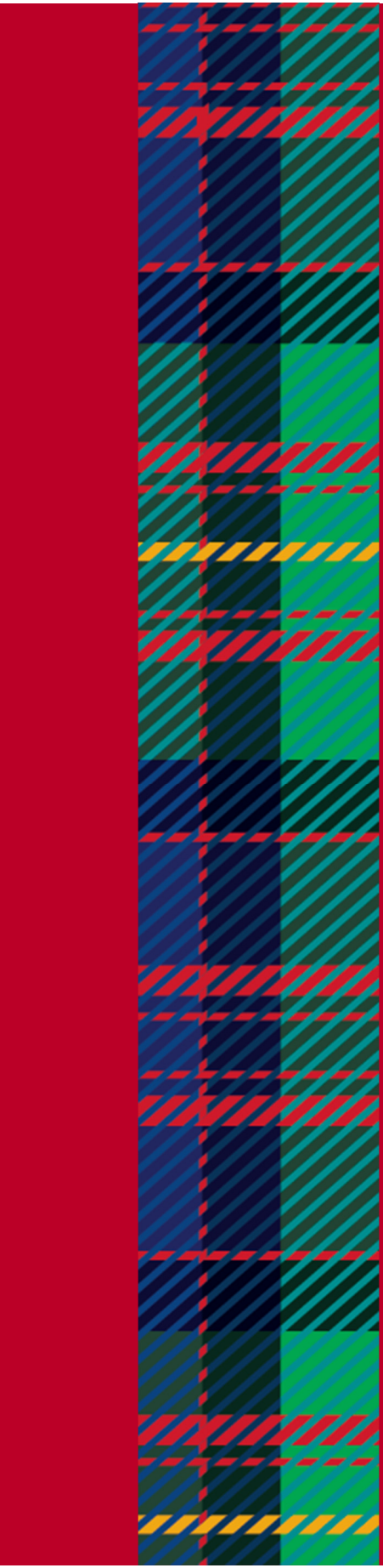




Carnegie Mellon University

Novel mixed methods and approaches to isolate structural components in community dynamics

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Gender Summit 21

April 15

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SINCE 1970

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(India)**



**School for International Training
(SIT India Sustainable Development
and Social Change Programme)**

**Carnegie
Mellon
University**

Isolating structural components around community dynamics requires us to rethink relationships between sustainable development goals (SDGs)

**What we usually do is think
about SDGS in isolation**



Image from <https://i1.wp.com/www.un.org/sustainabledevelopment/wp-content/uploads/2015/12/english-SDG-17goals-poster-all-languages-with-UN-emblem-1.png?fit=728%2C451&ssl=1>

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What we ought to do is think about SDGS in interaction

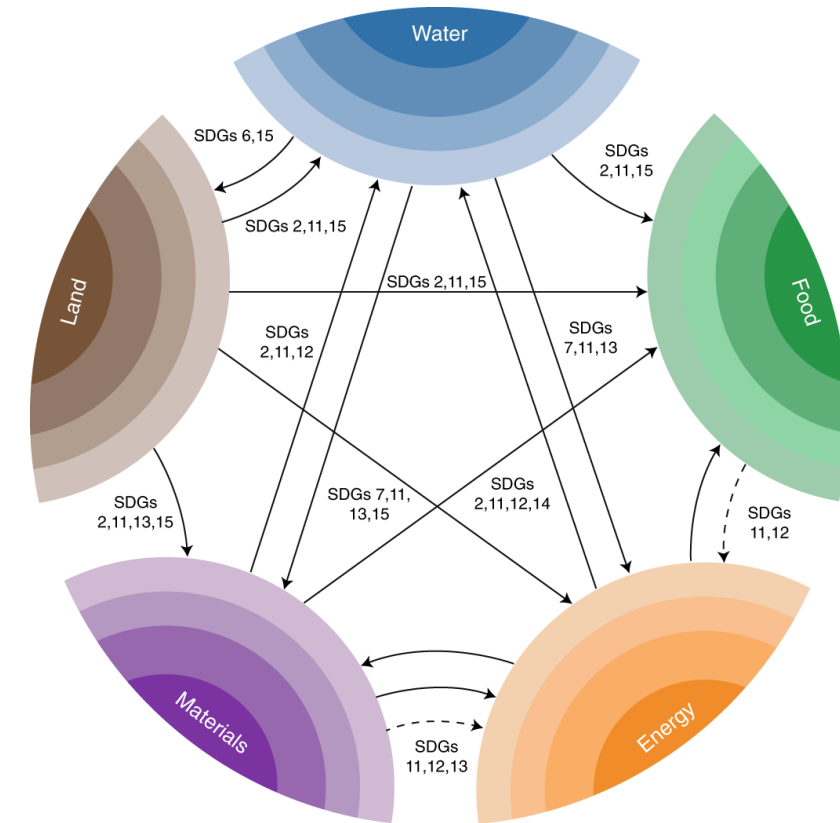


Figure 1 from Bleischwitz, R., et al., 2018. Resource nexus perspectives towards the United Nations Sustainable Development Goals. *Nature Sustainability* 1, 737-743.

