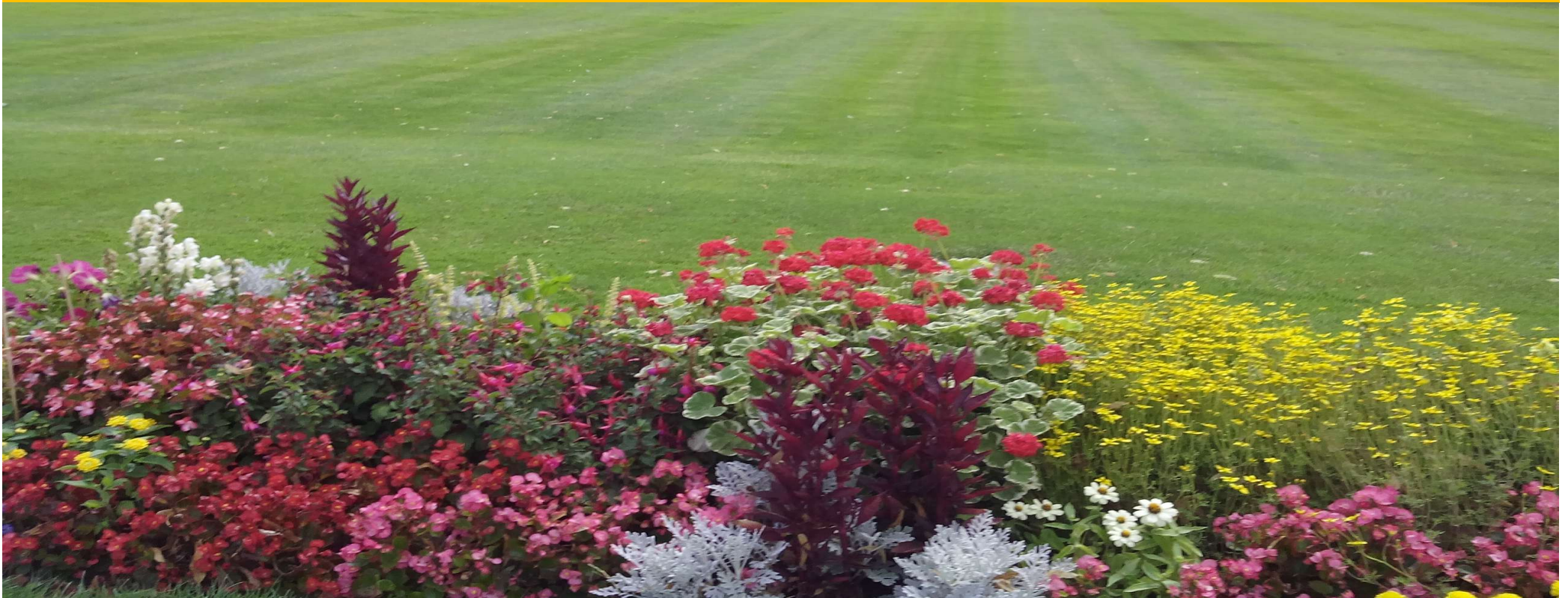


# Clean Cooking Transition: How Behaviour, Finance and Technology Shape Adoption Pathway



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# Energy Scenario

**532 PJ**

Overall energy consumption

**370 kWh**

Per-capita electricity use

**~95%**

electricity access

