Household Energy Equity and Human Well-being: A Case of India

Sohail **Ahmad**[1, 2 *] and Manu V. **Mathai**[1]

[1] United Nations University Institute of Advanced Studies (UNU-IAS), Yokohama, Japan
[2] Graduate School of Decision Science and Technology, Tokyo Institute of Technology, Tokyo, Japan
* E-mail: ahmad@ias.unu.edu Tel: +81-45-221-2345; Fax: +81-45-221-2302
6F, International Organizations Center, Pacifico-Yokohama, 1-1-1, Minato Mirai, Nishi-ku, Yokohama 220-8502 Japan

Abstract

About 377 million persons (31.2% of total population) lived in 7,935 towns and remaining 833 million persons lived in over 0.6 million villages in India in 2011. According to 2011 census, about 55% rural and 93% urban households had access to electricity, while a sample survey showed that on an average power supply per day in rural and urban households were 14 and 19 hours respectively.

This study using the nationally representative Human Development Survey (2005) shows that energy security is an important predictor for attributes of human well-being (education and health attainment) in India. Energy availability (power supply per day) is an important predictor for well-being both in rural and urban households, however, energy accessibility, as of now, matters only for the rural households since urban households already have accessibility.

The paper concludes with policy implications, including an energy governance system, in India for human well-being and dignity while realizing sustainable and equitable GHG emissions.

Keywords: energy accessibility; energy availability; human well-being; governance indicators; inclusive growth; India

Highlights

- This study argues for assessing poverty in multidimensional deprivation approach, including energy poverty, rather than limiting to income poverty.
- Examines nexus between energy security (accessibility and availability) and attributes of human well-being using micro data in rural and urban India separately.
- Rural households have low electricity accessibility (55% households) and availability (14hours/day) than urban households (93% households with 19hours/day).
- Energy availability affects human well-being in rural and urban households, while accessibility affects only rural households as of now.
- Energy accessibility and availability are more effective than income poverty alleviation for attaining human well-being, except for short term morbidity in rural households.

I. Introduction

Energy poverty is widely prevailed in India, notably in rural areas. About 57% rural and 28% urban households were energy poor, while 22% rural and 20% urban households were income poor in 2005 (Khandker, Barnes et al. 2012). Energy security is critical for human well-being (Wilkinson, Smith et al. 2007; Kanagawa and Nakata 2008; Parikh, Chaturvedi et al. 2012). Among several interventions, energy security (electricity accessibility and availability) can also influence to accomplish Millennium Development Goals (MDGs). Moreover, income poverty alleviation will not automatically lead to energy poverty alleviation and need specific strategies (Khandker, Barnes et al. 2012). The future challenges of energy security include bridging the gap of accessibility and availability, and meeting potential increased energy demand.

Energy Equity in India

Energy equity can be measured by access to energy, such as electricity accessibility, and its availability (power supply per day). The recent census data show that 92.7% urban households and 55.3% rural households have access to electricity (Census of India 2011). Although rural households have lower level of electricity access, it has been growing at a higher rate than urban India. For instance, in the last decade, electricity access in the rural households increased by 27%, while that in urban households grew by 6% (Table 1). Electricity access could be an indicator but its availability is a higher order parameter that could influence human well-being. In terms of availability of energy, power supply per day in rural and urban households was 14 hours and 19 hours respectively (Table 3).

Table 1: Sources of lighting 2001-11

	urban			rural		
			% change			% change
	2001	2011	2001-11	2001	2011	2001-11
# HHs (in millions)	53.69	78.87	46.88	138.27	167.83	21.37
Electricity (%)	87.6	92.7	5.82	43.5	55.3	27.13
Kerosene (%)	11.6	6.5	-43.97	55.6	43.2	-22.30
Other sources (%)	0.5	0.5	0.00	0.6	1	66.67
No lighting (%)	0.3	0.4	33.33	0.3	0.5	66.67

Source: (Census-of-India 2011)

Mission 2012: Power for All

In order to enhance energy equity, the ministry of power has set a goal "Mission 2012: Power for All", which envisaged an integrated strategy for the power sector development with following objectives: (a) sufficient power to achieve GDP growth rate of 8%; (b) reliable power; (c) quality power; (d) optimum power cost; (e) commercial viability of power industry; and (f) power for all. In order to achieve these objectives, the ministry of power developed strategies in power generation, transmission, distribution as well as developed regulation, conservation and communication (Table 2).

