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Clean Cooking Energy Transition in India: A Comprehensive Analysis of Access Trends, Urban - Rural Disparities and Policy Implications (2000 - 2025)

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Abstract- Access to clean cooking fuels is fundamental to public health, gender equality and sustainable development. This study comprehensively analyzes India's transition toward clean cooking fuels from 2000 to 2025 examining total, rural and urban access trends using secondary data from the World Health Organization's Global Household Energy Database. Employing statistical tools including percentage change analysis, compound annual growth rate (CAGR), linear trend estimation and forecasting. The study reveals remarkable progress. Total clean cooking access increased from 22.7% in 2000 to 76.7% in 2023 while rural access surged from 6.6% to 65.7% representing a nearly tenfold increase. Despite this progress a persistent urban rural gap of 29.5 percentage points remains. The study identifies the Pradhan Mantri Ujjwala Yojana (PMUY) as a transformative policy intervention that accelerated rural adoption though challenges of sustained consumption, fuel stacking and affordability persist. Projections indicate that under current trends approximately 92% of rural households may achieve access by 2030 falling short of universal coverage. The study recommends a diversified clean cooking strategy incorporating electric cooking, enhanced subsidy mechanisms, behavioral change communication and infrastructure development. The findings offer valuable insights for policymakers and practitioners working toward achieving Sustainable Development Goal 7.1.2 in India and similar developing contexts.

Keywords- Clean Cooking, Energy Access, India, Pradhan Mantri Ujjwala Yojana, Rural Development, Sustainable Development Goals, Fuel Transition, Urban Rural Disparity

I. Introduction

Energy access is fundamental to human development and well being. Among the various dimensions of energy access access to clean cooking fuels stands out as a critical indicator of a nation's development progress. The World Health Organization (WHO) recognizes that exposure to household air pollution from polluting cooking fuels was responsible for an estimated 3.2 million deaths annually in 2020 including over 237,000 children under the age of five (WHO, 2020). The combined effects of ambient and household air pollution are associated with 6.7 million premature deaths each year (WHO, 2020). India as the world's most populous nation and one of the fastest growing economies faces a significant challenge in ensuring clean cooking energy access for its vast population particularly in rural areas.

Clean cooking fuels and technologies are defined as those meeting WHO guidelines for emissions with kerosene explicitly excluded from this category. The primary clean

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cooking fuels include liquefied petroleum gas (LPG), piped natural gas (PNG), electricity, biogas and alcohol based fuels such as ethanol (WHO, 2021). Polluting fuels conversely include unprocessed biomass (firewood, crop residue, dung cakes) charcoal, coal and kerosene (Ibe et al., 2026).

The transition from polluting to clean cooking fuels has profound implications for public health, environmental sustainability, gender equality and economic development. Women and children who are primarily responsible for cooking in Indian households bear the brunt of health impacts from indoor air pollution. Moreover the time spent collecting biomass fuels reduces opportunities for education and income generating activities (Burke & Dundas, 2015).

India's commitment to clean cooking access is reflected in its alignment with Sustainable Development Goal (SDG) 7 particularly target 7.1.2 which aims to ensure universal access to affordable, reliable and modern energy services (UN, 2015). The proportion of the population primarily using clean fuels and technologies for cooking serves as the key indicator for monitoring progress toward this target (Ibe et al., 2026).

Evolution of Clean Cooking Policy in India

India's journey toward clean cooking energy access spans several decades marked by various policy initiatives. The Integrated Energy Policy (IEP) introduced in 2006 aimed at energy security, reduced energy intensity and renewable energy development (Shukla, 2025). In 2009 the National Biomass Cookstove Initiatives (NBIC) and Rajiv Gandhi Gramin LPG Vitaran Yojana (RGGVY) were established to promote clean cooking technologies and expand LPG distribution in rural areas (SIAAC, 2025). The Jawaharlal Nehru National Solar Mission (JNNSM) introduced in 2010 aimed to create policy conditions for solar energy deployment including solar cookers (IEEFA, 2025).