Isolating structural components around community dynamics requires us to rethink relationships between sustainable development goals (SDGs)

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We need to think more about **interdependencies** between SDGs, especially more **resource-based** and **socially-oriented** SDGs

What we ought to do is think about SDGS in interaction

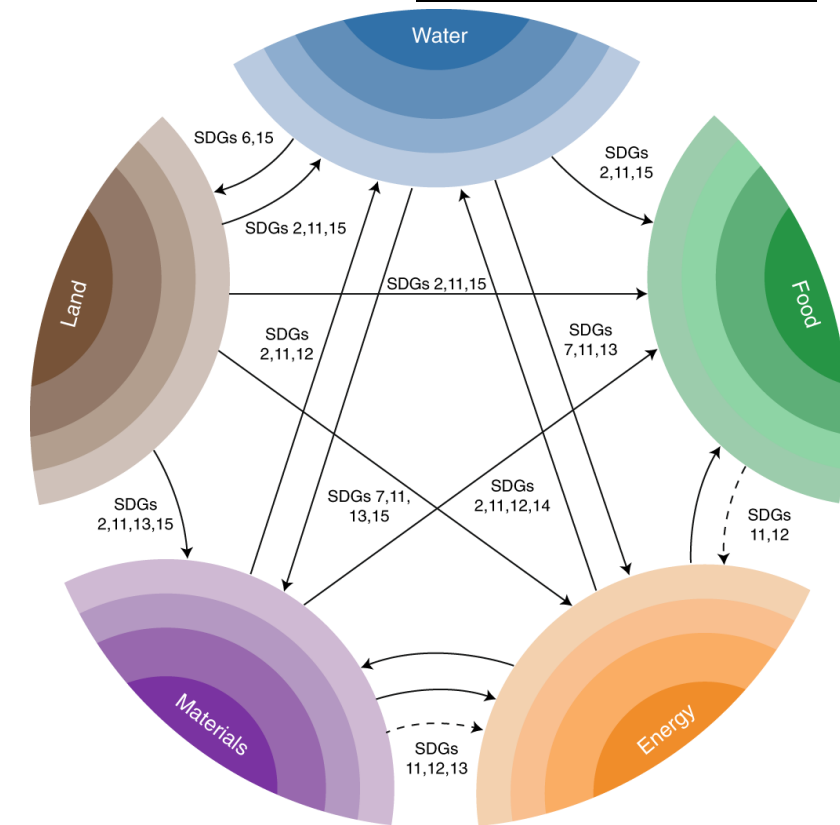


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Such reconceptualization requires a mixture of methods

Difficult Challenge

- Interacting systems with different norms
- Difficult to make these systems salient to those affected
- Data constraints

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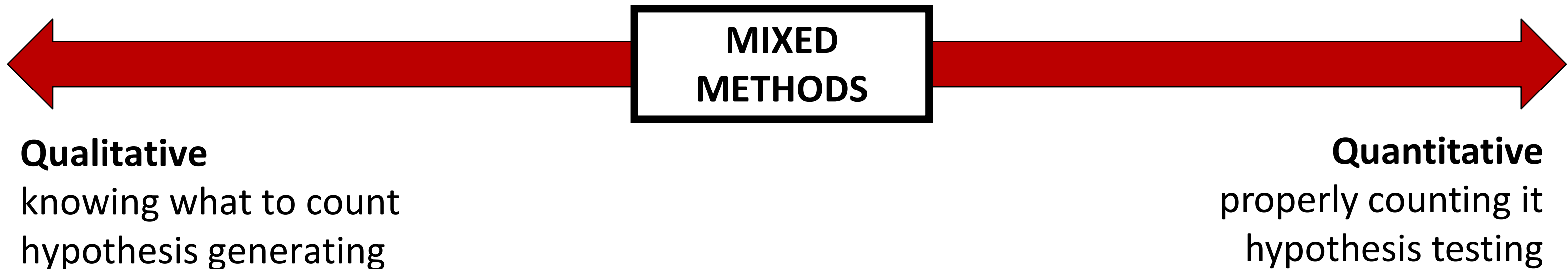
Qualitative

knowing what to count
hypothesis generating

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Novel Mixed Methods Example – Gender Inequality in Electricity Infrastructure

