

Time is not money: an experiment with community contribution requirements in cash and labour

Md. Ahasan Habib, PhD

NGO Forum for Public Health

With Anna Tompsett, Serenna Cocciolo and Selene Ghisolfi

WASH Economics Conference 2026

17th- 18th April 2026, Ahmedabad

CWAS
CRDF
CENTER FOR WATER AND SANITATION
CEPT UNIVERSITY

CEPT
UNIVERSITY
FACULTY OF PLANNING

IFS
Institute for Fiscal Studies

LONDON
SCHOOL OF
HYGIENE
& TROPICAL
MEDICINE

Gates Foundation



World Bank funding for local participatory development \$85bn over a decade, “still driven more by ideology and optimism than by systematic analysis, either theoretical or empirical”.

Mansuri and Rao (2013)

Community contribution requirements in cash, materials, or labour almost universal in community development projects.

White et al. (2018)

Why impose contribution requirements?

- + Screen out groups with lower demand
- + Create a “sense of ownership”
- + The “sunk cost” hypothesis
- + Efficiency via cost sharing
- May exclude poorest groups
- Undermines poverty reduction

What does a collective contribution requirement imply?

- ❑ What does a collective contribution requirement imply?
 - (Re-)introduces coordination and free rider problems.
 - Endogenizes within-community distribution of costs and benefits.
- ❑ Cash vs labour? Descriptive literature focuses on distributional consequences (who benefits):
 - Cash: excludes poorer groups, greater influence on decision-making for the rich, facilitate/legitimize elite capture.
 - Labour: regressively borne by the poor

How does requiring targeted beneficiary communities to contribute collectively in cash or labour affect the **average impact** and the **distribution of costs and benefits** in projects to provide safe community wells in rural Bangladesh?



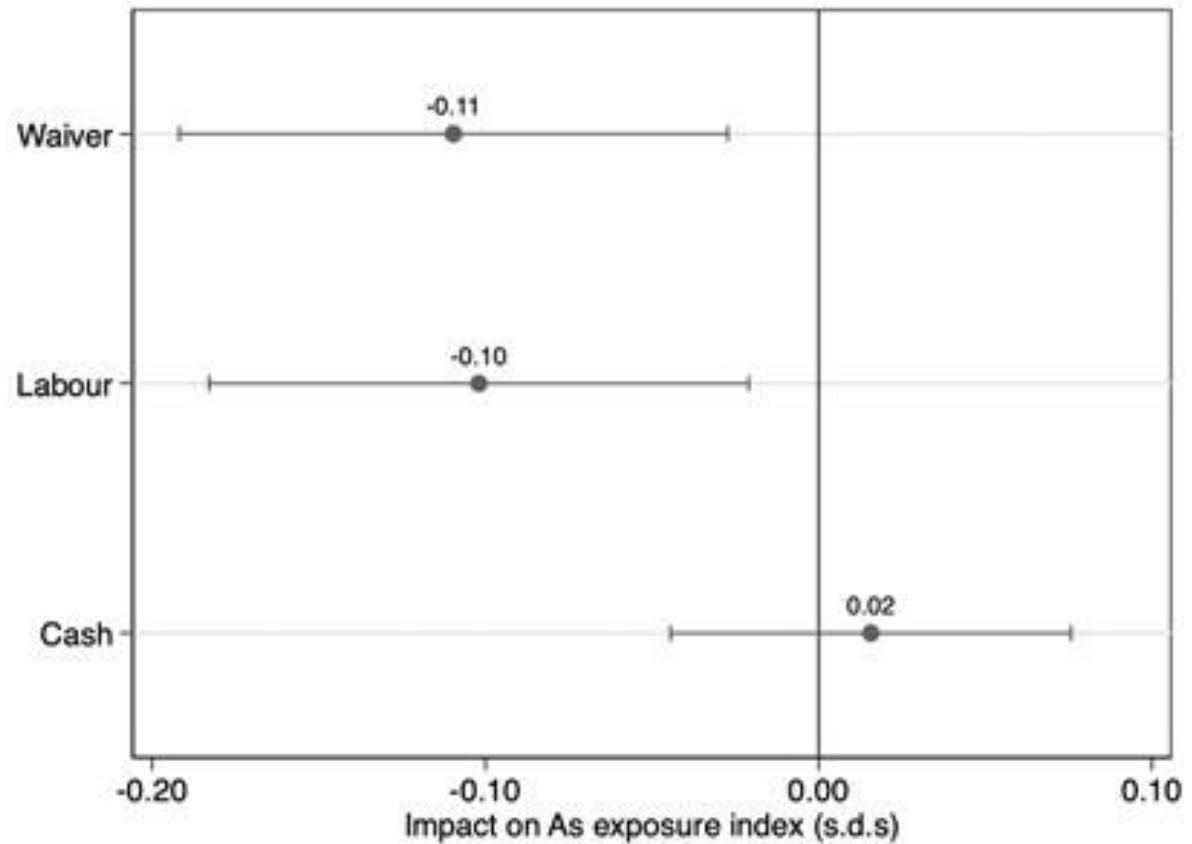
Empirical problem

Approach to contribution requirements correlated with other characteristics of implementing organization, community, and project, that may otherwise affect outcomes.

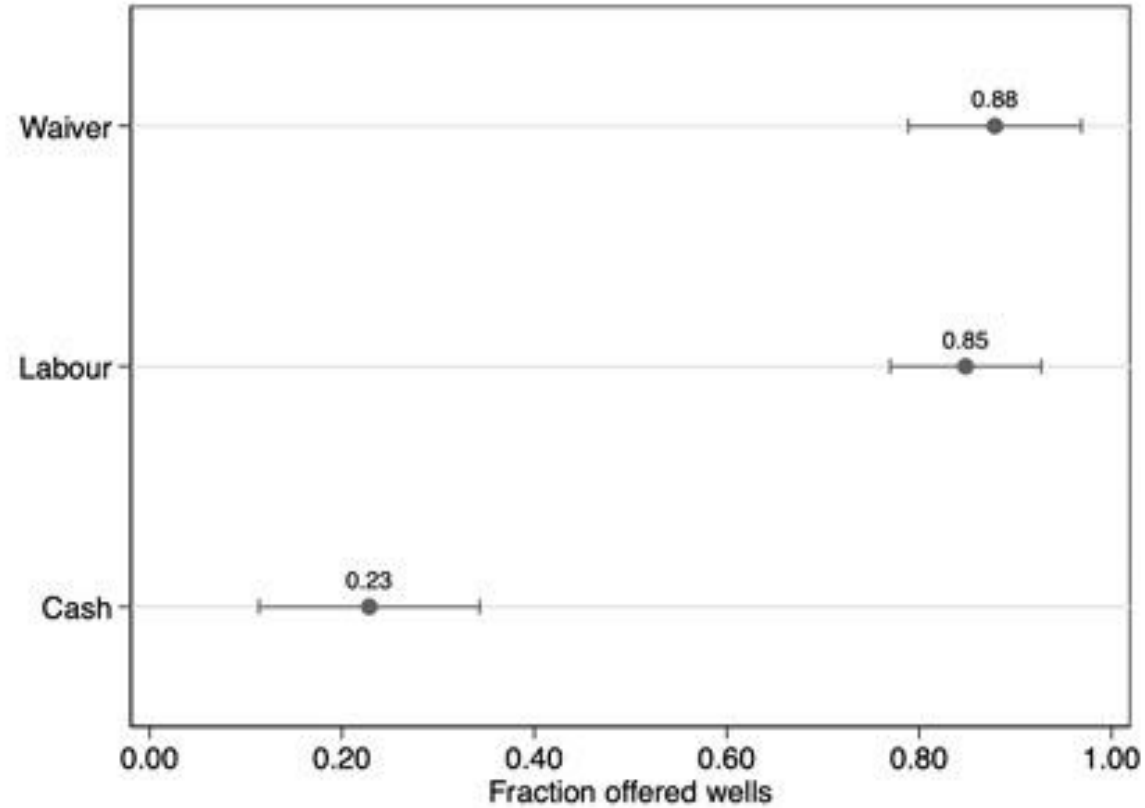
This study

- Implement a program of interventions designed to increase access to safe drinking water in 129 out of 171 communities
 - Subsidies and technical advice for arsenic-safe wells
- Randomly assign treated communities to:
 - cash contribution (status quo)
 - labour contribution, equivalent value priced at unskilled wage
 - contribution waiver
- Objective measure of impacts: water quality testing
 - Elucidate mechanism with rich quantitative/qualitative data

Average impacts



Impacts on community take-up of offered wells



Why?

- ❑ All cash contribution communities agree on a well location.
- ❑ Communities then fail to raise cash contribution.
 - Monetary value of labour substantially below unskilled wage.
 - Coordination costs appear higher for cash than labour.

Distributional effects: all second order

- ❑ Contributors are wealthier than non-contributors, for both cash and labour.
- ❑ Use patterns of successfully installed wells, and characteristics of well users, are similar across treatment arms.