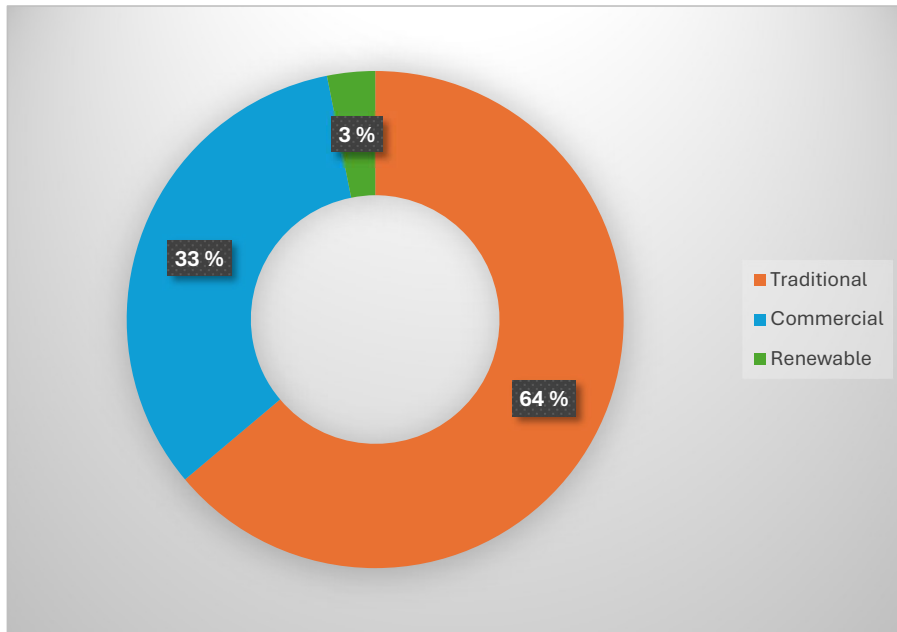


Figure 1. Overall Energy Consumption in Nepal (2023)

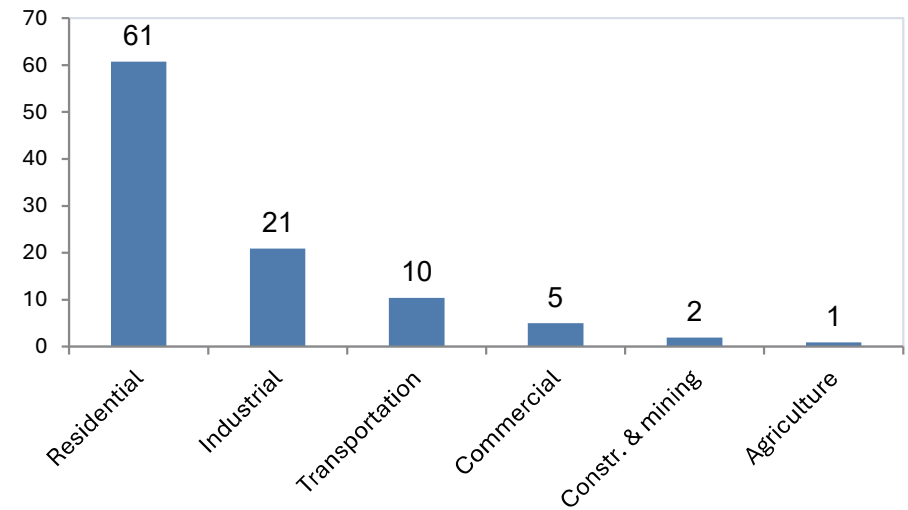


Figure 2. Sectoral Energy Consumption in Nepal (2023)

# Cooking Energy – Fuel Types

Overall consumption of traditional resource has decreased by 17% as compared to previous FY