Table 2: Strategies and their focus to achieve objectives

Strategy	Focus
Power Generation	Low cost generation, optimization of capacity utilization, controlling the input cost, optimisation of fuel mix, technology up gradation and utilization of Non Conventional energy sources
Transmission	Development of National Grid including Interstate connections, Technology up gradation & optimization of transmission cost
Distribution	System up gradation, loss reduction, theft control, consumer service orientation, quality power supply commercialization, Decentralized distributed generation and supply for rural areas.
Regulation	For protecting consumer interests and making the sector commercially viable and to generate resources for required growth of the power sector.
Conservation	To optimise the utilization of electricity with focus on Demand Side management, Load management and Technology up gradation to provide energy efficient equipment / gadgets
Communication	For political consensus with media support to enhance the general public awareness.

Source: (Ministry-of-Power 2012)

National Action Plan on Climate Change

The Government of India introduced Eight Missions of National Action Plan on Climate Change (NAPCC) in 2008 (GoI 2008). Three of the missions – National Solar Mission, National Mission for Enhanced Energy Efficiency, and National Mission on Sustainable Habitat – are directly and indirectly associated with the issue of energy security.

The national solar mission envisaged to make solar energy competitive with fossil-based energy options. The Mission has targeted of deploying 20,000 MW of grid connected solar power by 2022 through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R&D; and (iv) domestic production of critical raw materials, components and products, as a result to achieve grid tariff parity by 2022 (Ministry-of-Renewal-Energy 2010). The other two missions promote energy savings, energy efficiency and other desirable inputs to facilitate energy security in India (GoI 2008).

Though there is much discussion on the importance of energy security in achieving enhanced human well-being, there is limited evidence about the causal mechanisms, and hardly any empirical estimates. Such empirical estimates would provide useful guidance for policy makers, and bilateral and multilateral development agencies to allocate funding for such

programs/projects. In order to fill this gap, we examine the influence of energy accessibility and availability in attaining attributes of human well-being such as education attainment (e.g., increasing enrolment and reducing absenteeism) and improving health (e.g., reducing short term morbidity). This study asks following questions: (a) how does energy security (accessibility and availability) influence achievement of human well-being in rural and urban India? (b) Does alleviating energy poverty enhance human well-being greater than alleviating income poverty in rural and urban India? And (c) is the role of energy security in achieving human well-being the same for the rural and urban households?

Section II elaborates method and data set used for the analyses. Section III presents results and discussions, and section IV concludes with policy implications.

II. Method and Data

In line with literature, two indicators related to human well-being have been chosen: education and health. In education attainment, two sub-indicators – (a) unenrolled children between 8-11 years old and (b) number of days absent per student per month – were selected. The former sub-indicator expresses education attainments in quantitative term, while the later in qualitative term. The second indicator, health is proxy by 'number of short term morbidity in a household per month'. It includes three specific illnesses among all family members, including very young children: fever, cough and diarrhea. This study performs rural and urban analyses separately. Based on the theoretical underpinnings, explanatory factors (independent variables) are selected among household characteristics, provision of infrastructure, and socio-religious and related variables of inequity. Figure 1 reveals that human well-being depends upon numerous parameters, such as listed above. Each parameter is inter-related, for example, household characteristics and access of infrastructure is interrelated, for instance, rich households have high level of infrastructure provisions, such as demand of energy, and vice versa (Ahmad 2013, expected). Moreover, socio-religious and locational variation also leads to unequal outcome. For instance, marginalized section of society, households living in lower social strata, disadvantaged place such a slum area are often have lower degree of physical capitals and hence low level of human well-being (Baud, Sridharan et al. 2008; Ahmad 2012; Ahmad, Choi et al. in press).