Rosenberg, et al. 2020 - *Nature Sustainability*
(<https://www.nature.com/articles/s41893-019-0447-3>)

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- If we consider electricity ***usage beyond access***, are benefits equally distributed between males and females? -Links SDG 5 (gender) with SDG 7 (energy)

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- If we consider electricity ***usage beyond access***, are benefits equally distributed between males and females? -Links SDG 5 (gender) with SDG 7 (energy)
- Study 1 (Qualitative): Appliance Access & Usage Survey (N=31 women)
- Study 2 (Quantitative): ACCESS Data (N=8,563 households – <http://dx.doi.org/10.7910/DVN/0NV9LF>)

Context: India

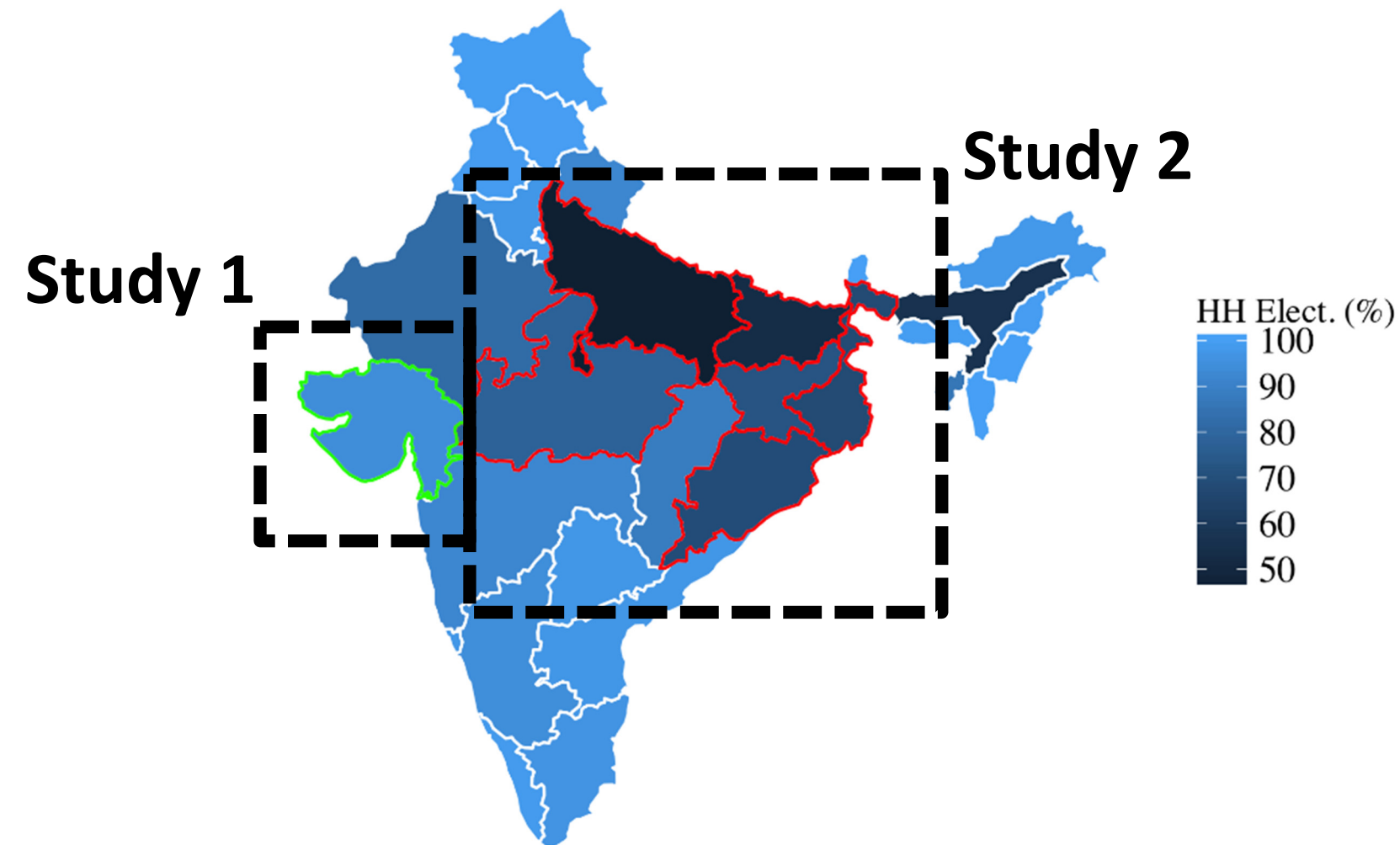
Country with largest un-electrified population in the world
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Study 1: Women do not benefit as much as men

