

Supplemental Information for:

Has India's Ujjwala Program enabled millions to shift to Liquefied Petroleum Gas as a primary cooking fuel?

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Table S1: Detailed assumptions and references for various estimations of useful cooking energy in India and comparison with Global estimates

India					Global				Unit	Note
Niti Ayog/ Govt of India ¹	NSS 68 Round	Field KPT	Purohit ²	Daioglou ³	Daioglou ³	Fuso Nerini ⁴	ESMAP/ Putti ⁵		Publication details	
		4.37						kg/hh/ day	Rural household India KPT-fuelwood equivalent	
	1299.6							kg/hh/ year	Rural household India NSS-fuelwood equivalent	
7			12.13					MJ/hh/ day	All households-Useful Energy	
					0.77	7.22		MJ/capita /day	All households-Useful Energy (low and high range)	
						3.64		MJ/ meal/ family	Rural households-Useful Energy ('final energy' term used in the paper)	
							320	MJ/hh/ month	All households-Useful Energy	
				6.20				GJ/capita /year	Rural Household Final Energy ¹	
	14.4	14.4						MJ/kg	Assumption (with 20% Moisture Content) based on FAO study ⁶	
15%	15%	15%		15%				Efficiency	Assumption: It varies from 12.5% ⁷ to 18% ⁸	
						2.5		meals/ day	Assumption	
350		350	350		350	350	350	days/ year	Assumption	
							12	months/ year		
				5	5	5		members	Average Family Size	
2450	2807	3304	4246	4651	1348	12635	3185	3840	MJ/hh/ year	

¹ 92% of 6.74 GJ of final energy is used for cooking

Table S2: Detailed assumptions and references for various estimations of useful cooking energy in India and comparison with Global estimates

Description	Value	Unit	Remarks
LPG energy content	45.84	MJ/ kg	Published estimate ⁹
Useful LPG quantity per cylinder	14	kg	Assuming that, on average, 0.2 kg in the 14.2 kg LPG cylinder is not extractable for use
One domestic cylinder energy content	642	MJ	To meet cooking energy requirement
LPG stove efficiency	60%		Published estimate ³
Energy delivered to cooking pot/ cylinder	385	MJ	

Table S3: Estimation of LPG cylinders to be purchased² and fully consumed within one year to meet primary ($\geq 51\%$) and exclusive ($\sim 100\%$) usage.

Useful Cooking Energy (MJ) Requirement Scenarios	Cylinders required for Exclusive Usage	Cylinders required for Primary Usage
2500	6.5	3.3
3500	9.1	4.6
4500	11.7	6.0

Note: Refill data details based on Government Statistics

² Ujjwala consumers get the first cylinder along with the connection, so this number includes the first cylinder and subsequent refills

Source: Official Twitter Account of Mr. Ashutosh Jindal, Joint Secretary (Marketing), Ministry of Petroleum and Natural Gas, Government of India.

<https://twitter.com/AshutoshJindalS/status/962573030693195776>

<https://twitter.com/AshutoshJindalS/status/962574929869922306>

Reference:

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