To sum, although, these explanatory factors are limited, but quite comprehensive to capture human well-being adequately. Eq.1 presents reduced form of estimations of human well-being model.

$$HW_{air} = \alpha^{a} + \beta^{a} X_{ir} + \varepsilon_{ir}^{a} \quad \ldots \text{eq.1}$$

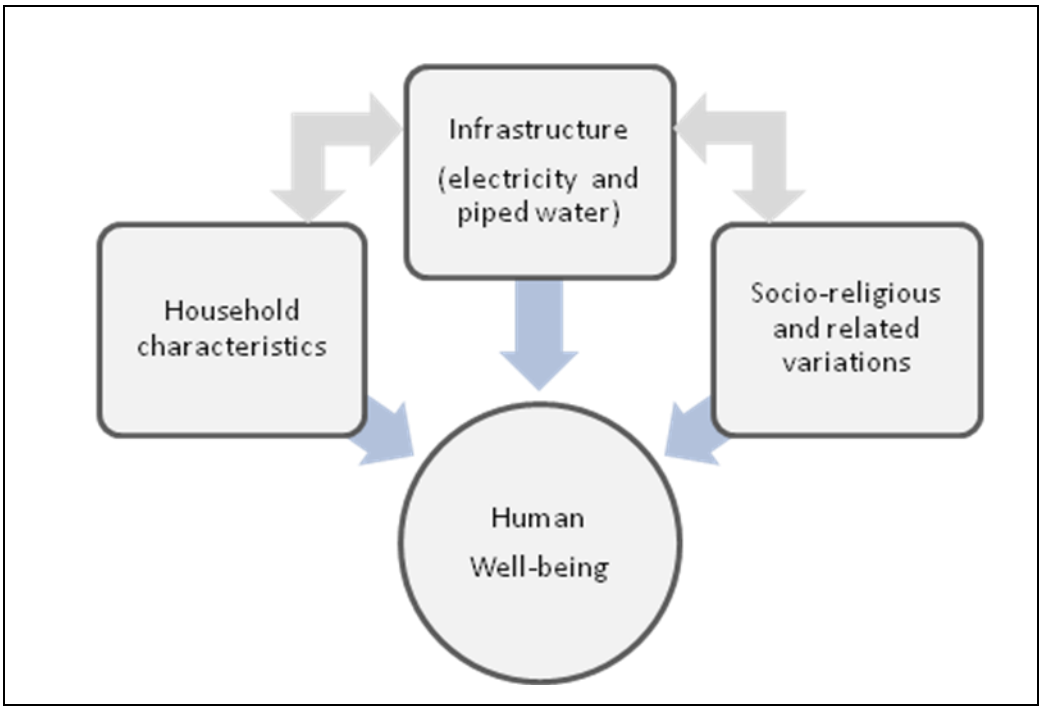
Where,

HW_{air} = Human well-being in *a*-th area type (e.g., rural and urban) of *i*-th household of *r*-th district,

X_{ir} = Vector of household characteristics, infrastructure provisions, and socio-religious characteristics, and

ε_{ir}^{a} = Unobserved random errors.

Figure 1: Theoretical model



Data

This study uses Indian Human Development Survey (IHDS), which has adequate information for proposed analyses such as education, health, household characteristics, amenities and socio-religious data. This data was designed and collected by the University of Maryland in collaboration with the National Council of Applied Economic Research (NCAER), New Delhi in 2004-05 (Desai and Vanneman 2009). Though this data is little old, but other national representative survey such as national sample survey and census data do not have adequate variable for our analyses (NSSO 2010a; NSSO 2010b; Census-of-India

2011). Table 3 presents descriptive statistics (mean and standard deviation) of variables disaggregated by rural and urban households. Independent variables (X_i) include household characteristics (household size, income, poverty status, assets index), infrastructure provisions (electricity access/availability, piped water supply) and socio-religious variables (consists of socio-religious groups in eight categories – Brahmins, Forward, OBCs, Dalits, Adivasis, Muslims, Sikhs/Jains, Christians – and six categories of dwelling types – bungalow, shared walls, flat, chawl, slum housing, miscellaneous). These independent variables are chosen based on previous studies and goodness to fit of the modals (Wilkinson, Smith et al. 2007; Kanagawa and Nakata 2008; Parikh, Chaturvedi et al. 2012).