Previous literature

- ❑ Rich non-experimental literature, focus on distribution:
 - e.g., Bowen 1986; Ribot 1995; Chase 2002; Ravallion 2009; Wong et al. 2013
- ❑ Experiments with prices/time costs for private goods with externalities: prices:
 - Kremer and Miguel 2007; Cohen and Dupas 2010; Ashraf et al. 2010
 - time costs: Thornton 2008; Dupas et al. 2016; Sylvia et al. 2022
- ❑ The monetary value of time in poor rural communities: labour markets:
 - Kaur 2019; Breza et al. 2021; Breza et al. 2022
 - valuations: e.g., Alam 2006; Kremer et al. 2011; Agness et al. 2022
- ❑ Block grant vs voucher-funded public good project (Beath et al. 2018)
 - Communities debate for longer and choose projects that are less closely aligned with leader preferences under voucher system

Our contributions

- ❑ First experimental evidence on effects of net collective contribution requirements for a development intervention.
- ❑ First experimental comparison of cash and labour contribution requirements

Arsenic (As) pollution in Bangladesh

the largest poisoning of a population in history

Smith et al. (2000)

- ❑ Naturally-occurring As contaminates shallow aquifers.
- ❑ Effects on human health include: skin lesions, cancers, miscarriage, congenital malformation.
- ❑ 1970s and 1980s: diarrhoeal disease from drinking bacterially-contaminated surface water; international agencies promote switch to groundwater.
- ❑ 1990s: cases of As poisoning emerge; As detected in shallow groundwater.
- ❑ 2013: ≈40m people drinking water with As > WHO standard.

Providing arsenic safe drinking water

- Switch to an arsenic safe source of drinking water, i.e., deep tubewells
- Installed using primarily manual labour
- Average cost of installation \approx \$700 (per capita GDP \$1360)
- Consumption of safe water \approx non-rival at low congestion \rightarrow provision presents a local public good problem



Intervention Package

- ❑ A package of technical advice and subsidies to construct 1 or 2 safe drinking water sources per community (50 to 250 hh).
- ❑ Interventions identical, except for contribution rules:
 - Cash: 6,000 BDT (\$72) \approx 10% installation costs
 - Labour: 18 person-days of unskilled labour, valued using unskilled wage at 5,400 BDT (\$65) \approx 9% installation costs
 - Waiver: contribution requirement “waived”.
- ❑ Community contribution risk-free. If installation failed:
 - cash contribution refunded (N = 2)
 - labour contribution compensated at market value (N = 7)

Decisions about well location

- ❑ Information meetings in each cluster of community
- ❑ General meeting with participation requirements for women and the poor
 - Decision-making by consensus, moderated by field staff
(Madajewicz et al. 2021)
 - Show large-scale local map of arsenic contamination Discuss contribution requirements only at general meeting

Installation process

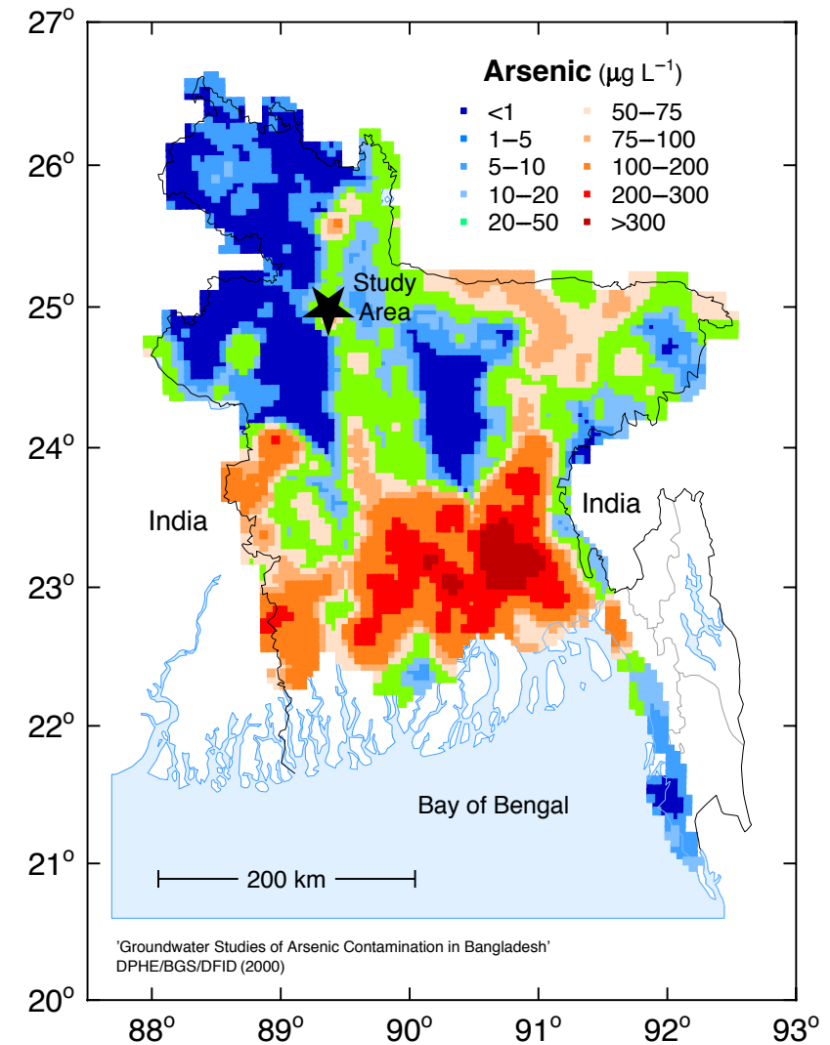
- Timing of contributions:
 - 12 weeks to collect cash contribution
 - coordinated date for labour contribution with RAs/vendor
- Contractor attempts installation if all requirements met, including contributions.
 - In principle: halted if labour contributions failed.
- Installation fails for hydrogeological reasons in 11% of attempted installations.
 - Risk of installation failure uncorrelated with or contribution treatment status

Study area

- Bogura and Gaibandha Districts in Northern Bangladesh
- Distant from epicentre of arsenic problem
 - + no history of interventions, expected high marginal value of new safe sources
 - limited baseline data to use to select villages, arsenic contamination concentrated in pockets

Arsenic Contamination

- WHO standard: 10 $\mu\text{g/L}$
- Bangladeshi standard: 50 $\mu\text{g/L}$

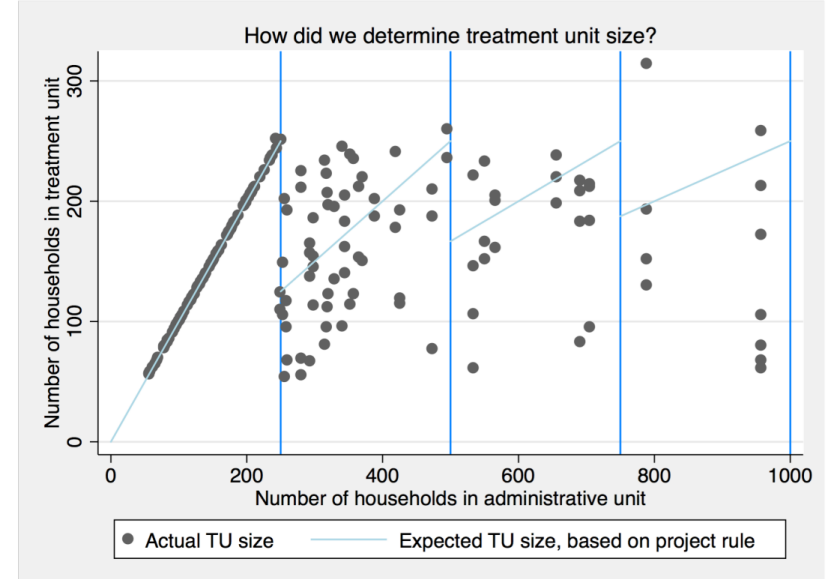


Map credit: British Geological Survey/Department of Public Health, Engineering/DFID