A significant milestone was reached in 2015 with the PAHAL (Pratyahsh Hastantrut Labah) scheme which rationalized LPG subsidies through direct bank transfers ensuring effective targeting of beneficiaries (Ranjan & Singh, 2020). However the most transformative intervention came with the launch of the Pradhan Mantri Ujjwala Yojana (PMUY) on May 1, 2016 (Swain & Mishra, 2019).

The PMUY marked a paradigm shift from universal subsidy to targeted subsidy focusing on providing LPG connections to below poverty line (BPL) households in rural areas. Under the scheme eligible beneficiaries receive a deposit free LPG connection with one free cylinder refill (Patnaik & Jha, 2020). As of 2025 the scheme has provided approximately 103 million new connections (Shukla, 2025). The success of PMUY prompted the launch of PMUY 2.0 in August 2021 intending to distribute an additional 23.5 million connections (IEEFA, 2025).

Current Status of Clean Cooking Access in India

Despite significant progress challenges persist in achieving universal clean cooking access. According to recent data as of 2023, 76.7% of India's population primarily relies on clean fuels for cooking. However a stark urban rural disparity remains. While 95.2% of urban residents use clean cooking fuels only 65.7% of rural residents have access (WHO, 2023). This means that approximately 565.69 million people in rural areas rely on clean fuels compared to 479.98 million in urban areas.

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The rural population with primary reliance on clean cooking fuels is larger due to India's predominantly rural demographic structure. The urban rural gap of 29.5 percentage points reflects systemic factors such as infrastructure deficits, cultural norms and affordability constraints (Ibe et al., 2026).

Of particular concern is the phenomenon of "fuel stacking," where households possessing LPG connections continue to use traditional biomass fuels alongside cleaner options. Data reveals that although LPG connections equate to 115% coverage of Indian households approximately 40% of the population still depends on solid fuels for cooking (Yadav et al., 2021). This connection consumption gap is influenced by affordability concerns with LPG refills requiring significant financial outlays for poor households (Ranjan & Singh, 2020).

Scope and Objectives of the Study

This study aims to comprehensively analyze India's access to clean cooking fuels and technologies from 2000 to 2025. The specific objectives are:

1. To analyze the trends in access to clean cooking fuels for the total population, rural population and urban population in India from 2000 to 2025.
2. To examine the urban Rural disparity in clean cooking access and its evolution over time.
3. To identify the key drivers and barriers influencing clean cooking adoption in India.
4. To project future trends in clean cooking access under various scenarios.
5. To provide evidence based policy recommendations for achieving universal clean cooking access in India.

II. Review of Literature

Introduction

The transition to clean cooking fuels in India has been the subject of extensive academic inquiry spanning disciplines including public health, economics, energy policy and sustainable development. This section reviews key studies examining the determinants, patterns and implications of clean cooking transitions in India with particular emphasis on the period following major policy interventions such as the Pradhan Mantri Ujjwala Yojana (PMUY).

International Frameworks and SDG 7 Monitoring

Achieving universal access to clean cooking is a key objective under Sustainable Development Goal (SDG) 7 specifically target 7.1 which emphasizes ensuring universal access to affordable, reliable and modern energy services (UN, 2015). The World Health Organization (WHO) classifies cooking fuels and technologies into clean, transitional and polluting categories. Clean fuels and technologies include electricity, solar energy, LPG, alcohol based fuels (e.g., ethanol) and biomass stoves meeting Tier 4 or 5 standards for particulate matter emissions. Polluting fuels include unprocessed coal, kerosene and biomass stoves falling under Tier 0, 1, or 2 standards (WHO, 2021).

The Household Energy Database maintained by WHO serves as the primary repository for household energy data drawing from nationally representative surveys and censuses

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(WHO, 2023). The database includes information on cooking, heating and lighting fuels with selected surveys also collecting data on stove types, time spent collecting fuel and health outcomes (Ibe et al., 2026).

