)	(0.137)	(0.132)
Middle 40%	1.247 (0.320)	1.289 (0.351)	1.385 (0.382)
Top 40%	0.930 (0.248)	0.874 (0.248)	0.946 (0.271)
Religion (Base: Others)			
Hindu	0.460 (0.250)	0.457 (0.258)	0.452 (0.259)
Islam	1.978 (1.075)	1.940 (1.109)	2.076 (1.202)
Caste (Base: Scheduled Caste and Tribe)			
Forward Caste	0.161*** (0.0753)	0.201*** (0.0983)	0.180*** (0.0894)
Backward and Other Backward Caste	0.358*** (0.108)	0.454** (0.147)	0.434** (0.141)
Constant	5.684* (5.250)	4.949 (4.858)	4.353 (4.315)
Pseudo R2	0.4066	0.3905	0.3959
LR	456.85	380.64	385.89
Prob > Chi2	0	0	0
Observations	824	713	713

Notes: Standard errors in parenthesis. All specifications included Karnataka District level fixed effects.

*** p<0.01, ** p<0.05, * p<0.1