More male-used appliances												
	Appliance access						Appliance usage					
	Has appliance			Average points of use			Female usage			Male usage		
	TV	Non-kitchen fan	Mobile	TV	Non-kitchen fan	Mobile	TV	Non-kitchen fan	Mobile	TV	Non-kitchen fan	Mobile
Payment problems ($n = 22$)	82%	100%	95%	0.86	3.73	2.55	72%	91%	62%	100%	100%	100%
No payment problems ($n = 8$)	75%	88%	88%	0.75	2.63	1.25	33%	63%	43%	100%	100%	100%
Land owner ($n = 8$)	100%	100%	100%	1.00	4.75	3.38	88%	88%	75%	100%	100%	100%
Not a land owner ($n = 23$)	70%	91%	91%	0.74	2.83	1.74	50%	82%	52%	100%	100%	100%
Kids ($n = 19$)	79%	95%	89%	0.84	3.21	2.16	73%	89%	59%	100%	100%	100%
No kids ($n = 12$)	75%	92%	100%	0.75	3.50	2.17	44%	73%	58%	100%	100%	100%
High caste ($n = 7$)	100%	100%	100%	1.00	4.43	2.86	71%	71%	71%	100%	100%	100%
Not high caste ($n = 24$)	71%	92%	92%	0.75	3.00	1.96	59%	87%	55%	100%	100%	100%
All households ($n = 31$)	77%	94%	94%	0.81	3.32	2.16	83%	90%	66%	100%	100%	100%

Rosenberg, M., Armanios, D. E., Aklin, M., & Jaramillo, P. 2020. Evidence of gender inequality in energy use from a mixed-methods study in India. *Nature Sustainability*, 3(2): 110-118.

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Payment problems (<i>n</i> = 22)	82%	100%	95%	0.86	3.73	2.55		100%	100%	100%
No payment problems (<i>n</i> = 8)	75%	88%	88%	0.75	2.63	1.25		100%	100%	100%
Land owner (<i>n</i> = 8)	100%	100%	100%	1.00	4.75	3.38		100%	100%	100%
Not a land owner (<i>n</i> = 23)	70%	91%	91%	0.74	2.83	1.74		100%	100%	100%
Kids (<i>n</i> = 19)	79%	95%	89%	0.84	3.21	2.16		100%	100%	100%
No kids (<i>n</i> = 12)	75%	92%	100%	0.75	3.50	2.17		100%	100%	100%
High caste (<i>n</i> = 7)	100%	100%	100%	1.00	4.43	2.86	100%	100%	100%	
Not high caste (<i>n</i> = 24)	71%	92%	92%	0.75	3.00	1.96	100%	100%	100%	
<i>All households (n = 31)</i>	<i>77%</i>	<i>94%</i>	<i>94%</i>	<i>0.81</i>	<i>3.32</i>	<i>2.16</i>		<i>100%</i>	<i>100%</i>	<i>100%</i>

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Study 1: Women do not benefit as much as men

More female-used appliances																		
	Appliance access						Appliance usage											
	Average points of use						Female usage						Male usage					
	Iron	Kitchen light	Kitchen fan	Mixer	Sewing machine	Grinder	Iron	Kitchen light	Kitchen fan	Mixer	Sewing machine	Grinder	Iron	Kitchen light	Kitchen fan	Mixer	Sewing machine	Grinder
Payment problems (<i>n</i> = 22)	0.50	0.64	0.18	0.59	0.27	0.23	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	17%	0%
No payment problems (<i>n</i> = 8)	0.38	0.13	0.00	0.00	0.00	0.00	100%	100%	NA	NA	NA	NA	0%	0%	NA	NA	NA	NA
Land owner (<i>n</i> = 8)	1.00	1.00	0.25	0.88	0.63	0.38	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	20%	0%
Not a land owner (<i>n</i> = 23)	0.26	0.30	0.09	0.30	0.04	0.09	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	0%	0%
kids (<i>n</i> = 19)	0.53	0.58	0.05	0.47	0.26	0.21	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	20%	0%
No kids (<i>n</i> = 12)	0.33	0.33	0.25	0.42	0.08	0.08	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	0%	0%
High caste (<i>n</i> = 7)	0.86	0.86	0.29	0.71	0.43	0.14	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	33%	0%
Not high caste (<i>n</i> = 24)	0.33	0.38	0.08	0.38	0.13	0.17	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	0%	0%
All households (<i>n</i> = 31)	0.45	0.48	0.13	0.45	0.19	0.13	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	17%	0%