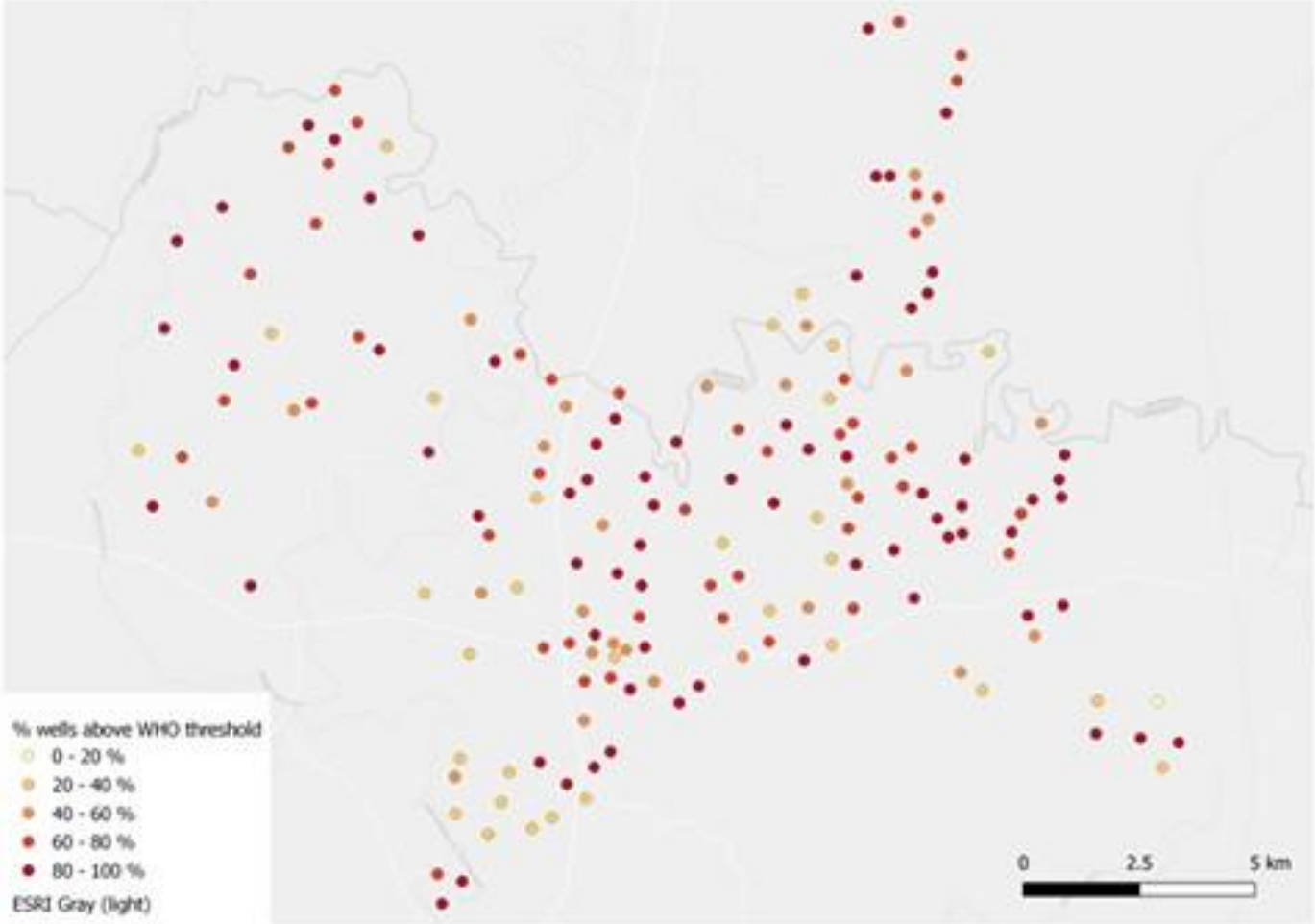
Recruitment of communities

- ❑ “Communities” comprise 50-250 households
 - Divide larger villages along natural boundaries
- ❑ Merge all available sources of data on arsenic contamination to identify 200 candidate communities
- ❑ Pre-test small sample of wells.
- ❑ If pre-tests indicate arsenic contamination, conduct a census of water sources, including arsenic testing.
- ❑ Enroll if more than 25% of sources arsenic contaminated OR if more than 15% of sources were contaminated and these sources were geographically clustered
- ❑ Final number of communities recruited: 171

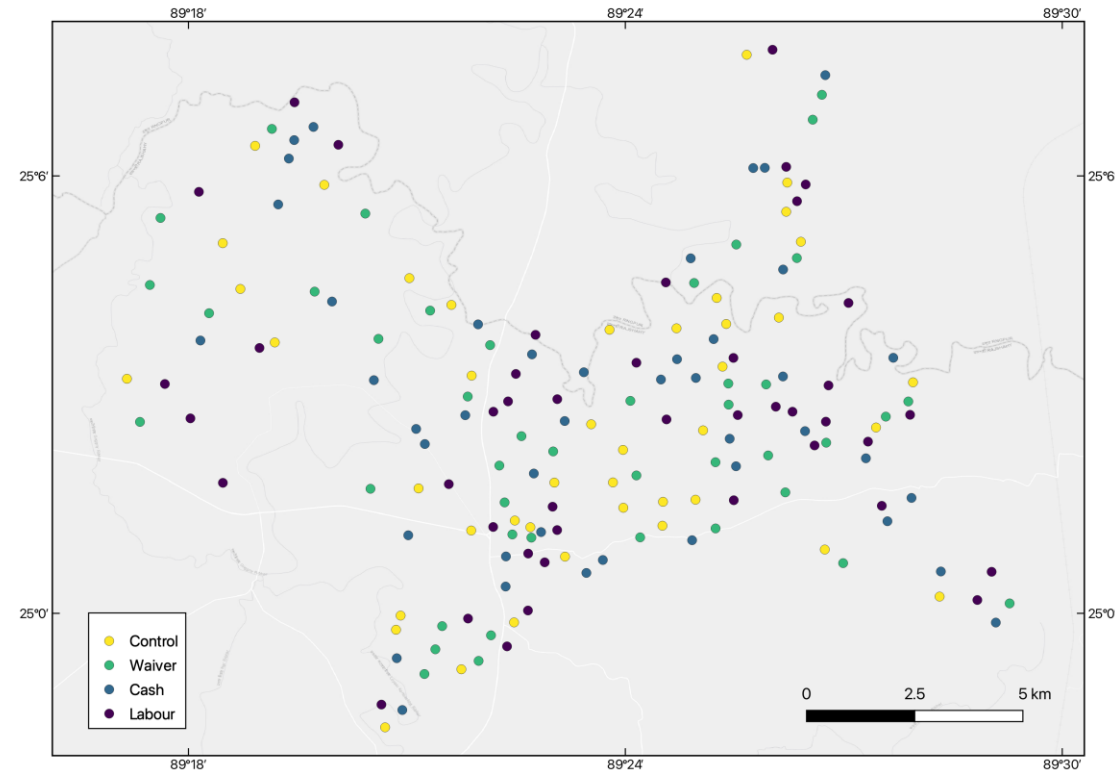
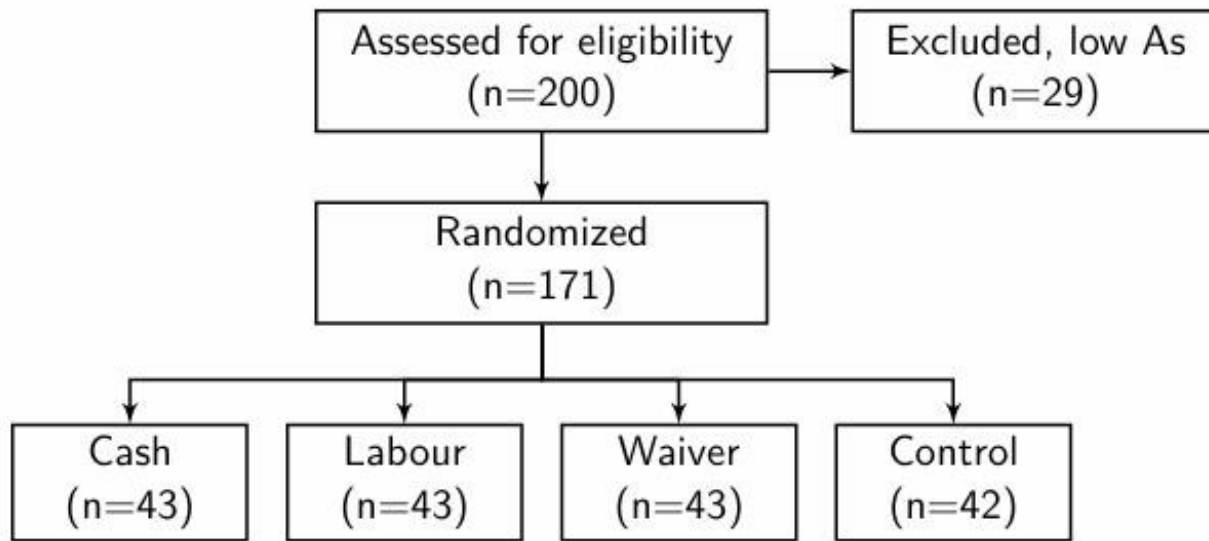
Treatment unit definition