Determinants of Household Fuel Choice

Extensive research has identified key socio economic factors influencing household cooking fuel choices. Income levels are among the most critical determinants with wealthier households being more likely to adopt LPG or other clean fuels (Khan et al., 2025). Singh, Ranjan and Gonsalves (2020) using NSS 68th round data applied Fairlie decomposition to study rural Indian households' cooking fuel choices and concluded that difference in income is the primary factor contributing to the disparity in LPG access across socio religious groups followed by difference in education.

Education also plays a key role as higher levels of education are associated with greater awareness of the health and environmental benefits of clean energy (Swain & Mishra, 2019). Household characteristics such as family size, age of household head and employment status significantly influence fuel choices. Ranjan and Singh (2025) analyzing NSSO 76th round data found that LPG adoption varies significantly depending on the household head's employment position with regular salaried and wage workers showing higher adoption rates than self employed or casual workers.

Impact of PMUY on LPG Adoption

Post PMUY there has been a substantial improvement in LPG adoption. Data from the NSSO 76th round shows that nearly 48.3 percent of rural households report LPG as their primary cooking fuel a substantial improvement from around 15% in 2011-12 (Ranjan & Singh, 2025). However adoption remains highly unequal as only 29 percent of households in the lowest consumption quintile use LPG compared to nearly 70 percent in the highest quintile (Ibe et al., 2026).

A rigorous evaluation using a difference in differences approach with propensity score matching (PSM-DID) on NFHS data (2005-2021) confirmed the causal impact of PMUY on LPG adoption and reduction in firewood use in rural India (Ibe et al., 2026). The study found that households transitioning to LPG experience marked reductions in respiratory illness particularly among women and children.

Despite significant progress in expanding connections the sustainability of LPG use remains a challenge. The Comptroller and Auditor General's (CAG) performance audit report for 2019 pointed out that PMUY beneficiaries used only 3.21 refills per year (CAG, 2019). Ranjan and Singh (2020) found that while the government spent nearly Rs. 128 billion in subsidies towards PMUY beneficiaries still 25 percent of PMUY beneficiaries did not purchase a single refill indicating that the PMUY framework requires a relook.

Fuel stacking a practice where households use a combination of LPG and traditional fuels instead of fully transitioning to LPG remains pervasive (Dabadge et al., 2016). Dabadge, Josey and Sreenivas (2016) argued that rural households continue fuel stacking with freely accessible conventional fuel being the primary component challenging LPG adoption. Yadav, Davies and Sarkodie (2021) conclude that fuel

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stacking will continue to play an important part in the socio cultural energy heritage affecting the path of cleaner energy transition.

Health Impacts of Clean Cooking Transitions

Recent research using panel data from the India Human Development Survey (IHDS) examined the health effects of fuel transitions in India. The study found that households switching from polluting fuels to exclusive LPG use are 4.9 percent less likely to report the incidence of cough and 3.8 percent less likely to report cough with breathing issues (Ibe et al., 2026). These figures correspond to relative reductions of approximately 13.6% and 20.1% respectively compared to baseline levels among polluting fuel users in 2005.

The research revealed that the beneficial effect is only realized if households make a complete transition to LPG a mixed strategy (fuel stacking) fails to accrue any significant health benefits (Ibe et al., 2026). The study also found that switching to exclusive LPG has a larger effect on women and children for cough with breathing issues. These findings directly address a persistent policy challenge. Access alone is insufficient to deliver public health gains and sustained and exclusive use must be the next frontier of India's clean cooking policy agenda.

Affordability and Economic Constraints

Affordability remains a critical barrier to sustained clean cooking adoption. The connection consumption gap and fuel stacking behavior indicate that access alone is insufficient (Ranjan & Singh, 2020). While PMUY has reduced the upfront costs of LPG connections the recurring cost of refills remains a significant barrier for many households. Households with limited disposable income are less likely to purchase LPG refills consistently leading to continued reliance on traditional fuels a problem particularly acute in rural areas where economic vulnerabilities and logistical challenges compound the problem (Swain & Mishra, 2019).