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No payment problems (<i>n</i> = 8)	0.38	0.13	0.00	0.00	0.00	0.00	100%	100%	NA	NA	NA	NA
Land owner (<i>n</i> = 8)	1.00	1.00	0.25	0.88	0.63	0.38	100%	100%	100%	100%	100%	100%
Not a land owner (<i>n</i> = 23)	0.26	0.30	0.09	0.30	0.04	0.09	100%	100%	100%	100%	100%	100%
kids (<i>n</i> = 19)	0.53	0.58	0.05	0.47	0.26	0.21	100%	100%	100%	100%	100%	100%
No kids (<i>n</i> = 12)	0.33	0.33	0.25	0.42	0.08	0.08	100%	100%	100%	100%	100%	100%
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All households (<i>n</i> = 31)	0.45	0.48	0.13	0.45	0.19	0.13	100%	100%	100%	100%	100%	100%

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Study 1: Economic affordability does not fully explain this

	HH Access F Usage M Usage					
	Kitchen Light	Kitchen Fan	Kitchen Light	Kitchen Fan	Kitchen Light	Kitchen Fan
No problems with payment (N=22)	0.64	0.18	100%	100%	0%	0%
Problems with payment (N=8)	0.13	0.00	100%	N/A	0%	N/A
Land Owner (N=8)	1.00	0.25	100%	100%	0%	0%
Non-Land Owner (N=23)	0.30	0.09	100%	100%	0%	0%
Kids (N=19)	0.58	0.05	100%	100%	0%	0%
No Kids (N=12)	0.33	0.25	100%	100%	0%	0%
High Caste (N=7)	0.86	0.29	100%	100%	0%	0%
Non-High Caste (N=24)	0.38	0.08	100%	100%	0%	0%
All Households (N=31)	0.48	0.13	100%	100%	0%	0%

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Kids (N=19)	0.58	0.05	100%	100%	
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Kids (N=19)	0.58	0.05	100%	100%
No Kids (N=12)	0.33	0.25	100%	100%
High Caste (N=7)	0.86	0.29	100%	100%
Non-High Caste (N=24)	0.38	0.08	100%	100%
All Households (N=31)	0.48	0.13	100%	100%

HH AccessF Usage M Usage

	Non-Kitchen Fan	Non-Kitchen Fan	Non-Kitchen Fan
No problems with payment (N=22)	3.73	91%	100%
Problems with payment (N=8)	2.63	63%	100%
Land Owner (N=8)	4.75	88%	100%
Non-Land Owner (N=23)	2.83	82%	100%
Kids (N=19)	3.21	89%	100%
No Kids (N=12)	3.50	73%	100%
High Caste (N=7)	4.43	71%	100%
Non-High Caste (N=24)	3.00	87%	100%
All Households (N=31)	3.32	90%	100%

HH AccessF Usage M Usage

	Non-Kitchen Bulb	Non-Kitchen Bulb	Non-Kitchen Bulb
No problems with payment (N=22)	4.91	100%	100%
Problems with payment (N=8)	3.13	100%	100%
Land Owner (N=8)	5.88	100%	100%
Non-Land Owner (N=23)	3.74	100%	100%
Kids (N=19)	3.84	100%	100%
No Kids (N=12)	5.00	100%	100%
High Caste (N=7)	6.00	100%	100%
Non-High Caste (N=24)	3.79	100%	100%
All Households (N=31)	4.29	100%	100%

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Study 1: Women do not benefit as much as men

Women can more easily engage in work (96%) and work longer into the night (91%)

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Women can more easily use daytime hours towards activities of interest

- 65% say they can more easily engage in leisurely activities and 70% say they can access more information sources

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Women can more easily use daytime hours towards activities of interest

- 65% say they can more easily engage in leisurely activities and 70% say they can access more information sources

Women may be working longer both day & night

- Only about half (57%) said they spend less time in household work

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Electricity access has **not** changed the local **patriarchal social structure** (more bargaining power for males)

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- Only 26% felt they have more ability to do what they want

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- Some respondents even stopped talking when males came home

- Even wealthier females noted the very interview was not possible with males present and they could not leave home unaccompanied

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Study 1: What can explain this? – Local Social Norms Drive Power

Electricity access is associated with appliances more frequently used by those with more power in the household

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H1: households with electricity access will be associated with more male-used than female-used appliances

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H2: even for more affordable appliances (light bulbs and fans), we expect these appliances will be more greatly associated in those locations that are more frequented by males than females (non-kitchen)

