Fueling the Engines of Liberation with Cleaner Cooking Fuel
Tushar Bharati¹, Yiwei Qian², Jeonghwan Yun²
¹University of Western Australia, ²University of Southern California

Introduction

- Women held back from participating in productive market activities is human capital wasted.
- Engines of liberation (Greenwood et al. 2005): Adoption of cheap, time-saving technology increased female labor force participation in developed countries.
- The channel has not received enough attention in developed countries.
- We study the 'Conversion to LPG program' in Indonesia to examine the potential role of a household cooking technology in determining female labor force participation in developing countries.

Conversion to LPG program

- Before the 'Conversion to LPG Program' was introduced, 48 out of 52 million Indonesian households depended on kerosene, which was highly subsidized at the time.
- In 2007, to reduce the subsidy burden, the Indonesian government launched the 'Conversion to LPG Program' to promote the use of LPG in Indonesian households.
- Depending on the readiness of the LPG procurement, storage, and distributional infrastructure in the region, the program was rolled out at different times in different regions (Budya and Arofat, 2011).

Data

- The program roll-out information at province level;
- Census data;
- Repeated cross section balanced at the district level.
- Detailed representative panel household survey;

Objectives

We examine the causal impact of the 'Conversion to Liquified Petroleum Gas (LPG) program', an LPG subsidy program in Indonesia, on the:
- household’s adoption LPG as the primary cooking fuel;
- labor force participation of women;
- other outcomes, like health conditions, general well-being, household expenditure and intra-household decision-making power of women.

Empirical Strategy

The identification relies on two sources of variations:
- The staggered program roll-out at the province level over time
- Difference-in-Difference strategy using census data

The program led to
- Increased use of LPG as the primary fuel.
- Increased in the female labor force participation.
- Improved decision-making power of women.

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Complete score (score out of 18)</th>
<th>Financial score (score out of 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-program kerosene</td>
<td>0.25</td>
<td>0.05</td>
</tr>
<tr>
<td>Post x pre-program kerosene</td>
<td>0.39</td>
<td>0.35**</td>
</tr>
<tr>
<td>Female</td>
<td>0.28</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Results

Variation in pre-program kerosene usage rates across communities/sub-districts

- The distribution of LPG depended on the existing kerosene distribution infrastructure.
- Kerosene subsidy was removed when the LPG program was introduced.
- Difference-in-Difference strategy using in census and IFLS data

Figure 1: Staggered roll-out of the LPG subsidy program across provinces

Figure 2: Higher Pre-program Kerosene Adoption Indicates Higher LPG Adoption

Table 1: The Impact on employment status (source: IFLS)

<table>
<thead>
<tr>
<th>Activity</th>
<th>All respondents</th>
<th>Female respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary activity</td>
<td>Post x pre-program kerosene</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.2)</td>
</tr>
<tr>
<td></td>
<td>Post x pre-program kerosene for females</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>(0.28)</td>
<td>(0.15)</td>
</tr>
</tbody>
</table>

Mean of DV

- No significant health improvements.
- Increased in household expenditure on food and education.
- Improved decision-making power of women.

Table 2: The Impact on decision-making power (source: IFLS)

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Complete score (score out of 18)</th>
<th>Financial score (score out of 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-program kerosene</td>
<td>0.25</td>
<td>0.05</td>
</tr>
<tr>
<td>Post x pre-program kerosene</td>
<td>0.39</td>
<td>0.35**</td>
</tr>
<tr>
<td>Female</td>
<td>0.28</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Conclusion

- The program introduced a significant increase in LPG adoption and female labor force participation probably through the time-saving nature of the cooking technology.
- The program improved the decision-making power of women within households that could promote sustained use of LPG even after the subsidy is withdrawn.
- In this way, the program served as an engine of liberation for women in Indonesia.

Contact Information

Email: yiweiqia@usc.edu