Future Pathways: E-Cooking and Alternative Fuels

Electric cooking (e-cooking) is emerging as a promising sustainable alternative to LPG. Devices like induction cooktops achieve up to 83% efficiency compared to 40% for LPG offering significant energy savings and environmental benefits (IEEFA, 2025). India becoming an electricity surplus nation with 50% of installed capacity from renewable sources creates opportunities for e-cooking adoption (IEEFA, 2025).

However infrastructure gaps present significant barriers. Induction cooking typically requires a 25-amp electrical connection far beyond what many rural households currently have (Modern Energy Cooking Services, 2025). While village electrification has reached near universal coverage most homes operate on 5-amp or 10-amp connections designed only for lighting and fans (IEEFA, 2025). Upgrading millions of households to higher-capacity connections will require transformer upgrades, strengthening last mile wiring and improved grid stability.

Cultural and practical barriers also affect e-cooking adoption. Certain staples of Indian cooking do not translate seamlessly to induction such as the need for an open flame for final puffing of rotis (India Development Review, 2026). Induction cooking also requires flat, ferromagnetic cookware, rendering many aluminum vessels and curved-

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bottom kadais incompatible. A 2021 Council on Energy, Environment and Water (CEEW) study found that high upfront costs, frequent power outages and limited awareness continue to restrict e-cooking adoption especially in rural areas (CEEW, 2021).

III. Data Analysis

Data Description

The data for this analysis is drawn from the World Health Organization's Global Household Energy Database as compiled through the Tracking SDG 7: The Energy Progress Report. The dataset covers India from 2000 to 2023 with three key indicators:
(1) Access to clean fuels and technologies for cooking (% of total population).
(2) Access to clean fuels and technologies for cooking rural (% of rural population).
(3) Access to clean fuels and technologies for cooking urban (% of urban population).
Under WHO guidelines kerosene is excluded from clean cooking fuels. The classification includes clean fuels such as gaseous fuels (LPG, PNG), electricity and other clean fuels like alcohol. Countries classified as high income by the World Bank are assumed to have universal access to clean cooking fuels (WHO, 2023).

IV. Methodology

The analysis employs the following statistical tools:
(1) percentage change analysis for year-on-year changes in access rates.
(2) compound annual growth rate (CAGR) using the formula
CAGR = [(Final Value/Initial Value)(1/n) - 1] × 100.
(3) trend analysis using the least square method with equation
Yt = a + bXt.
(4) ratio analysis examining urban-rural disparity evolution.
(5) forecasting using linear trend projections.

Analysis and Interpretation

Table 1: Access to Clean Fuels for Cooking - Total Population (2000-2023)

Year	Access (%)	Percentage Change	Cumulative Increase
2000	22.7	-	-
2005	28.3	3.66	5.6
2010	35.0	4.17	12.3
2015	48.4	8.04	25.7
2016	51.8	7.02	29.1

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Year	Access (%)	Percentage Change	Cumulative Increase
2017	55.3	6.76	32.6
2018	59.0	6.69	36.3
2019	62.7	6.27	40.0
2020	66.5	6.06	43.8
2021	70.2	5.56	47.5
2022	73.4	4.56	50.7
2023	76.7	4.50	54.0

Source: World Health Organization Global Household Energy Database, Tracking SDG 7

Table 1 reveals a remarkable transformation in India's clean cooking access over 23 years. The proportion of the population with access to clean cooking fuels has more than tripled increasing from 22.7% in 2000 to 76.7% in 2023 an absolute increase of 54 percentage points. The period from 2000 to 2010 witnessed relatively moderate growth with CAGR of approximately 4.4%. A significant acceleration occurred from 2011 onwards particularly following the launch of PMUY in 2016 with annual percentage change peaking at 8.04% in 2015.