Arsenic contamination in study communities



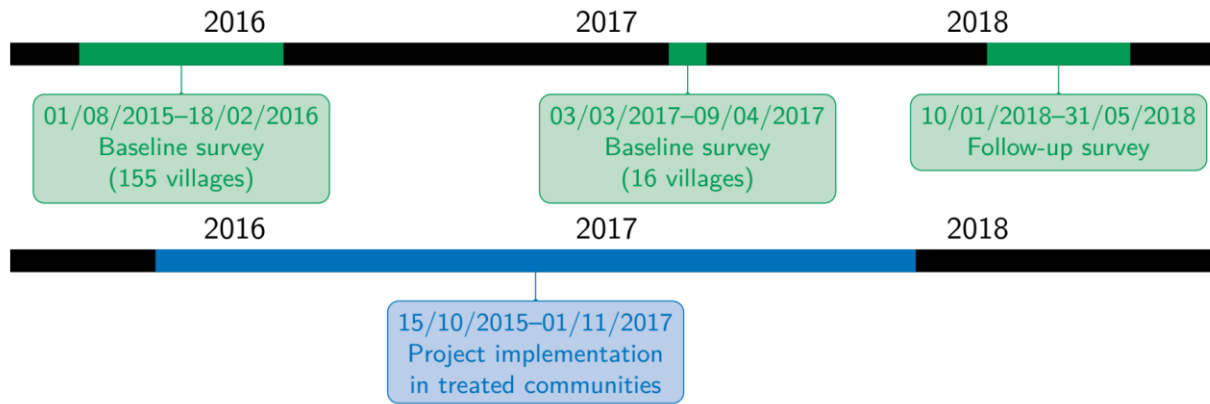
Experimental design



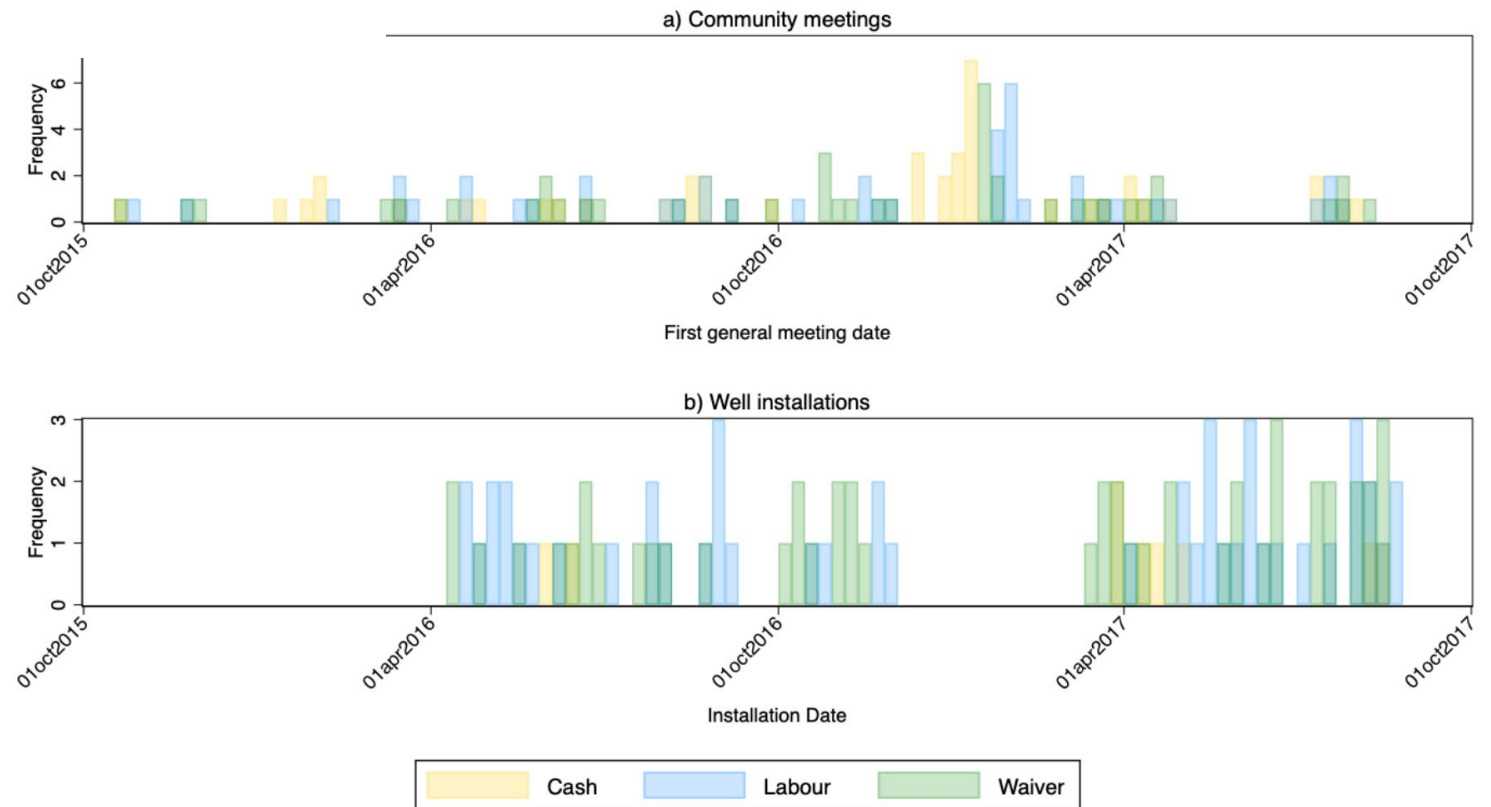
Assignment to treatment

- Assign communities to treatment/control and to contribution status by public lottery
 - + transparency, legitimacy for project staff, safety
 - communities informed that other communities received project under different conditions
- One lottery (or two) in each union parishad (local administrative unit) → stratification

Timeline



Timing of implementation



Water source census and household survey

- ❑ Baseline water source census for > 20,000 water sources
 - All water sources used by any household in communities
 - Identifying data: description, coordinates, photos
- ❑ Household survey in ≈ 6,500 households (at baseline)
 - Randomly sample ≈ 40 households per community
 - At follow-up, oversample households of special interest: contributors, landowners, project contact persons, caretakers, network focal points, leaders
- ❑ Matched household-water source panel dataset
 - Water quality tests in household drinking water and all sources used by household

Testing for arsenic contamination

- ❑ Use EZ Arsenic High Range Test Kit (Hach) kit to test all tubewell and household water samples
- ❑ Results available in 20 minutes
- ❑ Inform households/ caretakers immediately



Fig. Testing arsenic contamination

Rich data on program implementation

- Meeting locations and attendance
- Locations discussed and selected at meetings
- Translated transcripts of meeting audio recordings
- Identity of households contributing cash or labour
- Activity reports record staff visits to communities
- Qualitative accounts by research assistants and retreat with field staff

Access to safe drinking water at baseline

- 62% of sources used by households are contaminated with As at the WHO standard (24% at Bangladeshi standard)
- Baseline As exposure suggests an additional 3.6 deaths of cancer/community (\approx 160 households) (Smith et al. 2000)
- Almost all households using a source belonging either to their own household (78%) or to a relative (21%)

Average effects

$$Y_{ijt} = \alpha_j + \sum_{m \in M} \beta_m (1_{mj} \times POST_t) + f_m(U_j, POST_t) + \epsilon_{ijt}$$

- ❑ Where " Y_{it} " is an outcome for household "i" in community "j" at time t in treatment arm m; and $f_m(U_j, POST_t)$ contains a vector of stratification controls, centered and interacted with treatment and the $POST_t$ dummy.
- ❑ Pairwise randomization-based inference over coefficients β_m by replicating lottery process 500 times
- ❑ weight so that each community counts equally in summary statistics, independent of unit of observation

Measuring arsenic exposure

- For each household, four measures of As exposure:
 - household drinking water vs volume-weighted water source
 - As > 10 ppb (WHO standard) vs As > 50 ppb (Bangladeshi standard)
- Report effects separately and pool into inverse covariance weighted index
 - (Anderson 2008)

Alternative specification choices

Results robust to:

- Balanced panel only, with and without household fixed effects
- Including or excluding oversampled households
- No strata controls
- Weighting by tubewell feasibility

Distributional effects

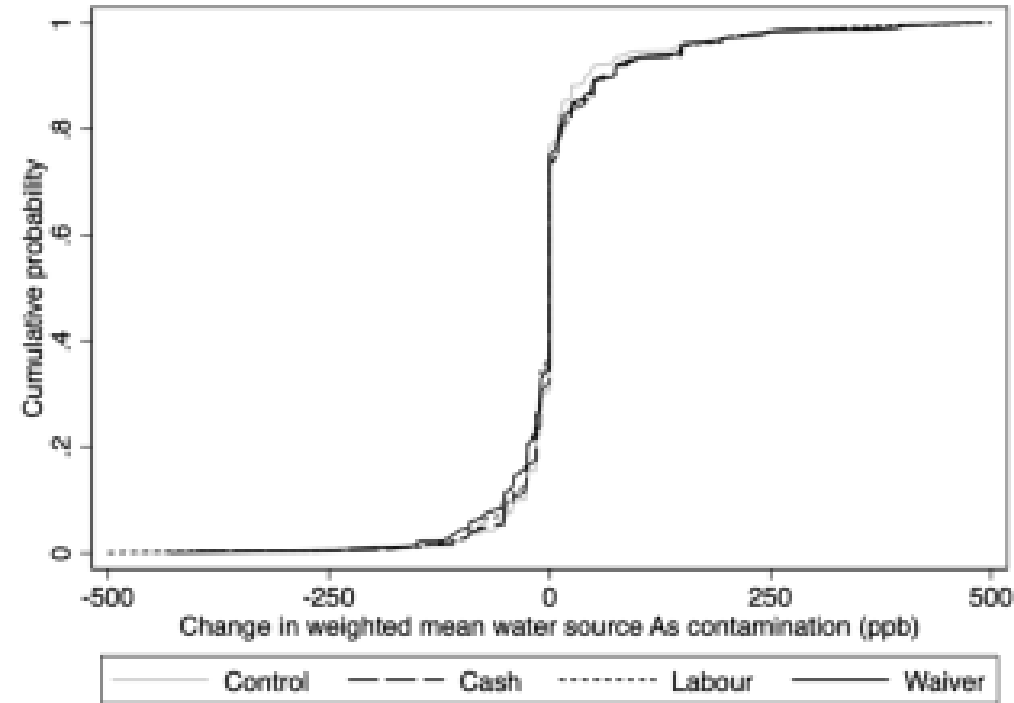
1. Describe differences between groups that benefit or bear costs, and evaluate how these vary across treatment arms.
 - within treatment arms or within communities
 - multiple hypothesis testing problem
2. Use machine learning to identify characteristics most strongly correlated with benefits/costs.
(Chernozhukov et al. 2020)
 - sacrifices power, cannot reject null of no systematic selection (BLP/GATES)
 - but consistently identifies variables that are predictive of selection (CLAN)

Average change in exposure to arsenic contamination

	Control	Estimated impact				C = W	L = W	C = L	N
	Mean	Cash	Labour	Waiver					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Arsenic exposure index	-0.10 (0.02)	0.02 (0.03)	-0.10* (0.04)	-0.11** (0.04)	0.016	>0.999	0.022	13 617	
Household drinking water (WHO)	-0.10 (0.02)	0.01 (0.02)	-0.05 (0.03)	-0.03 (0.02)	0.094	0.432	0.076	13 560	
Household drinking water (BGD)	-0.02 (0.01)	0.02 (0.02)	-0.01 (0.02)	-0.04 (0.02)	0.052	0.460	0.114	13 560	
Water source (WHO)	-0.07 (0.02)	-0.02 (0.03)	-0.10** (0.03)	-0.06** (0.02)	0.240	0.278	0.070	13 476	
Water source (BGD)	-0.01 (0.02)	0.00 (0.02)	-0.02 (0.02)	-0.07** (0.02)	0.012	0.184	0.340	13 474	