Table 3: Summary statistics of variables by area type (rural and urban) in India, 2005

Indicator	variable	definition	rural			urban		
			obs.	mean	std. dev.	obs.	mean	std. dev.
Human well-being	Households with 8-11 years age children and enrollment status	total households with 8-11 years children	2,109	-	-	713	-	-
		with all child (or children) enrolled %	1,613	75.33	-	558	77.18	-
		with 1 child unenrolled %	125	5.75	-	40	5.66	-
		with 2 children unenrolled %	371	18.93	-	115	17.16	-
	Absenteeism per student per month	absent from school in the last month per currently enrolled students in a household	17,509	3.82	6.22	8,826	1.82	4.05
	Monthly short term morbidity per household	number of members with short term morbidity over the last month (fever, cough and diarrhea)	27,011	0.86	1.15	13,818	0.50	0.77
Household characteristics	household-size	household size	27,011	5.32	2.62	13,818	4.82	2.14
	Income ('000)	total household income in Rs.	27,010	36.77	65.37	13,818	77.96	103.74
	BPL household	household below poverty line	26,981	0.22	0.41	13,785	0.18	0.38
	Assets household	30 dichotomous items measuring household possessions and housing quality (0 to 30).	27,011	9.26	4.97	13,818	16.65	5.49
Infrastructure provisions	Electricity access	access to electricity (yes=1; no=0)	26,759	0.63	0.48	13,766	0.95	0.22
	Electricity supply in hrs	average hours per day power	19,792	13.73	7.45	13,142	18.95	5.96
	Piped/tube well water supply	household access to piped water or tube well (yes=1; no=0)	26,973	0.41	0.49	13,794	0.80	0.40
Socio-religious and related variables	Socio religious-Brahmins	Brahmins=1; others=0	27,011	0.04	0.19	13,818	0.09	0.28
	Socio religious-Forward	Forward castes=1; others=0	27,011	0.13	0.33	13,818	0.24	0.43
	Socio religious-OBCs	OBCs=1; others=0	27,011	0.37	0.48	13,818	0.31	0.46
	Socio religious-Dalits	Dalits=1; others=0	27,011	0.24	0.43	13,818	0.15	0.36
	Socio religious-Adivasis	Adivasis=1; others=0	27,011	0.10	0.30	13,818	0.02	0.15
	Socio religious-Muslims	Muslims=1; others=0	27,011	0.10	0.30	13,818	0.14	0.35
	Socio religious-Sikhs/Jains	Sikhs/Jains=1; others=0	27,011	0.01	0.08	13,818	0.02	0.14
	Socio religious-Christians	Christians=1; others=0	27,011	0.01	0.12	13,818	0.02	0.15
	Du type-bungalow	Bungalow=1; others=0	26,695	0.17	0.38	13,627	0.20	0.40
	Du type-shared walls	Shared walls=1; others=0	26,695	0.47	0.50	13,627	0.52	0.50
	Du type-flat	Flat=1; others=0	26,695	0.01	0.10	13,627	0.08	0.27
	Du type-chawl	Chawl=1; others=0	26,695	0.12	0.33	13,627	0.08	0.27
	Du type-slum housing	Slum housing=1; others=0	26,695	0.12	0.32	13,627	0.08	0.27
	Du type-miscellaneous	Miscellaneous=1; others=0	26,695	0.11	0.31	13,627	0.04	0.21

Source: (Desai and Vanneman 2009)

III. Result and Discussions

In rural sample households (with 8 to 11 years old children), about 75.3% children were enrolled and remaining unenrolled – 5.8% with single child and 19% with two children (Table 3). The corresponding values for urban sample households were 77.2%, 5.6% and 17.2% respectively. These figures, similar to believe, reveal urban children were slightly in better position than rural children. In term of absenteeism, the urban children are also better than the rural. Moreover, in term of monthly short term morbidity, on an average 0.5 urban households and 0.86 rural households were sick. Therefore, in morbidity term, urban households also performed better than rural households.

Estimates of human well-being are presented in Table 4 and 5 for rural and urban households respectively. Each estimate has two equations, one with electricity accessibility and another with availability of electricity (power supply per day). Each equation uses district dummy to capture district level variations but not shown in model. All regressions are based on Ordinary Least Square (OLS) method and use analytic weights. All models show a modest level of goodness to fit with adjusted R^2 ranges 0.08 to 0.25. There is no multicollinearity problem, as checked by the mean Variance Inflation Factors (VIF).