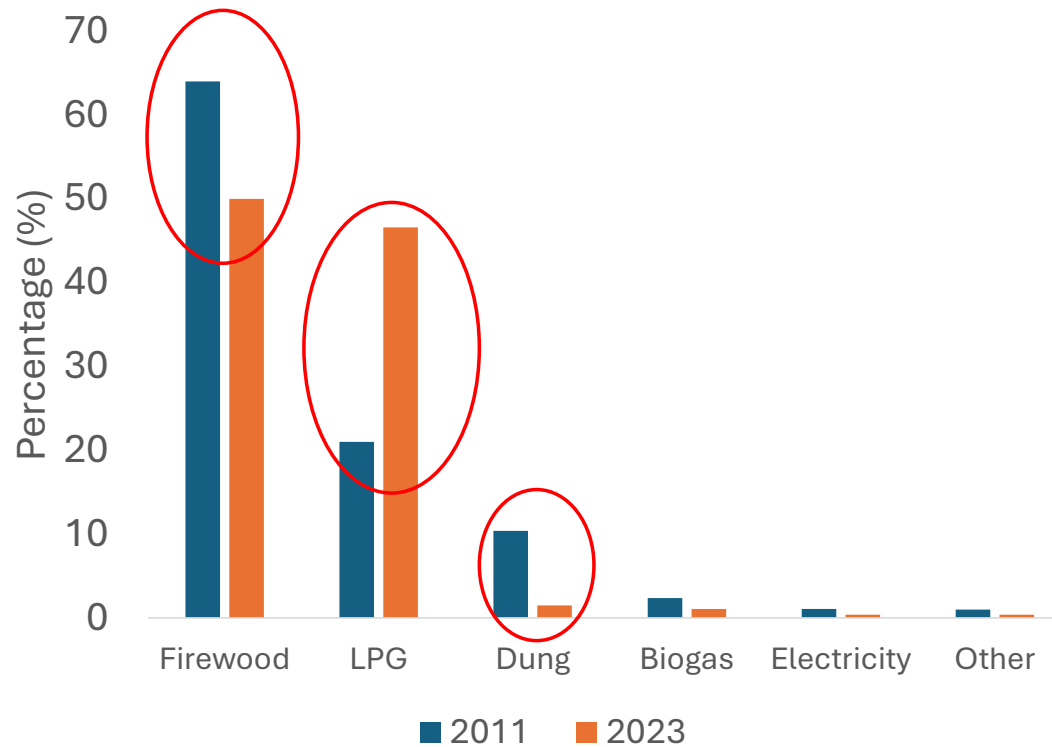
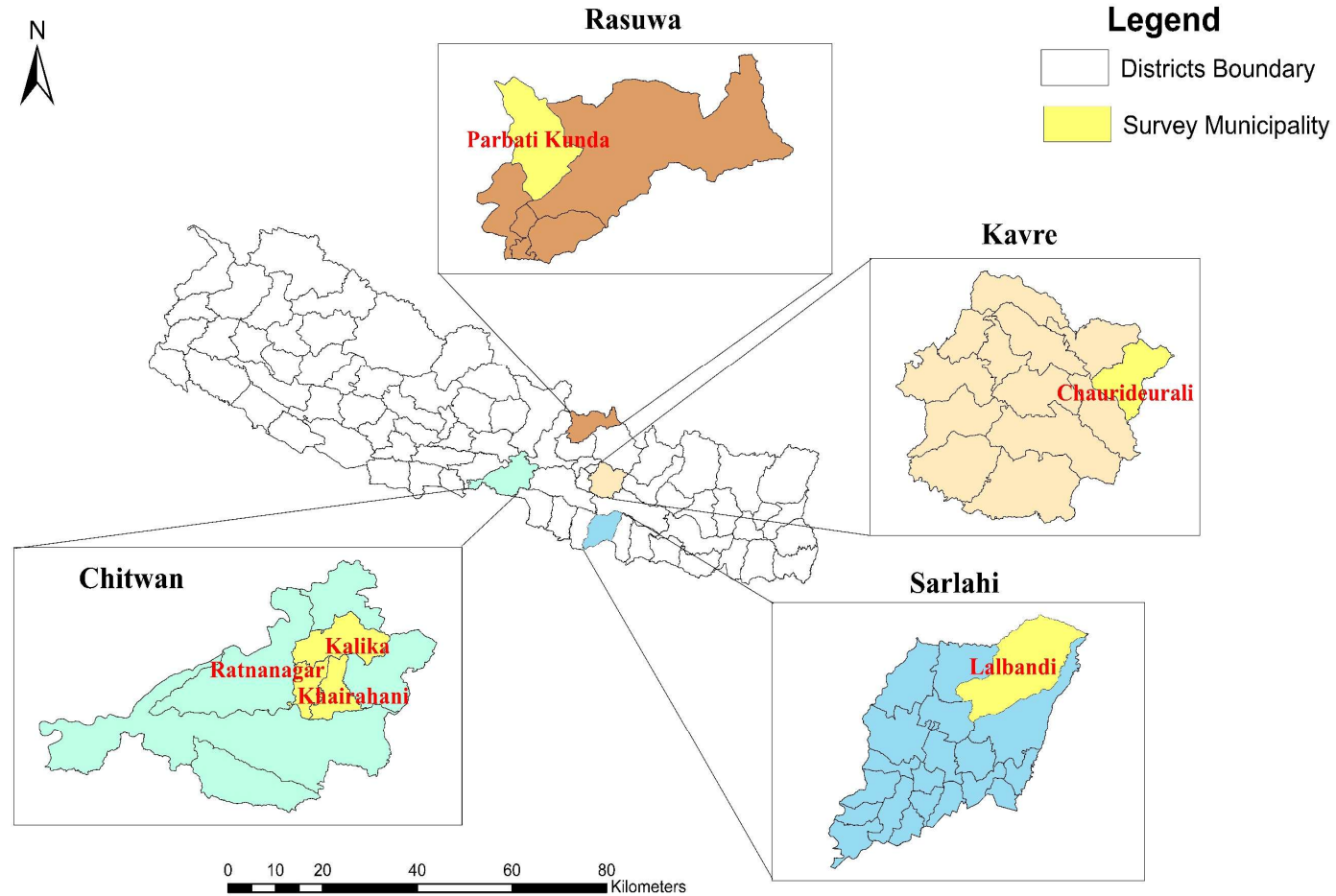