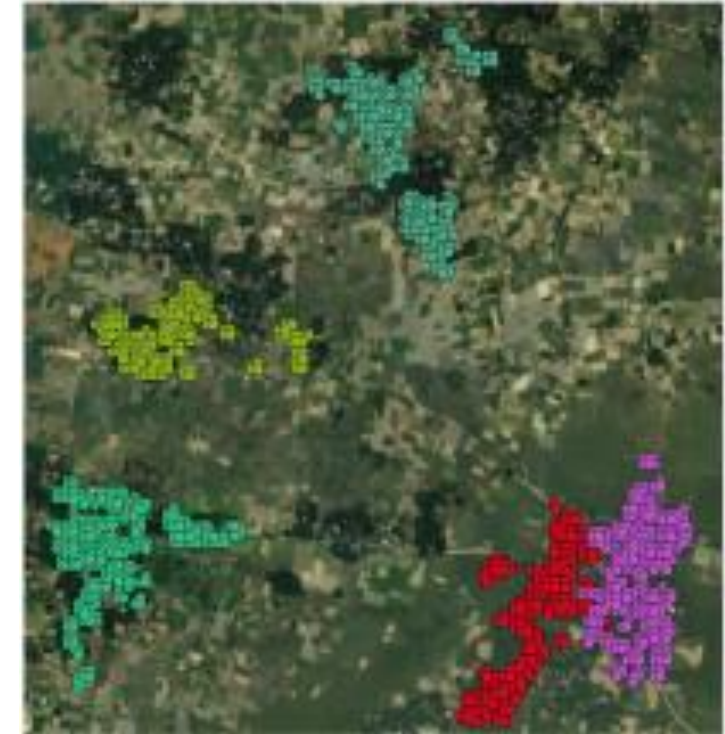
Notes: Table reports means and standard errors (in parentheses). Unit of observation is a household. Weights applied so that each community counts equally, clustering by community. Significance levels obtained from randomization-based inference with stratification controls.

Changes in As contamination: water sources



Geography and Location quality

- Create grid of feasible locations
- Predict take-up, impact, and change in As GINI at each gridpoint using baseline As contamination and household location
- Geography: max predicted use across gridpoints.
- Location quality: predicted use at chosen location(s)/ geography.



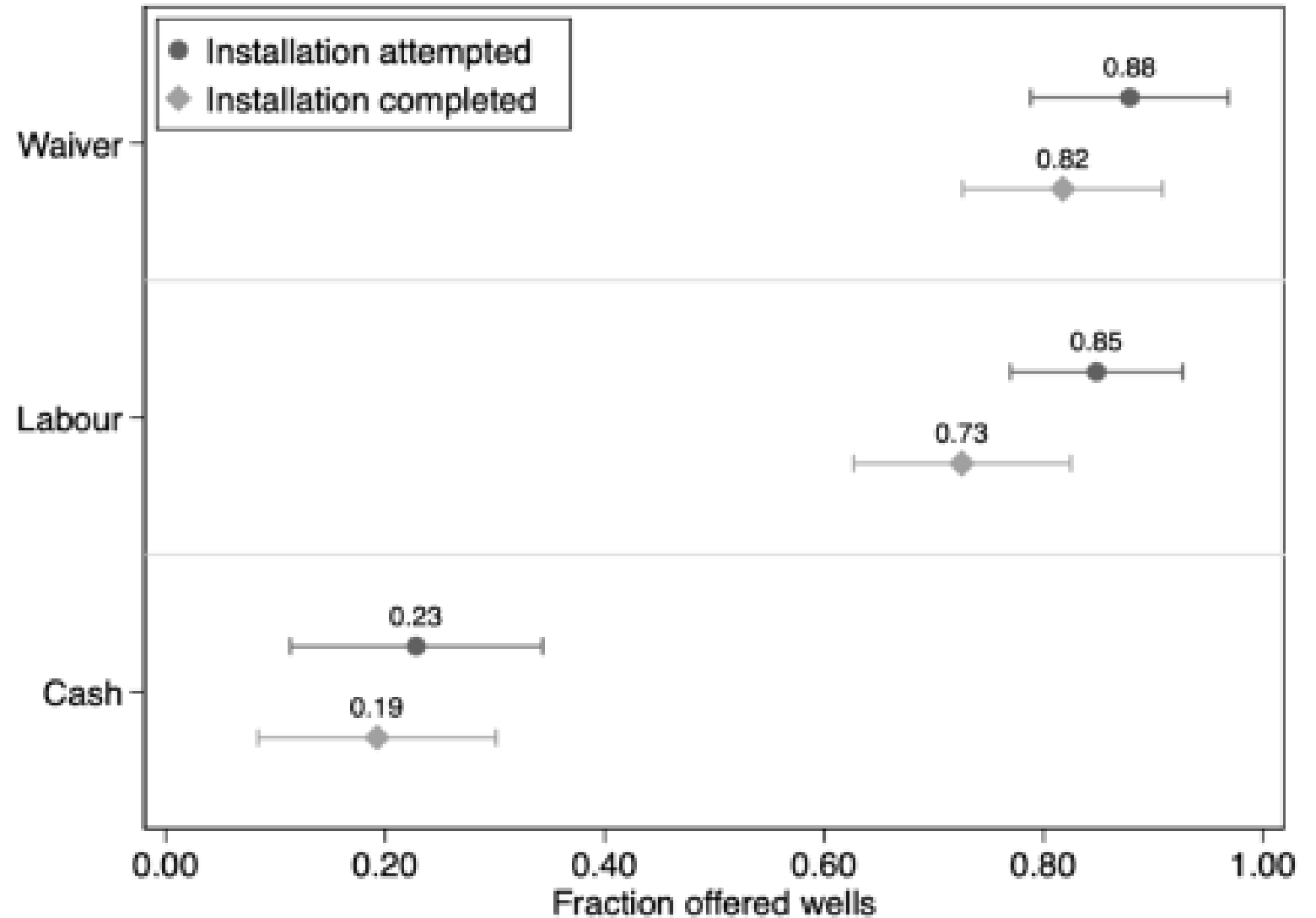
Well use

	Control	Estimated impact				C = W	L = W	C = L	N
	Mean	Cash	Labour	Waiver					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Share of households	0.00 ()	0.07*** (0.02)	0.20*** (0.02)	0.22*** (0.03)	<0.001	0.598	<0.001	7094	
Share of water	0.00 ()	0.03*** (0.01)	0.08*** (0.01)	0.09*** (0.01)	<0.001	0.624	<0.001	7094	

Notes: Table reports means and standard errors (in parentheses). Unit of observation is a household. Weights applied so that each community counts equally, clustering by community. Significance levels obtained from randomization-based inference with stratification controls.