In compare to electrified, non-electrified households have 0.24 less enrolled children, holding other variables constant between 8 and 11 years old children in rural India. In similar way, children living in non-electrified households make 0.30 more absenteeism per student monthly in compare to electrified households children. However, in term of enrollment, quality of electricity (power supply per day) does not impact in rural India but the very same enhance probability to reduce school absenteeism. To sum access of electricity significantly increases school enrollment and reduces absenteeism, hence improve education attainment in rural households. These results support previous studies which also argue that access to electricity enhances literacy rate in rural India (Kanagawa and Nakata 2008). In addition, results show that access to electricity also reduces short term morbidity in rural household.

In urban households, access of electricity does not significantly affect enrolment. However, quality of electricity does impact on children enrollment but very weekly (*p-value<0.1*). Moreover, quality of electricity reduces school absenteeism and also reduces short term

morbidity, with quite notable magnitude. For instance, in urban households 1.9 hours increase in electricity per day is associated with 0.11 reduction in absenteeism per student (av. absenteeism = 1.82) and 0.013 reduction in short term morbidity per household (av. morbidity = 0.50).

One notable finding emerges from the analyses that in urban and rural households the magnitude of impact due to energy access and availability is more than the poverty tag on the households. It means human well-being can be achieved literally more from expanding energy accessibility and availability than merely income poverty alleviating, except in the case of short term morbidity in rural households. Therefore, in order to reduce short term morbidity in rural households, poverty alleviation program in rural India will be more effective, while in urban settings, availability of energy can deal this problem in effective way. In rural and urban settings, accessibility and availability of energy could prove more productive tool for enhancing education attainment than income poverty alleviation programs. These findings support measurement of poverty in multi dimensional aspects than consumption expenditure or income aspects only.

Another related point, based on context of multiple dimensions of deprivations, it can be noted that in order to increasing children enrolment and reduced absenteeism focus should be also on improving physical capitals, such as housing and infrastructure and targeting socio-religious disadvantaged groups, such as OBCs and Dalits.

Table 4: Estimates of human well-being in rural households in India, 2005

Dependent V.→	unenrolled children				absenteeism per student				short term morbidity per household			
Independent V. ↓	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta
Household-size	0.010*	0.043	-0.002	-0.012	0.048***	0.024	-0.023	-0.013	0.074***	0.169	0.063***	0.151
Income (log)	-0.024	-0.032	0.005	0.007	-0.075	-0.014	0.009	0.002	-0.041***	-0.036	-0.035***	-0.032
BPL households	-0.054	-0.032	0.071	0.040	0.242**	0.019	0.885***	0.064	-0.192***	-0.068	-0.125***	-0.039
Assets households	-0.006	-0.044	0.004	0.025	-0.127***	-0.128	-0.088***	-0.089	-0.020***	-0.093	-0.018***	-0.079
Electricity access	-0.237***	-0.145	-	-	-0.300***	-0.026	-	-	-0.106***	-0.043	-	-
Electricity supply in hrs (log)	-	-	-0.014	-0.012	-	-	-1.201***	-0.146	-	-	-0.055***	-0.029
Piped/tube well water supply	0.181***	0.115	0.053	0.037	-0.432***	-0.040	-0.587***	-0.060	-0.232***	-0.101	-0.295***	-0.132
Socio religious-Forward [a]	0.145	0.066	0.029	0.015	-1.680***	-0.113	-1.601***	-0.125	-0.100**	-0.031	-0.010	-0.003
Socio religious-OBCs [a]	0.055	0.034	-0.015	-0.010	-0.958***	-0.087	-1.019***	-0.100	-0.084**	-0.035	-0.069*	-0.030
Socio religious-Dalits [a]	0.073	0.041	-0.007	-0.004	-1.243***	-0.098	-1.271***	-0.105	-0.074*	-0.027	0.011	0.004
Socio religious-Adivasis [a]	-0.008	-0.003	0.086	0.032	-1.959***	-0.110	-1.164***	-0.064	-0.382***	-0.104	-0.322***	-0.082
Socio religious-Muslims [a]	0.061	0.026	0.080	0.034	-1.241***	-0.069	-1.280***	-0.072	-0.035	-0.009	-0.028	-0.007
Socio religious-Sikhs/Jains [a]	-0.360**	-0.066	-0.387**	-0.092	-1.332***	-0.032	-1.751***	-0.054	-0.062	-0.006	-0.007	-0.001
Socio religious-Christians [a]	0.131	0.013	0.146	0.018	-2.729***	-0.064	-2.560***	-0.073	-0.039	-0.004	0.006	0.001
Du type-shared walls [b]	-0.314***	-0.203	-0.250***	-0.170	0.251**	0.024	0.119	0.012	0.155***	0.068	0.142***	0.062
Du type-flat [b]	-0.117	-0.017	0.131	0.023	1.190***	0.023	1.031**	0.024	0.026	0.002	-0.036	-0.004
Du type-chawl [b]	-0.035	-0.012	-0.195**	-0.063	0.820***	0.045	0.329	0.016	0.179***	0.047	0.018	0.004
Du type-slum housing [b]	-0.286***	-0.108	-0.334***	-0.134	1.420***	0.079	1.194***	0.070	0.010	0.003	-0.012	-0.003
Du type-miscellaneous [b]	-0.361***	-0.141	-0.282***	-0.090	0.236	0.012	0.917***	0.040	0.118***	0.027	0.098**	0.018
Constant	0.858***	.	0.307	.	6.553***	.	8.214***	.	1.228***	.	1.262***	.
Observations	2,023		1,372		16,904		11,866		25,949		18,003	
Adj. R-squared	0.201		0.153		0.253		0.204		0.0929		0.0865	