Figure Distribution and comparison of households by main fuel used for cooking (%)

# Financial & Behaviour Intention to Clean Cooking Transition-Study Area



50 HHs each district

# Financial Needs to Willingness to Shift

## Subsidy Preference & Financial Readiness

- Majority willing to transition only if subsidies cover initial investment cost → affordability is the critical financial threshold
- Investment-only subsidies most preferred, yet insufficient alone → many households unaware of operational fuel costs, risk adoption without long-term affordability planning
- Well-targeted, time-bound investment subsidies are necessary but must be paired with operating cost measures to secure sustained adoption

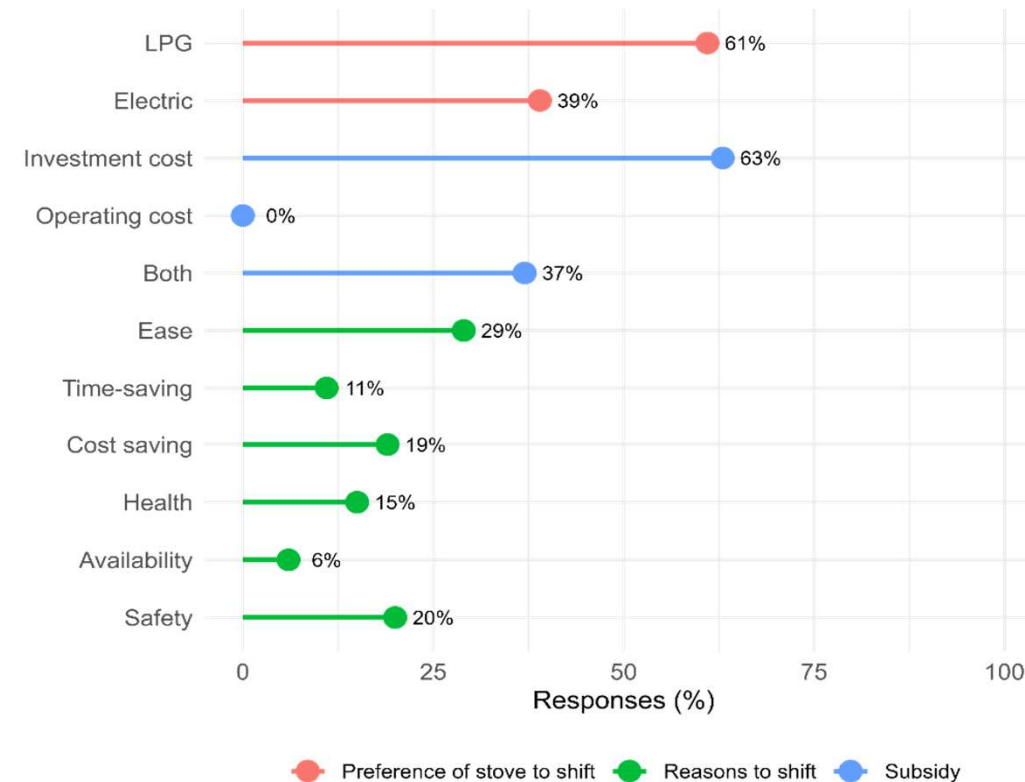
## Reasons to shift

primarily ease of use, safety & health benefits, cost savings, time savings & fuel availability — wellbeing concerns outweigh economic drivers

## Technology Preference

- LPG preferred over electric stoves
- LPG favored for cultural compatibility, convenience & reliability
- Electricity limited by unreliable supply, especially in rural areas and dry season