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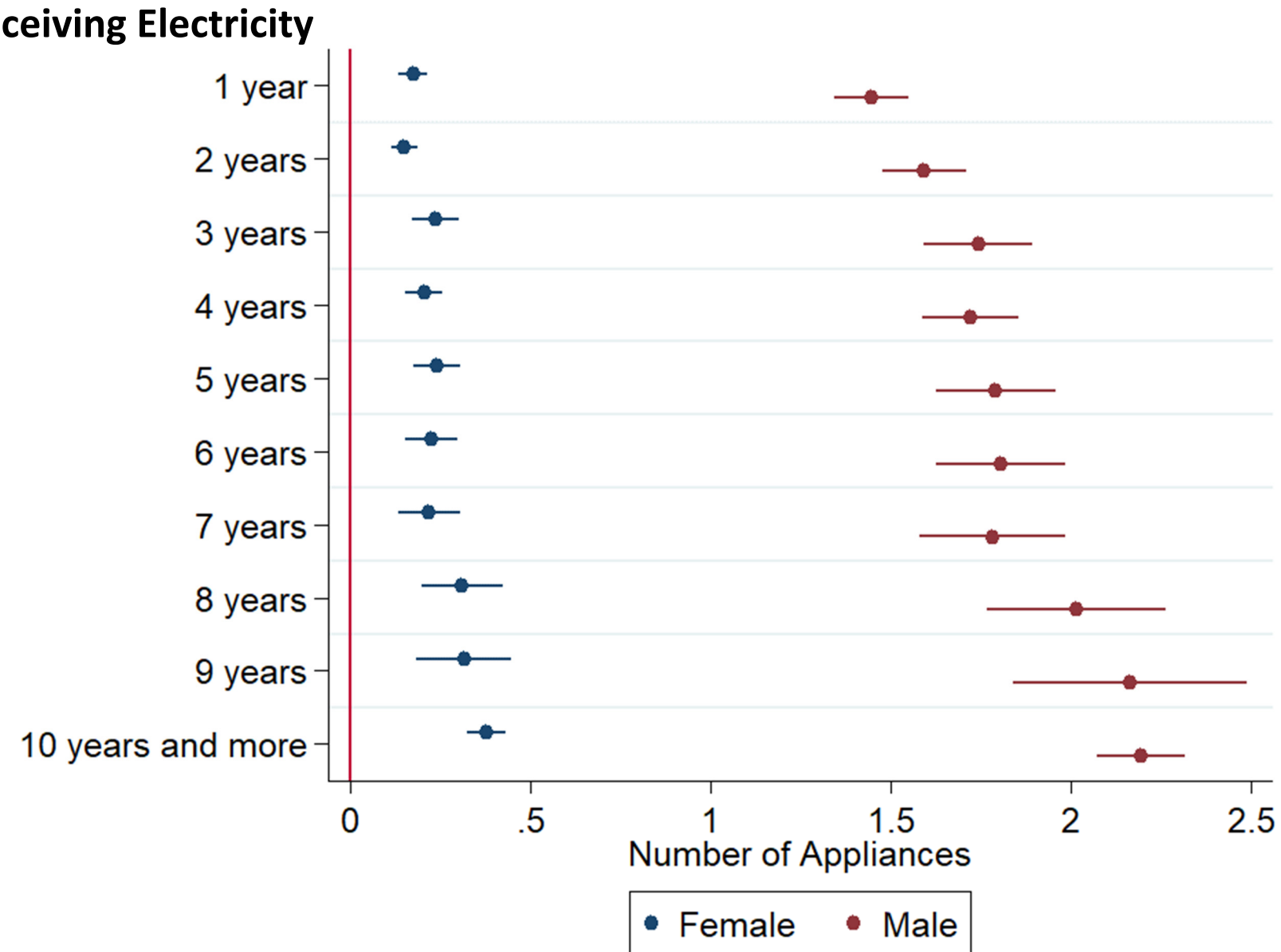
H1: households with electricity access will be associated with more male-used than female-used appliances

H2: even for more affordable appliances (light bulbs and fans), we expect these appliances will be more greatly associated in those locations that are more frequented by males than females (non-kitchen)