Source: HDPI, 2005. Notes: (1) District dummies suppressed; (2) *** p<0.01, ** p<0.05, * p<0.1; (3) Reference group: [a] Socio religious-Brahmins; [b] Du type-bungalow

Table 5: Estimates of human well-being in urban households in India, 2005

Dependent V.→	unenrolled children				absenteeism per student				short term morbidity per household			
Independent V. ↓	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta	Coef.	beta
Household-size	-0.004	-0.018	-0.004	-0.016	0.115***	0.061	0.082***	0.045	0.076***	0.211	0.070***	0.197
Income (log)	-0.048	-0.057	-0.070	-0.087	-0.049	-0.011	0.006	0.001	-0.031***	-0.037	-0.024**	-0.028
BPL households	0.095	0.059	0.100	0.063	-0.150	-0.014	-0.032	-0.003	-0.058***	-0.028	-0.048**	-0.022
Assets households	0.006	0.043	0.009	0.063	-0.102***	-0.137	-0.090***	-0.115	-0.012***	-0.087	-0.011***	-0.071
Electricity access	-0.168	-0.057	-	-	-0.329	-0.016	-	-	-0.037	-0.010	-	-
Electricity supply in hrs (log)	-	-	-0.101*	-0.078	-	-	-1.110***	-0.136	-	-	-0.130***	-0.079
Piped/tube well water supply	-0.127*	-0.078	-0.098	-0.061	-0.299***	-0.030	-0.021	-0.002	-0.101***	-0.053	-0.077***	-0.040
Socio religious-Forward [a]	0.201*	0.094	0.211*	0.104	-0.194	-0.021	-0.115	-0.013	0.014	0.007	0.022	0.012
Socio religious-OBCs [a]	0.081	0.049	0.095	0.060	-0.252	-0.029	-0.185	-0.022	-0.011	-0.006	-0.004	-0.002
Socio religious-Dalits [a]	-0.016	-0.008	-0.028	-0.015	0.115	0.010	0.260	0.023	0.025	0.012	0.041	0.019
Socio religious-Adivasis [a]	0.405	0.081	0.451*	0.094	-0.232	-0.010	-0.245	-0.011	-0.006	-0.001	0.022	0.005
Socio religious-Muslims [a]	0.137	0.080	0.139	0.083	0.432**	0.038	0.393**	0.035	-0.002	-0.001	0.008	0.004
Socio religious-Sikhs/Jains [a]	-0.041	-0.008	-0.044	-0.009	-0.336	-0.012	-0.405	-0.015	-0.077	-0.014	-0.074	-0.014
Socio religious-Christians [a]	-0.141	-0.022	-0.108	-0.019	-1.065***	-0.037	-0.843***	-0.031	0.054	0.010	0.087*	0.017
Du type-shared walls [b]	-0.041	-0.027	-0.064	-0.043	-0.821***	-0.102	-0.748***	-0.095	0.079***	0.051	0.084***	0.055
Du type-flat [b]	-0.027	-0.007	-0.019	-0.006	-0.391**	-0.026	-0.266	-0.018	0.109***	0.037	0.120***	0.042
Du type-chawl [b]	-0.025	-0.009	-0.018	-0.007	-0.537***	-0.032	-0.526***	-0.031	0.039	0.013	0.044	0.014
Du type-slum housing [b]	-0.081	-0.030	-0.056	-0.020	-0.643***	-0.040	-0.462**	-0.028	0.034	0.011	0.030	0.010
Du type-miscellaneous [b]	-0.201	-0.050	-0.247	-0.062	-0.693***	-0.033	-0.717***	-0.034	0.013	0.003	0.023	0.006
Constant	0.877	.	1.175**	.	4.440***	.	6.367***	.	0.740***	.	0.963***	.
Observations	697		649		8,624		8,262		13,463		12,764	
Adj. R-squared	0.200		0.159		0.135		0.145		0.103		0.100	