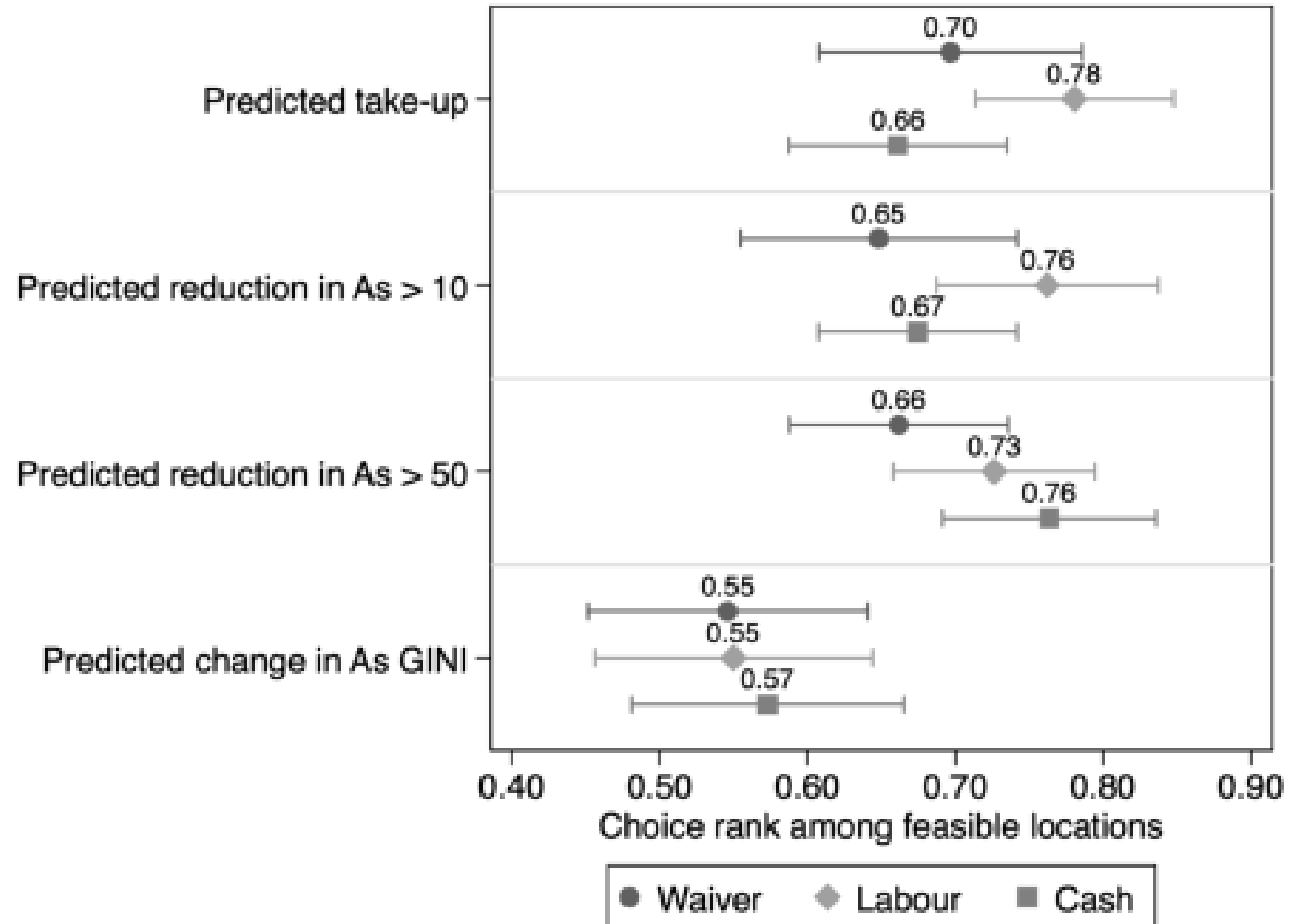
Decomposing use of project wells

- Community take-up Explains 29% of variation in well use, much lower under cash

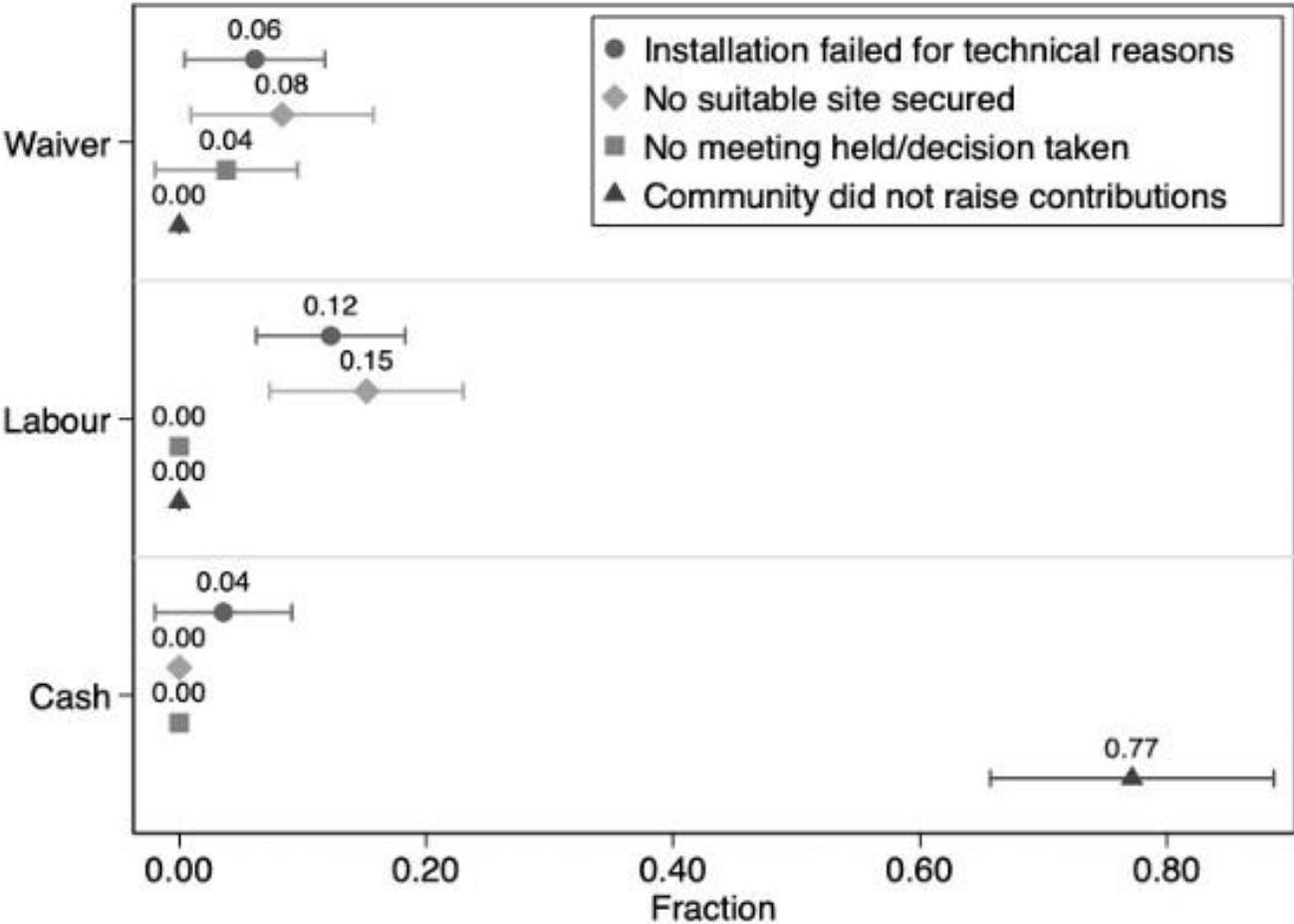


Decomposing use of project wells

- Location quality Some evidence for better decision-making under labour, but only explains 2% of variation in well use
- Household take-up Explains at most 30% of variation in well use, but does not differ across treatment arms



Why were wells not installed?



Take-up: reasons for failure

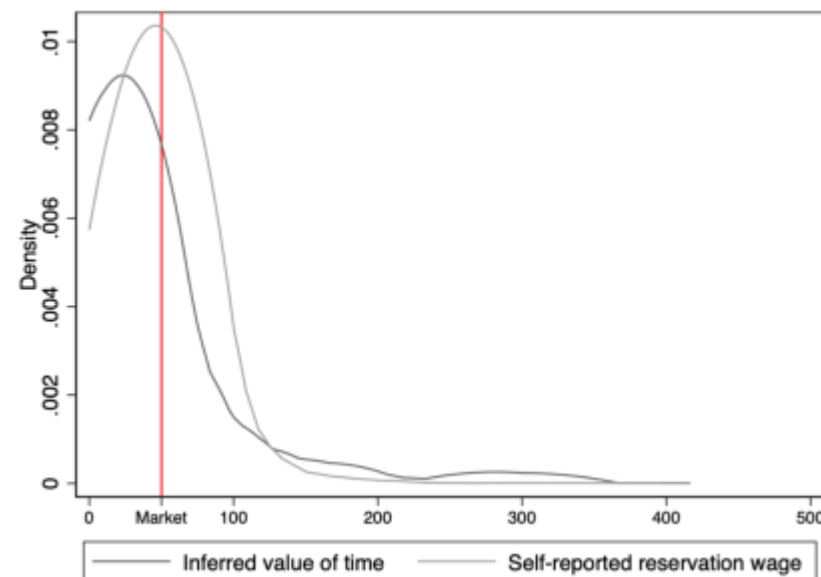
	Cash	Labour	Waiver	C = W	L = W	C = L	N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Installation attempted but failed	0.04 (0.03)	0.12 (0.03)	0.06 (0.03)	0.378	0.150	0.066	179
Contribution requirements not met	0.77 (0.06)	0.00 (.)	-	-	-	<0.001	179
No suitable site secured	0.00 (.)	0.15 (0.04)	0.08 (0.04)	0.014	0.184	0.016	179
No meeting held/no decision	0.00 (.)	0.00 (.)	0.04 (0.03)	0.254	0.214	>0.999	179

Notes: Table reports means and standard errors (in parentheses). Unit of observation is an offered well. Weights applied so that each community counts equally, clustering by community. Significance levels obtained from randomization-based inference with stratification controls.

Why is take-up so much lower for cash contributions?