We would expect that H1 and H2 will not hold for female-led households

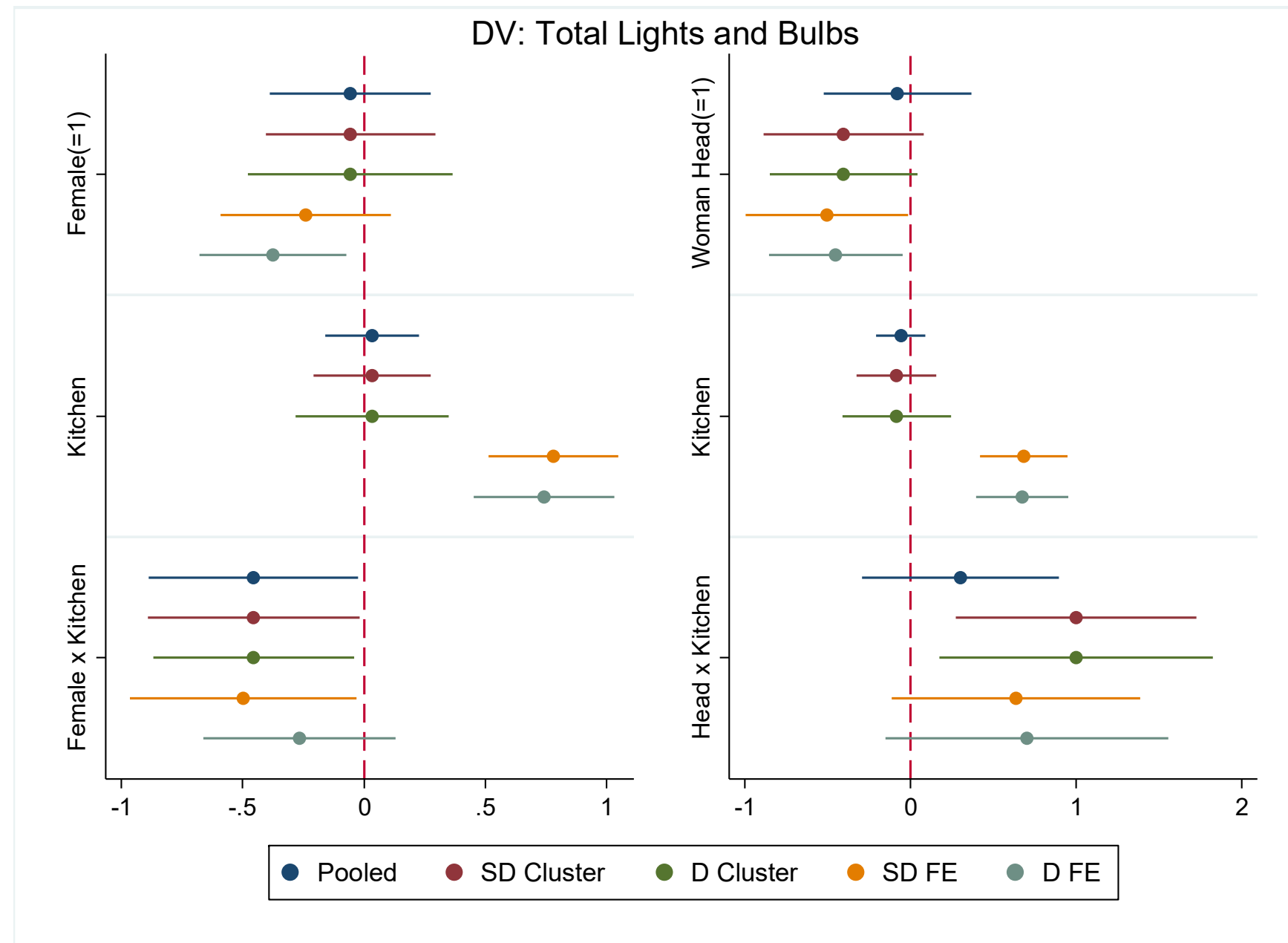
Rosenberg, M., Armanios, D. E., Aklin, M., & Jaramillo, P. 2020. Evidence of gender inequality in energy use from a mixed-methods study in India. *Nature Sustainability*, 3(2): 110-118.