Source: HDPI, 2005. Notes: (1) District dummies suppressed; (2) *** p<0.01, ** p<0.05, * p<0.1; (3) Reference group: [a] Socio religious-Brahmins; [b] Du type-bungalow

IV. Conclusion

The objective of the study was to reveal impact of energy (electricity access and availability) on human well-being (education and health attainment) in India, disaggregated by rural and urban households. This study used regression analyses, using nationally representative household survey. Dependent variables were human well-being indicators (education and health) and independent variables were household characteristics, infrastructure provisions and socio-religious variables (Figure 1).

Results show that rural households have low level of electricity access (55%) and accessibility does significantly matter for education and health attainment, while urban households have high level of electricity access (93%), and accessibility is no more the issue for education and health attainment. Availability of electricity (power supply per day) does significantly impact on reducing school absenteeism in rural and urban households alike (standardized coefficient ~ 0.14). A ten percent increase in electricity availability (about 1.4 hours in rural and 1.9 hours in urban) in households leads to 0.12 reduce in absenteeism per student monthly. Availability of electricity is also important in reducing short term morbidity in rural and urban households, *ceteris paribus*, with higher degree of impact to urban households. For instance, a ten percent increase in electricity availability lead to reduce short term morbidity per household by 0.013 in urban (average = 0.5) and 0.005 in rural households (average = 0.86). Based on these empirical findings, we can conclude that impact of energy access could be a significant factor in rural India in accomplishment of Millennium Development Goals (MDGs). However, availability of electricity could be of greater importance in achieving such goals in rural and urban settings.

The results also show that other socio-economic factors such as better housing and amenities in addition to energy accessibility/availability could enhance human well-being, even with higher magnitude than income poverty alleviation.

Based on these empirical findings following four recommendations are made for better outcome of attributes of human well-being in India.

(a) Accessibility of electricity should be penetrated in rural India or alternatively micro grid options should be explored. In addition, focus should be made on the availability of power both in rural and urban India.

(b) In order to achieve the MDGs, policies and programs should focus on comprehensive package rather than limiting that specific sector. For instance, in order to enhance literacy rate, projects should not limit to education infrastructure but also other related inputs, such as electricity access, electricity availability, and infrastructures.
(c) Adequate energy security provisions enhance attributes of human well-being more than alleviation of the poverty; therefore, policy-makers and donor agencies should focus more priority on it than merely income poverty alleviation.
(d) Multiple dimensions of poverty should be conceptualized and operationalized particularly in developing economies like India, and accordingly policies and programs should focus to eliminate it.

The results are also useful for bilateral multilateral and donor agencies, which are often involved in projects and programs to achieving MDGs in developing countries.

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