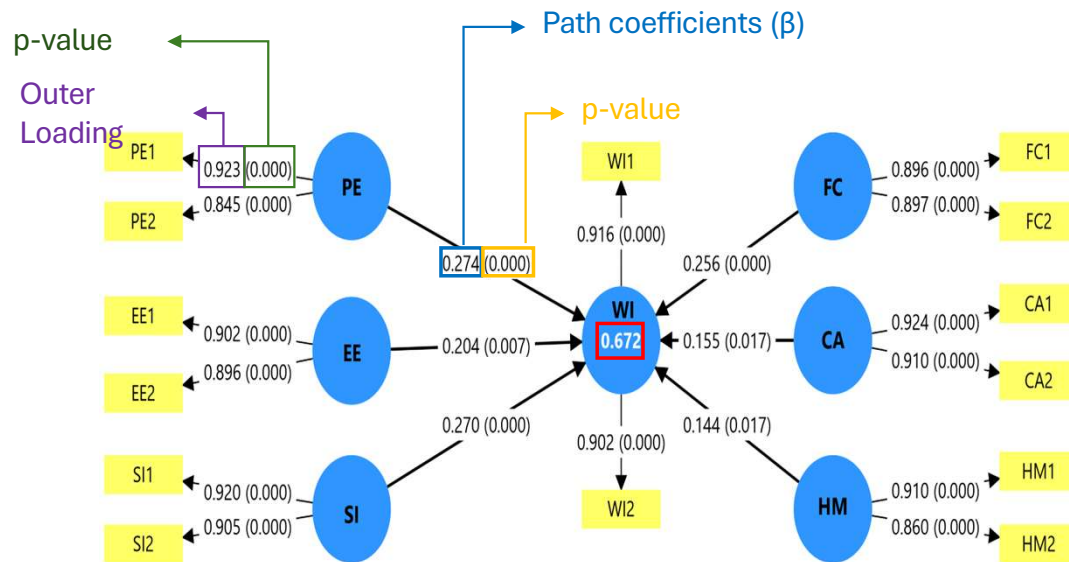
Survey: Solid biomass users



Household preferences, subsidy needs, and reasons for transitioning

# Behavioural Intention to Willingness to Shift (Without Subsidy)

## Unified Theory of Acceptance and Use of Technology (UTAUT) Model



Constructs	Abbreviation
Performance Expectancy	PE
Effort Expectancy	EE
Social Influence	SI
Facilitating Conditions	FC
Cultural Aspect	CA
Hedonic Motivation	HM

**Path Coefficient ( $\beta$ ) Range: -1 to +1**  
 $|\beta| < 0.10 \rightarrow$  negligible effect  
 $|\beta| \geq 0.10 \rightarrow$  small effect  
 $|\beta| \geq 0.20 \rightarrow$  moderate effect  
 $|\beta| \geq 0.35 \rightarrow$  large effect (Hair et al., 2019)

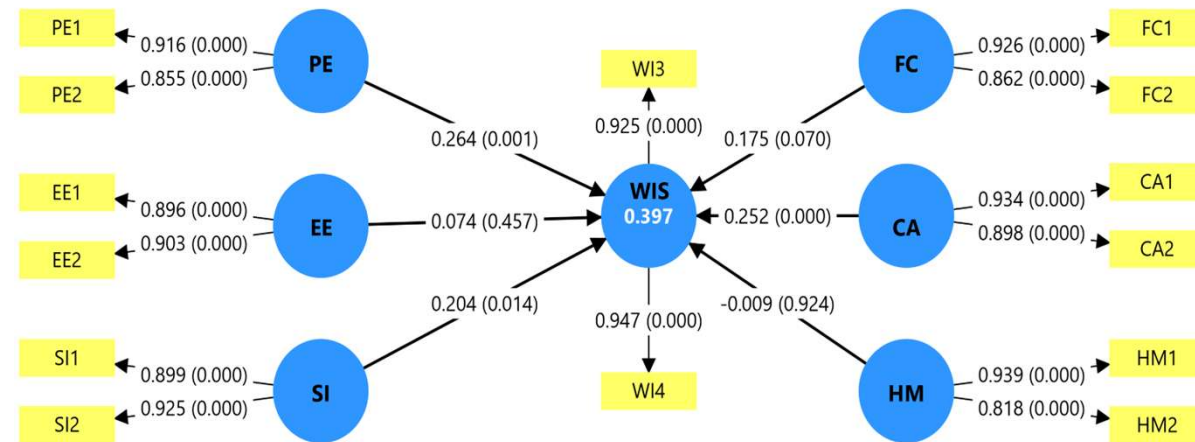
**Outer Loadings (Indicator Reliability) Range: 0 to 1**  
 $\geq 0.70 \rightarrow$  acceptable (recommended threshold)  
 $\geq 0.60 \rightarrow$  tolerable in exploratory research  
 $< 0.40 \rightarrow$  weak

