What happens after technology adoption:
Gendered aspects of small-scale irrigation technology in Ethiopia, Ghana, and Tanzania

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How could women benefit from scaling up small-scale irrigation?

- **Income**: High value produce, more harvests per year
- **Production**: More nutritious crops
- **Water supply**: More accessible water supply for multiple uses
- **Health risks**: Reduced burden of caring for the sick

(Domenech, 2015; Passarelli et al., under review)
Recognized gendered constraints to technology adoption

- Technologies not designed, priced, or marketed for women
- Limited access to and control over land that can be irrigated and water source for irrigation
- No access to credit to buy technology
- No training on irrigation and agronomic practices
- Cannot reach markets to buy inputs and sell irrigated produce

Is it enough to lift these constraints?

• Lots of attention on the gendered constraints to acquiring technology
• These constraints relate to the first two phases of technology adoption:
  ➢ Awareness → Tryout → Continued adoption (Lindner et al. 1982; Lambrecht 2014)
• Continued adoption: farmers decide whether to continue using the technology, based on their perception of costs and benefits
• Are costs and benefits shared equally by household members, or does only the ‘adopter’ of the technology benefit?
Bringing concepts from two bodies of literature to technology adoption

1. **Gender and assets:** What does it mean for an asset to be ‘jointly’ owned? May be shared rights or different rights (Johnson et al. 2016)

2. **Property rights literature on ‘bundles of rights’:** (e.g. Alchian and Demsetz 1972; Eggertsson 1990; Schlager and Ostrom 1992)

What are property rights to irrigation technology *within the household*?
## Negotiable Intrahousehold Rights to Assets/Technology

<table>
<thead>
<tr>
<th>Right</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
<td>The right to <strong>use/physically operate</strong> the asset</td>
<td>Carry and lay out the pipes of the pump, operate the motor, secure the water source</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>The right to make decisions about <strong>how, when, and where to apply</strong> the technology</td>
<td>Decide to use the irrigation pump on family and women-managed plots of land</td>
</tr>
<tr>
<td><strong>Fructus</strong></td>
<td>The right to <strong>control outputs</strong>, profits from irrigated production</td>
<td>Control the proceeds from sales of the irrigated crop</td>
</tr>
<tr>
<td><strong>Alienation</strong></td>
<td>The right to <strong>sell, lease, or give away</strong> the tech</td>
<td>Lease out the pump to a neighbor for revenue without needing to ask for permission</td>
</tr>
</tbody>
</table>
Methods

- Qualitative data collected in 19 communities in Ethiopia, Ghana, and Tanzania in 2016
- 38 gender-separated focus group discussions (FGDs) were conducted with 375 men and women (190 women)
- Fieldwork in ILSSI pilot and control sites in each country promoting motor pumps, solar pumps, manual water-lifting technologies (e.g. rope and washer or pulley)
- In Tanzania, also included the Helen Keller International (HKI) Enhanced Homestead Food Production project promoting drip irrigation
Results: Distribution of rights (*use, management, fructus, alienation*)

- One member of the household generally does not hold exclusive rights, no matter who is the “adopter”
  - Intrahousehold dynamics likely to dominate despite technology diffusion efforts targeting women
- Men are more likely to hold more rights and higher valued rights to mechanized technologies
- Women typically have use rights in a “helper” role on men’s or family plots, but rarely *fructus* or management rights
- Women may have *fructus* rights using manual technologies on land that men allocate them, but no management right to use mechanized technology on their own plot
Results: Use right is most measured and least valued

- Women who irrigate (manually) are perceived as “suffering”
  - Women in Ghana and Tanzania wanted motor pumps to reduce energy burden; in Ethiopia preferred solar for time savings

- Perception amongst men that shared workload means gender equality
  - “Agricultural responsibilities are for both of us, husband and wife…The only activities which we differ are household chores, whereby when we reach home, she is the one cooking as I am resting. But in agricultural activities, the ratio is 50–50.”

- Yet expectation that women complete family plot and domestic work prior to working on her own plot of land, leaving minimal time to invest on her own land
Results: *Fructus* rights are least measured, but most valued

- Use and management rights do not guarantee *fructus* or alienation rights
- Information asymmetry over the sale of irrigated produce reduces women’s power to negotiate *fructus* rights:
  - “On ownership, it’s father [my husband], because he signs the sacks at the warehouse and even sells, but you won’t even know of the amounts, whether he gives you a fake calculation you just have to accept.”
  - “…you can’t go daily to check them [the sacks], since you aren’t the one who signed for it inside there, because his fellow men will think of me oppositely, so I just remain at home.”
  - Whole value chain, including postharvest, affects *fructus*
- While the profits help to “build good houses,” women are not happy to lose *fructus* rights
Applying an intrahousehold lens to technology diffusion research and programs

- **Overlapping rights**: The person who adopts technology does not necessarily control all rights, nor are all rights shared equally within the household.

- **Use and fructus rights**: use does not necessarily convey *fructus* rights.

- **Strengthening *fructus* rights**: women strategize to preserve *fructus*; can be strengthened through shifts in intrahousehold relations, and/or working outside the household (e.g. collective action).

- **Expectations**: distribution of rights could affect incentives to adopt technologies and more broadly, participate in a project.

- **“Female friendly” technologies**: should consider women’s preferences for technology taking into account these rights.
Questions for future research

- How does adoption modality affect the intrahousehold distribution of rights?
- Do different (irrigation) technologies—including their design, location, mobility, cost, and physical energy requirements—affect the distribution of rights?
- What do men and women consider a fair distribution of rights?
- What social and behavior change measures encourage shared rights to technology?
- To what extent are the technologies men and women prefer related to expectations about the distribution of rights?