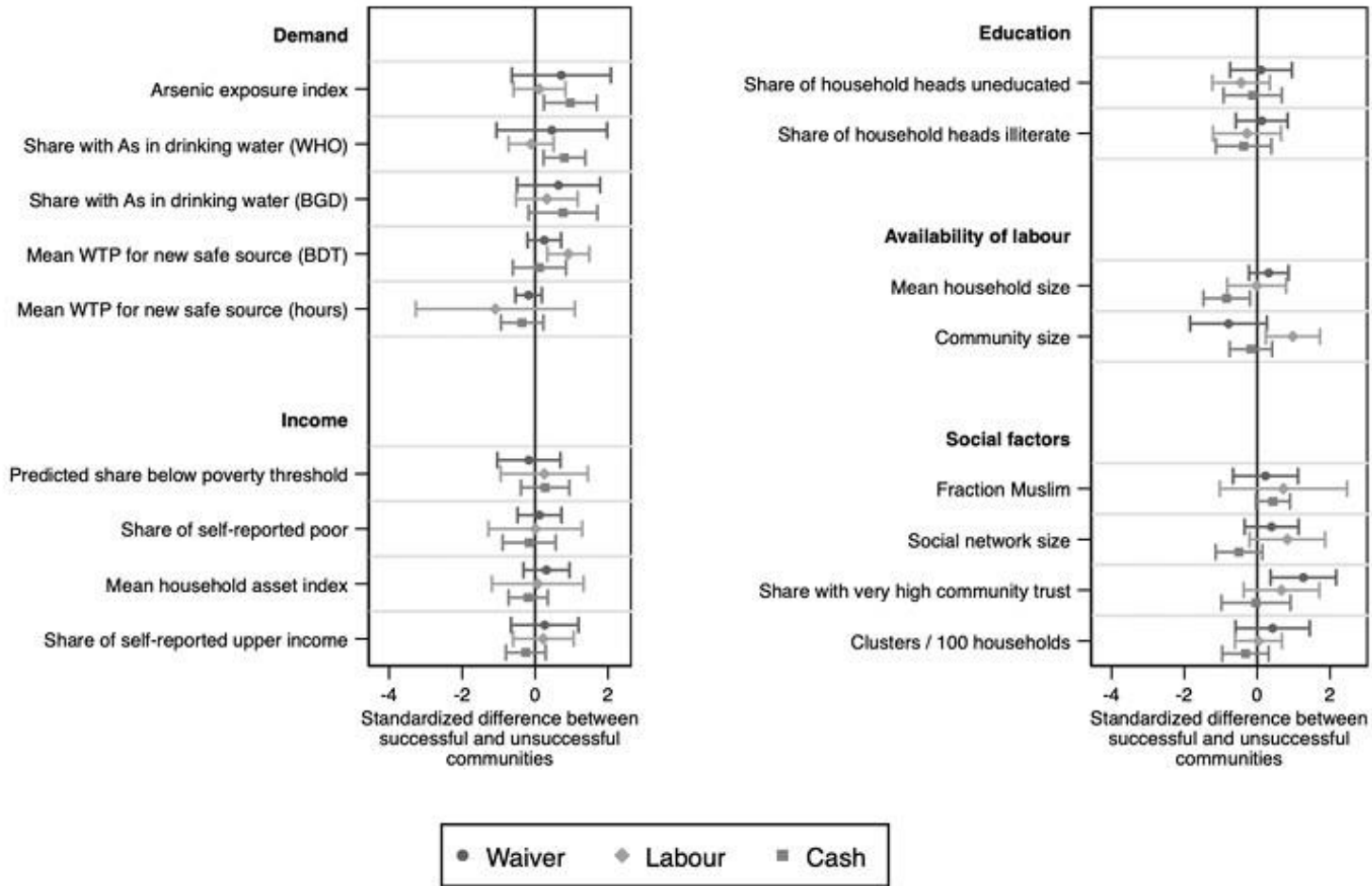
- Monetary value of time is much lower than the unskilled wage.
 - Median household: 83% of value (reservation wage), 33% of value (inferred value of time)
 - Value of time 90% CI for community indifference: [0% – 30%]
- Demand curve Coordinating cash contributions may be more costly.
- Does not seem driven by fairness concerns or free-riding or strategic behavior.

Monetary value of time

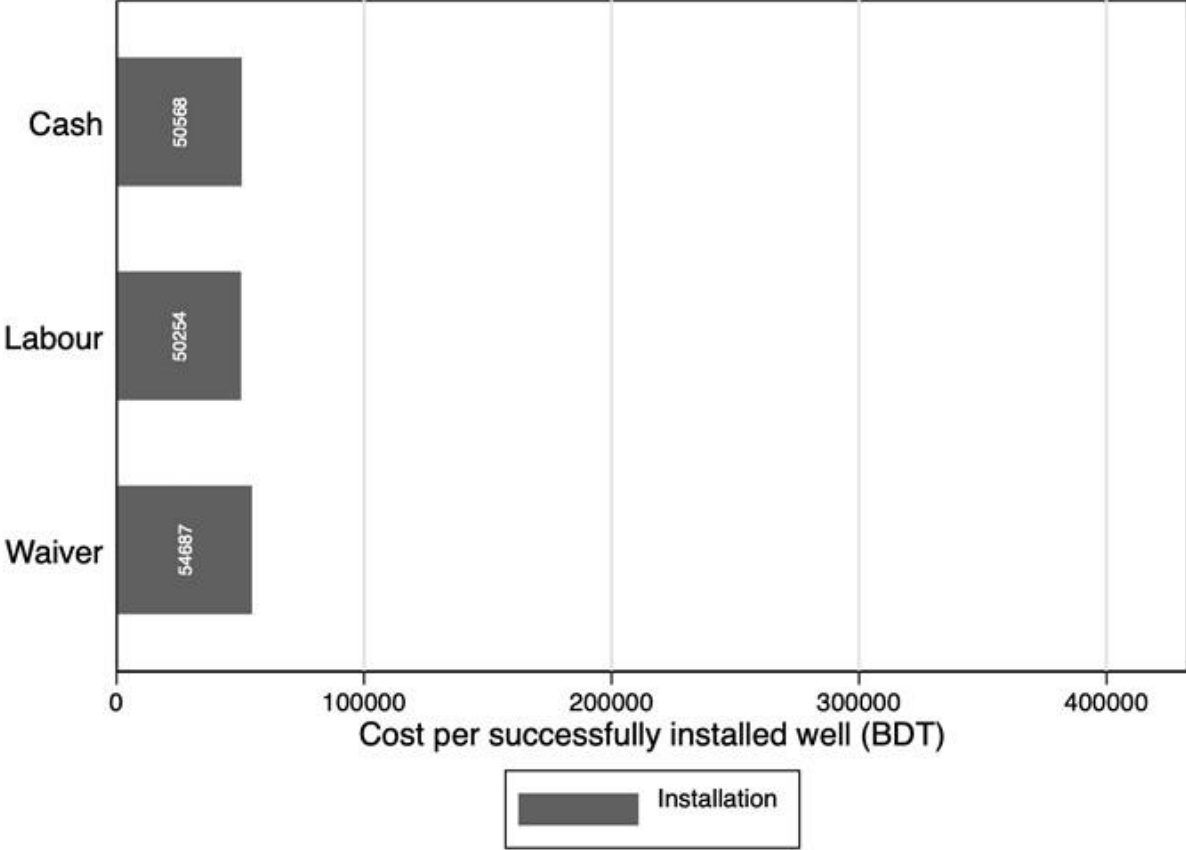


- 75% value time below market wage Baseline stated preference WTPs
- ≈ 60% report reservation wage below market wage

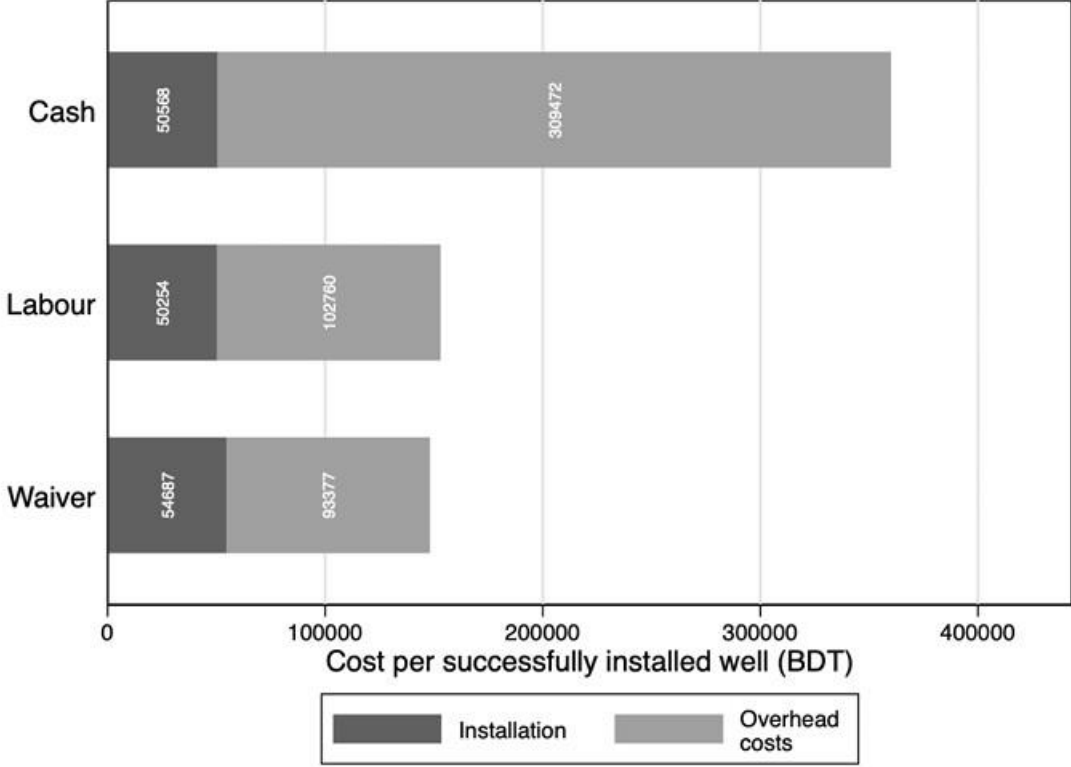
Naive comparisons suggest modest targeting effects...