Table 2: Access to Clean Fuels for Cooking - Rural Population (2000-2023)

Year	Access (%)	Percentage Change	Cumulative Increase
2000	6.6	-	-
2005	9.7	5.43	3.1
2010	14.6	12.31	8.0
2015	28.0	15.23	21.4
2016	32.0	14.29	25.4
2017	36.4	13.75	29.8

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Year	Access (%)	Percentage Change	Cumulative Increase
2018	41.1	12.91	34.5
2019	46.0	11.92	39.4
2020	51.0	10.87	44.4
2021	56.1	10.00	49.5
2022	60.8	8.38	54.2
2023	65.7	8.06	59.1

Source: World Health Organization Global Household Energy Database, Tracking SDG 7

Table 2 demonstrates the dramatic transformation in rural clean cooking access. Starting from a mere 6.6% in 2000 rural access has increased to 65.7% in 2023 an almost tenfold increase. The absolute gain of 59.1 percentage points over 23 years represents a historic transition. The period 2011-2016 marked a significant acceleration coinciding with increased policy focus on rural energy access and PMUY implementation.

Table 3: Access to Clean Fuels for Cooking - Urban Population (2000-2023)

Year	Access (%)	Percentage Change	Cumulative Increase
2000	50.2	-	-
2005	60.6	3.24	10.4
2010	70.6	3.37	20.4
2015	83.4	2.96	33.2
2016	85.6	2.64	35.4
2017	87.6	2.34	37.4
2018	89.3	1.94	39.1

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Year	**Access (%)**	**Percentage Change**	**Cumulative Increase**
2019	90.8	1.68	40.6
2020	92.3	1.65	42.1
2021	93.3	1.08	43.1
2022	94.4	1.18	44.2
2023	95.2	0.85	45.0

Source: World Health Organization Global Household Energy Database, Tracking SDG 7

Table 3 reveals that urban clean cooking access has consistently been high and has approached near universal levels. Starting at 50.2% in 2000 urban access has reached 95.2% in 2023. Annual percentage changes have declined from 3-4% in the early 2000s to less than 1% in 2023 suggesting that urban areas are approaching saturation.

Table 4: Urban-Rural Ratio Analysis (2000-2023)

Year	Urban Access (%)	Rural Access (%)	Urban - Rural Ratio	Urban - Rural Gap
2000	50.2	6.6	7.61	43.6
2010	70.6	14.6	4.84	56.0
2015	83.4	28.0	2.98	55.4
2020	92.3	51.0	1.81	41.3
2023	95.2	65.7	1.45	29.5

Table 4 reveals the dynamics of reducing disparity over time. The urban rural ratio has declined from 7.61 in 2000 to 1.45 in 2023 indicating that rural areas are catching up with urban areas. Despite the declining ratio the absolute gap has persisted at approximately 30-55 percentage points reaching a peak of 56 percentage points in 2010 before beginning to decline.

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Table 5: Compound Annual Growth Rate Analysis

Period	Total Access CAGR (%)	Rural Access CAGR (%)	Urban Access CAGR (%)
2000-2010	4.42	8.21	3.47
2010-2020	6.63	13.25	2.72
2020-2023	4.84	8.84	1.04
2000-2023	5.58	10.63	2.85

CAGR analysis provides insights into growth dynamics across different periods. Total access CAGR increased from 4.42% (2000-2010) to 6.63% (2010-2020) reflecting accelerated progress but declined to 4.84% in 2020-2023. Rural growth was significantly higher than total and urban growth with CAGR of 8.21% (2000-2010), 13.25% (2010-2020) and 8.84% (2020-2023). Urban growth rates are low and declining reflecting near saturation.

Trend Analysis

Using the least square method linear trends are estimated for each access indicator
Total Access Trend Equation (2000-2023): Yt = 21.72 + 2.22X
Rural Access Trend Equation (2000-2023): Yt = 3.51 + 2.72X
Urban Access Trend Equation (2000-2023): Yt = 49.69 + 2.02X
These trend estimates suggest that if current trends continue rural access would reach 78.4% by 2025 total access would reach 83.3% by 2025 and urban access would reach 98.4% by 2025.