**R<sup>2</sup> (Coefficient of Determination)**  
 $R^2 < 0.25 \rightarrow$  weak  
 $0.25 \leq R^2 < 0.50 \rightarrow$  moderate  
 $0.50 \leq R^2 < 0.75 \rightarrow$  substantial  
 $R^2 \geq 0.75 \rightarrow$  strong

- All 6 UTAUT2 constructs positive & statistically significant
- PE & SI strongest predictors - perceived benefits and social norms dominate adoption intent
- HM weakest yet significant -intrinsic motivation still plays a role
- EE, FC, CA all significant - ease, resources & culture are active drivers
- Model explains 67.2% of variance – most of users' technology adoption behavior

Structural and measurement model results for Willingness to shift

# Behavioural Intention to Willingness to Shift (With Subsidy)



Structural and measurement model results for Willingness to shift

- Only 3 of 6 constructs retained significance
- **PE, CA, SI remain significant - subsidy shifts judgment toward perceived benefits, cultural fit & social pressure**
- EE, FC, HM non-significant - financial support neutralizes practicality, resource & enjoyment concerns
- **Model explains 39.7% of variance- subsidy narrows but does not eliminate behavioral drivers**
- Subsidies reshape rather than replace adoption motivation

# Technical Barriers to Sustained Adoption



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Original research article

Rethinking clean cooking solutions: Assessing the impact of subsidy and distribution modality on improved cook stove programs in Nepal

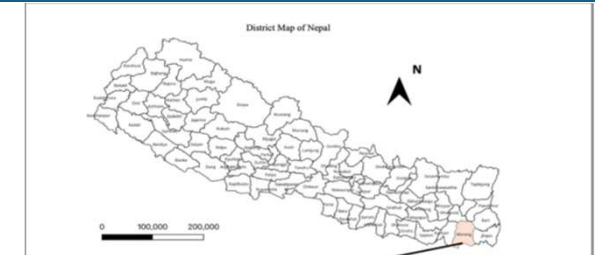
Sunil Prasad Lohani<sup>a,\*</sup>, Rosy Pradhan Shrestha<sup>b</sup>, Mandip Shrestha<sup>c</sup>, Henna Rinta-Kiikka<sup>d</sup>, Jarkko Tissari<sup>d</sup>

<sup>a</sup> Renewable and Sustainable Energy Laboratory, Department of Mechanical Engineering, Kathmandu University, Nepal

<sup>b</sup> Renewable and Sustainable Energy Laboratory, Department of Mechanical Engineering, Kathmandu University, Dhulikhel, Kavre, Nepal

<sup>c</sup> Faculty of Environmental Management, Prince of Songkla University, Thailand

<sup>d</sup> Fine Particle and Aerosol Technology Laboratory, Department of Environmental and Biological Sciences, University of Eastern Finland, Kuopio, Finland



## Low cooking satisfaction

- Low flame and slower cooking reduced food satisfaction.
- Not compatible to cultural practices

## Family-size mismatch

- Better suited to small families than extended households.

## Fuel preparation burden

- Needed small wood chips, adding time and effort.