Study 2: H1 supported



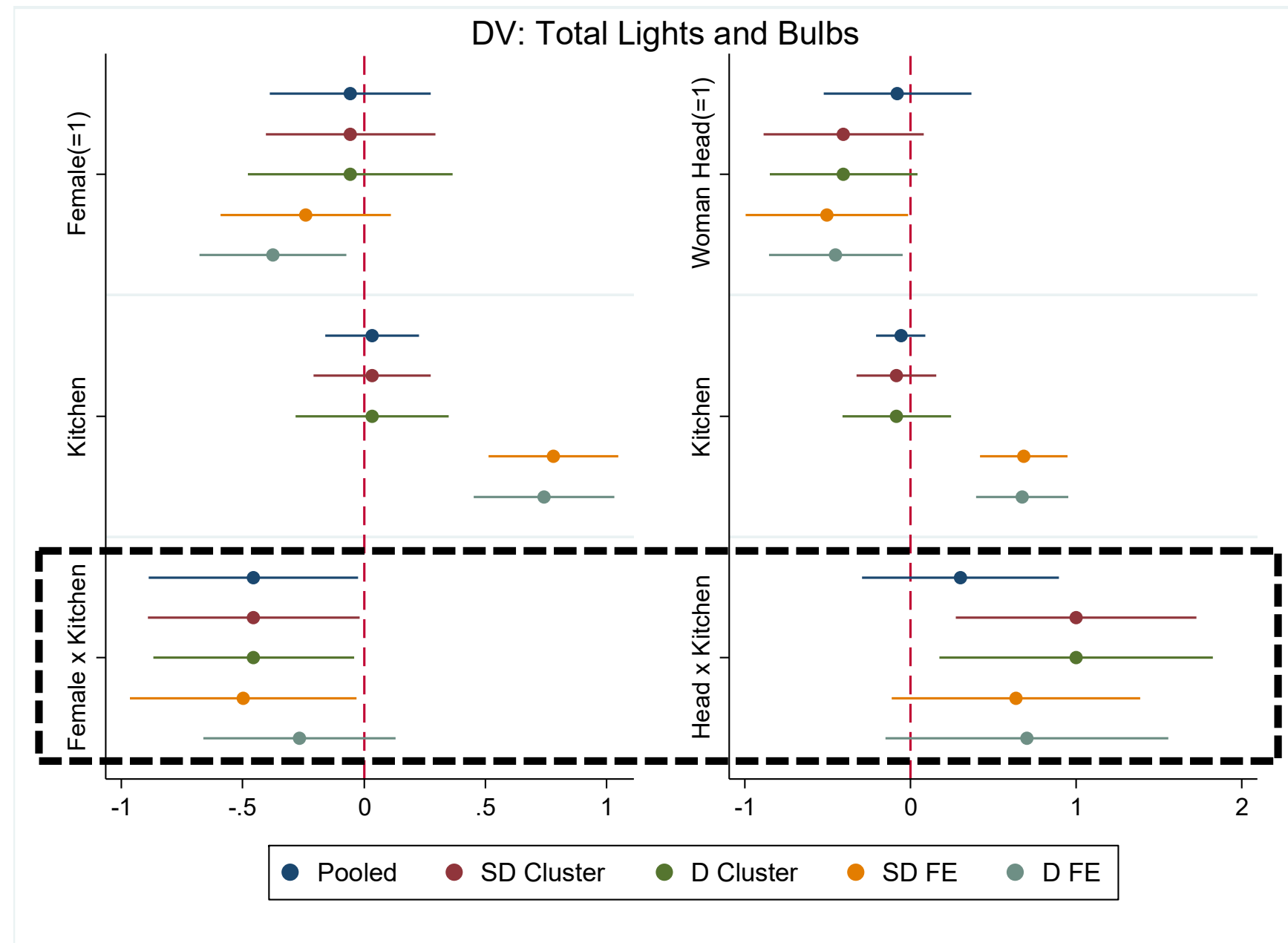
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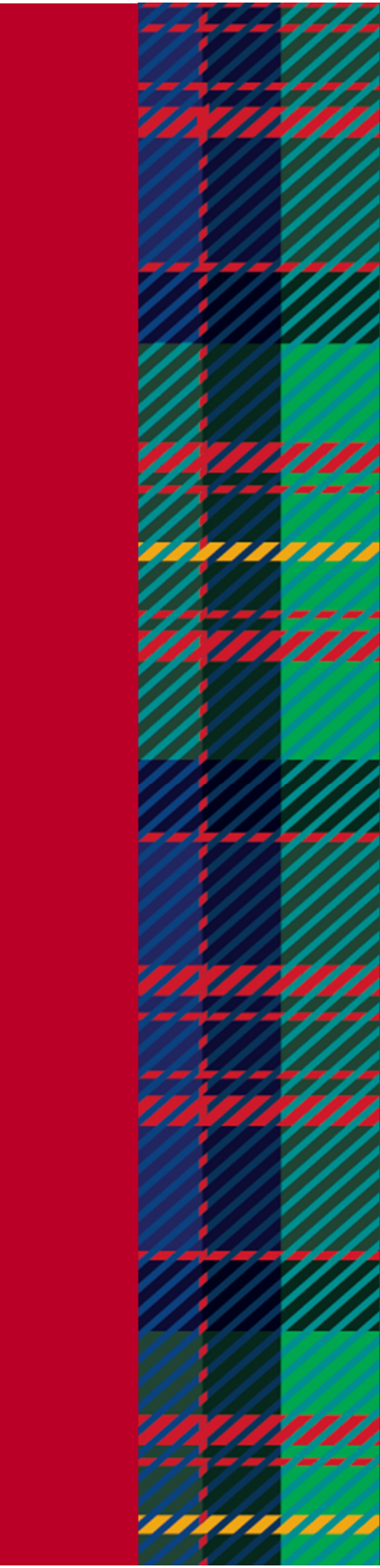
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When data is not confidential, sharing constructed archival datasets

- Armanios, DE. et al. 2020 - <https://doi.org/10.5465/amd.2018.0014>
(Dataset: <https://www.cmu.edu/epp/stategovexp/>)



Carnegie Mellon University

Thank You!

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