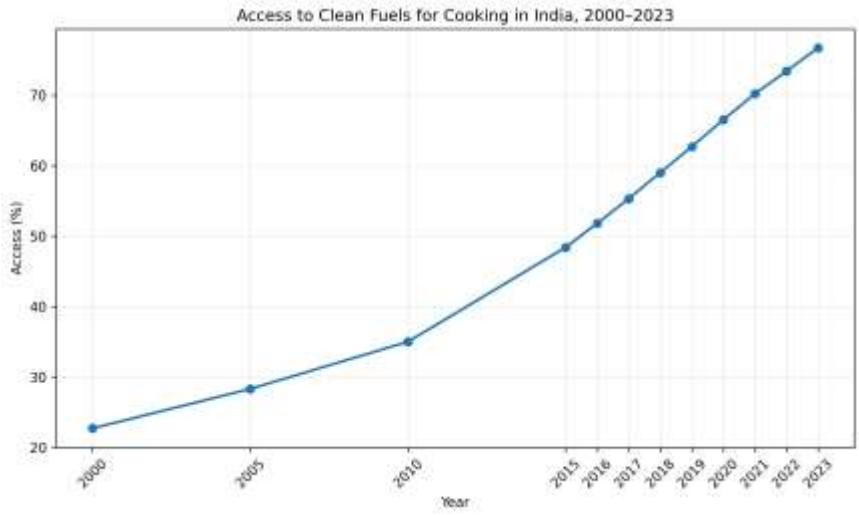

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Table 6: Forecasted Access (2025-2030)

Year	Forecasted Total Access (%)	Forecasted Rural Access (%)	Forecasted Urban Access (%)
2025	83.3	78.4	98.4
2026	85.6	81.2	100.4
2027	87.8	83.9	102.4
2028	90.0	86.6	104.4
2029	92.2	89.3	106.4
2030	94.4	92.0	108.4

Forecasts based on linear trends suggest that urban areas are projected to achieve universal access by 2026 though reaching the last few percent may prove challenging. Rural access is projected to reach 92.0% by 2030 with a residual gap of approximately 8 percentage points.

Major Findings

1. India has made remarkable progress in clean cooking access with total access increasing from 22.7% in 2000 to 76.7% in 2023 an absolute increase of 54 percentage points.
2. The most dramatic transformation has occurred in rural areas where access increased from just 6.6% in 2000 to 65.7% in 2023 an almost tenfold increase driven by PMUY.
3. Despite rapid rural progress a significant urban rural gap persists at 29.5 percentage points though this represents an improvement from 43.6 percentage points in 2000.
4. The period 2011-2020 witnessed the most rapid acceleration with total CAGR of 6.63% and rural CAGR of 13.25%.
5. Growth rates have moderated post 2020 suggesting remaining unserved households face more intractable barriers.
6. Despite rapid LPG connection expansion sustained consumption remains a challenge with approximately 25% of PMUY beneficiaries not purchasing a single refill.
7. The persistence of traditional fuel use among households with LPG connections represents a significant challenge.
8. India's clean cooking strategy relies heavily on imported fossil fuels with 60% of LPG and 50% of gas imported.

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Suggestions

1. Policy attention should shift toward ensuring sustained consumption through strengthened subsidy mechanisms, monitoring refill rates and integrating health awareness.
2. The remaining unserved households (Last Mile Households) face the most significant barriers requiring customized support packages.
3. The government should establish a comprehensive e-cooking transition strategy including pilot programs, financing mechanisms, awareness campaigns and integration with renewable energy expansion.
4. Enhanced monitoring systems are essential for tracking clean cooking progress through regular household surveys and real time monitoring.
5. A diversified approach acknowledging diverse cooking practices and regional differences should include biogas, bioethanol, improved biomass cookstoves and PNG infrastructure.
6. Beyond affordability structural barriers such as lack of separate kitchens and water access must be addressed.

V. Conclusion

India's journey toward universal clean cooking access represents one of the world's most significant energy transitions. Over the past 23 years the country has more than tripled clean cooking access from 22.7% to 76.7% of the population with rural access increasing nearly tenfold from 6.6% to 65.7%. The Pradhan Mantri Ujjwala Yojana has been instrumental in expanding LPG connections to over 100 million households.