## Design mismatch

- One standard design could not fit all users and small/single stove size



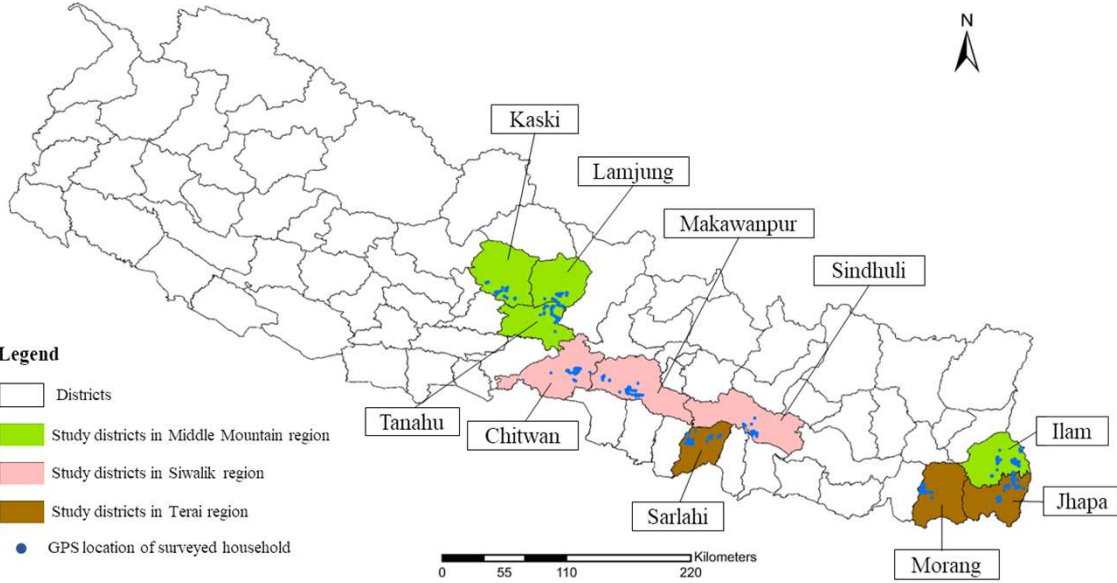
# Technical Barriers to Sustained Adoption

scientific reports

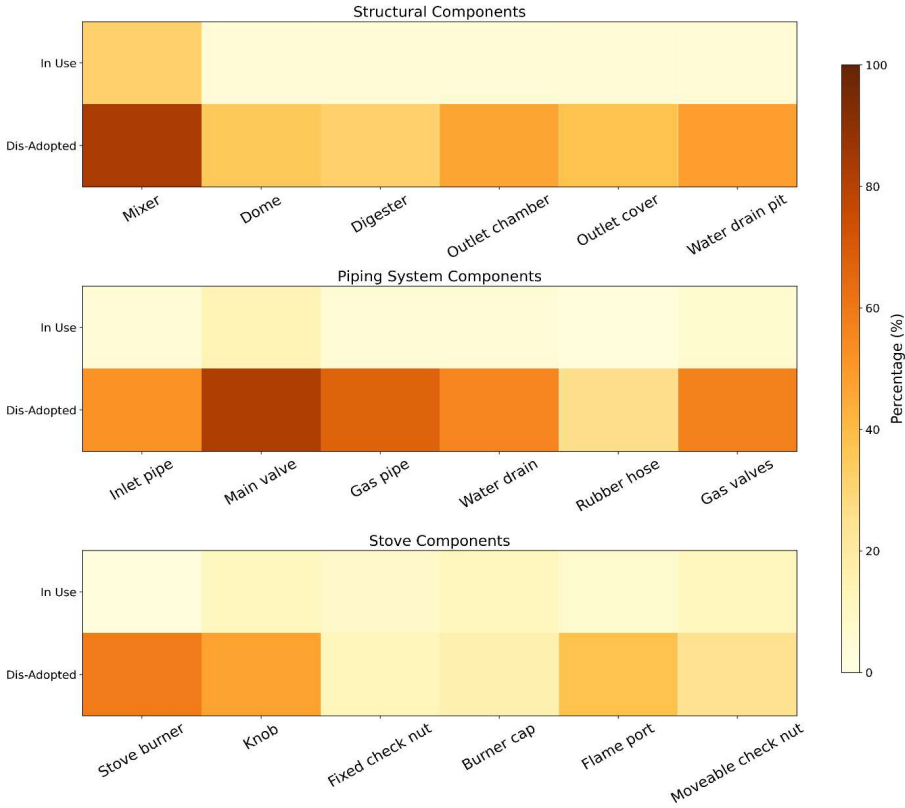
OPEN **Sustainability and contribution of household biogas plants to energy transition in Nepal**

Sunil Prasad Lohani<sup>1,4</sup>, Poushan Shrestha<sup>1,4</sup>, Marc Jeuland<sup>2</sup> & Daniel Kammen<sup>3</sup>

Check for updates



**Figure 1** Map of Nepal showing the survey location. The ten surveyed districts are color-coded according to the region, and the blue dots represent the GPS locations of the clusters of surveyed households.



# Technical Barriers to Sustained Adoption

THE KATHMANDU POST  
Without Fear or Favour  
Wednesday, March 25, 2026  
Lumbini tourism development MP recall rules New infra contracts in limbo Tuberculosis control

**MONEY**  
**Nepal's household biogas dream is quietly collapsing**  
Study finds half of household plants in disuse nationwide, turning decades of investment into stranded public assets.