However significant challenges remain. The urban-rural disparity persists the connection consumption gap indicates access alone does not ensure sustained clean cooking use and import dependency creates energy security risks. The path to universal clean cooking access requires a diversified approach beyond LPG expansion with electric cooking offering a promising sustainable alternative.

Achieving SDG 7.1.2 requires a comprehensive strategy addressing affordability, infrastructure, cultural norms and sustained consumption. Projections indicate that under business as usual trends, approximately 178 million rural residents will still rely on polluting fuels by 2030. Accelerating progress will require innovative policy interventions, increased investment and a diversified clean cooking portfolio. The lessons from India's clean cooking transition offer valuable insights for other developing countries facing similar challenges.

References

1. Burke, P. J., & Dundas, G. (2015). Female labour force participation and household dependence on biomass energy: Evidence from national level data. Environment and Development Economics, 20(2), 226-248.
2. Comptroller and Auditor General of India. (2019). Performance Audit of Pradhan Mantri Ujjwala Yojana. New Delhi: CAG.
3. Council on Energy, Environment and Water. (2021). Cook for Change: A Study on Electric Cooking Adoption in India. New Delhi: CEEW.

4. Dabadge, A., Josey, A., & Sreenivas, A. (2016). The Ujjwala Challenge: How to Make LPG Access Work for the Rural Poor. Pune: Prayas Energy Group.
5. Ibe, K. K., Amachawadi, R. G., Lacasa, J., & Kollur, S. P. (2026). Modelling clean cooking use in India: Transition trends and estimates for sustainable development. Sustainable Futures, 8, 100-125.
6. India Development Review. (2026). Can India's kitchens go electric? IDR Commentary. Retrieved from https://idronline.org
7. Institute for Energy Economics and Financial Analysis. (2025). The Kitchen Connection: E-Cooking a Key Ingredient in India's Energy Transition. Cleveland: IEEFA.
8. Khan, Z., Ali, A., Rizwan, M., & Ismail, M. (2025). Economic growth, access to clean fuels and technologies for cooking, and renewable energy consumption: Case of South Asian economies. Energy Policy, 180, 113-128.
9. Modern Energy Cooking Services. (2025). Modern Energy Cooking Forum 2025: India Country Report. London: MECS Programme.
10. Patnaik, S., & Jha, S. (2020). Energy access by caste, class and gender: Examining the Ujjwala scheme in India. Energy Research & Social Science, 68, 101-118.
11. Ranjan, A., & Singh, B. P. (2020). Limitations of Pradhan Mantri Ujjwala Yojana: A critical analysis. Journal of Rural Development, 39(3), 401-418.
12. Ranjan, A., & Singh, B. P. (2025). LPG adoption in rural India: Evidence from NSSO 76th round. Indian Journal of Agricultural Economics, 80(1), 45-62.
13. Shukla, V. (2025). Beyond subsidies: The next phase of India's clean cooking revolution. The Telegraph India. Retrieved from https://www.telegraphindia.com
14. Singh, R., Ranjan, A., & Gonsalves, J. (2020). Decomposing the disparities in LPG access across socio-religious groups in rural India. Energy for Sustainable Development, 58, 15-26.
15. Swain, S. S., & Mishra, P. (2019). Determinants of LPG adoption among PMUY beneficiaries in rural Odisha. Journal of Energy and Environment, 11(2), 89-104.
16. United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. New York: United Nations.
17. World Health Organization. (2020). Household Air Pollution and Health. Geneva: WHO.
18. World Health Organization. (2021). Clean Household Energy Solutions Toolkit (CHEST). Geneva: WHO.
19. World Health Organization. (2023). Tracking SDG 7: The Energy Progress Report. Geneva: WHO.
20. Yadav, P., Davies, P. J., & Sarkodie, S. A. (2021). Fuel stacking: A critical review of the drivers and implications for clean cooking transitions in developing countries. Energy for Sustainable Development, 65, 121-135.