**The Himalayan**

HOME KATHMANDU NEPAL WORLD **OPINION** BUSINESS SPORTS SCHOOL TIMES ENTER

**Opinion**  
**Rethinking clean cooking interventions in Nepal: Technology must align with user needs**  
By Dr Sunil Prasad Lohani  
Published: 09:59 am Mar 19, 2026

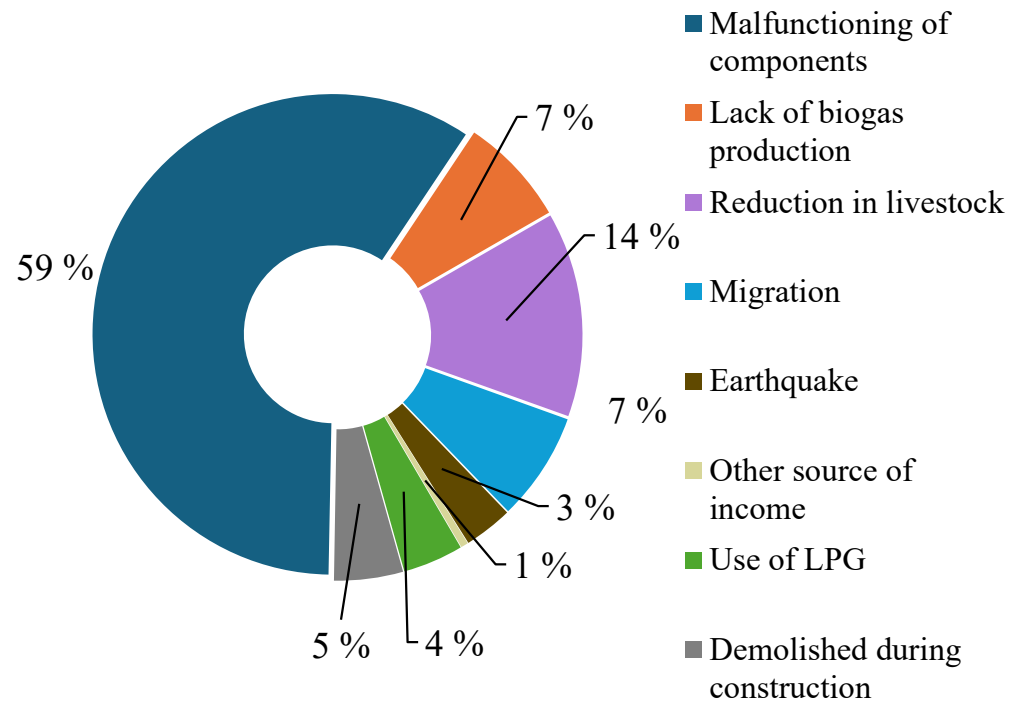
THE KATHMANDU POST  
Without Fear or Favour  
Wednesday, March 25, 2026  
Lumbini tourism development MP recall rules New infra contracts in limbo Tuberculosis control

**EDITORIAL**  
**Invest in biogas**  
The state should do more to promote this cooking solution based on clean energy.

**The Himalayan**

HOME KATHMANDU NEPAL WORLD **OPINION** BUSINESS SPORTS SCHOOL TIMES ENTERTAINMENT

**Opinion**  
**The fading promise of biogas in Nepal: Prioritise sustainability over installation**  
By Dr Sunil Prasad Lohani  
Published: 11:06 am Dec 09, 2025



**Could be 80-90% dis-adoption**

# Conclusion

- **Access without affordability stalls transition.** High upfront costs and absent operational support trap households in traditional biomass despite LPG and near-universal electricity access.
- **Subsidies lower the entry barrier but not the exit risk.** Financial support removes cost concerns while leaving adoption dependent on perceived performance, social pressure and cultural fit rather than internalized motivation.
- **Social norms, perceived benefits and cultural fit are the strongest behavioral levers.** Community demonstration, not technology awareness, drives adoption intent.
- **Technical and design failures drive abandonment.** Component malfunction, family-size mismatch, and cultural incompatibility are the leading causes of non-use.
- **Clean cooking transition demands integrated policy.** Finance, behavior, and adapted design must work together; no single lever is sufficient.

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**THANK YOU!**