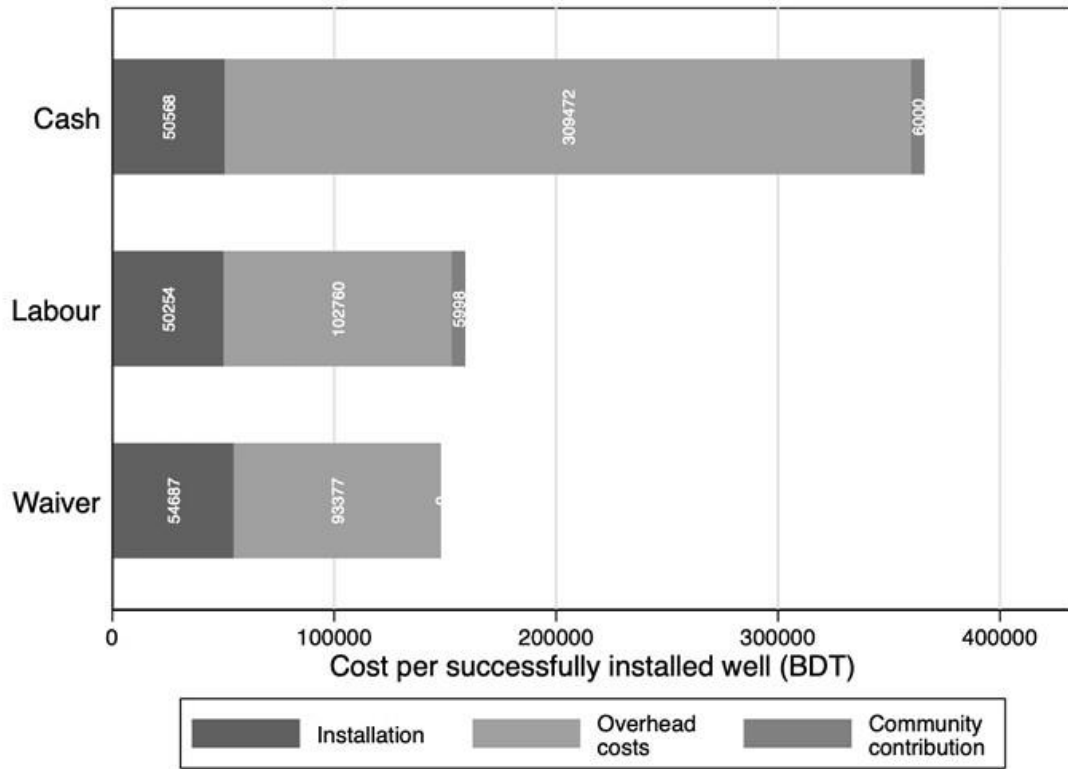
Cost-effectiveness: Installation costs only



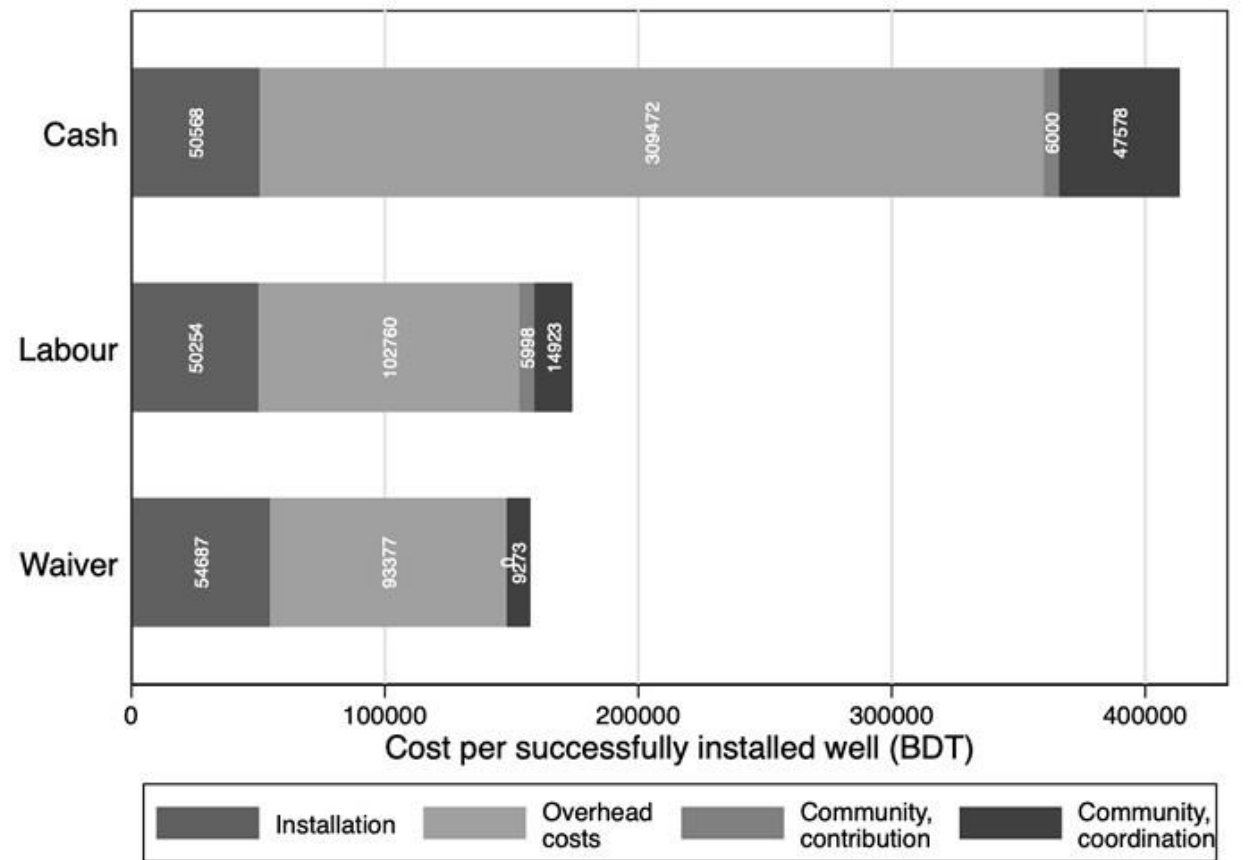
Cost-effectiveness : NGO total monetary costs



Account conservatively for community contributions



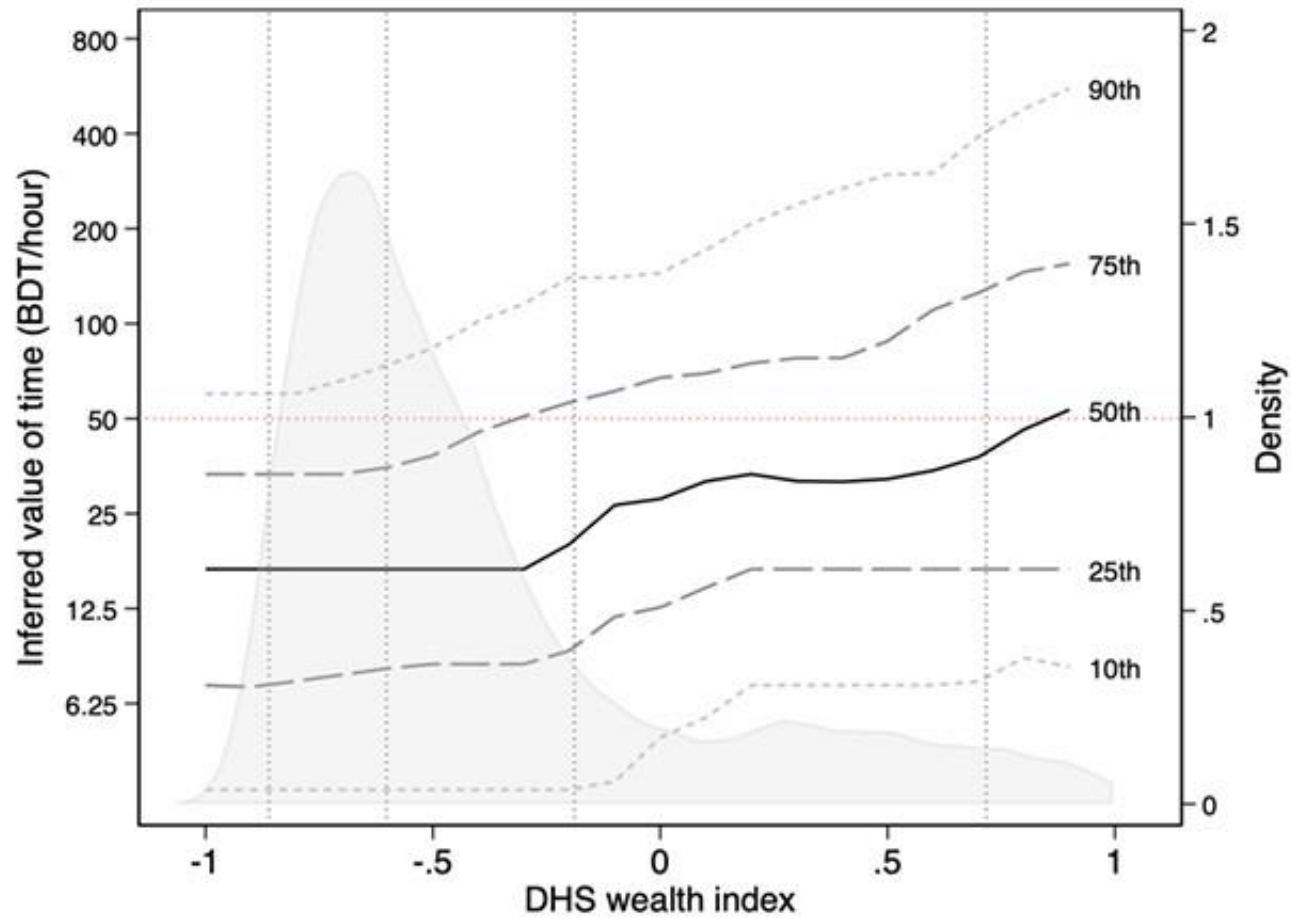
Account for community time costs, inferred value of time



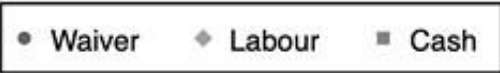
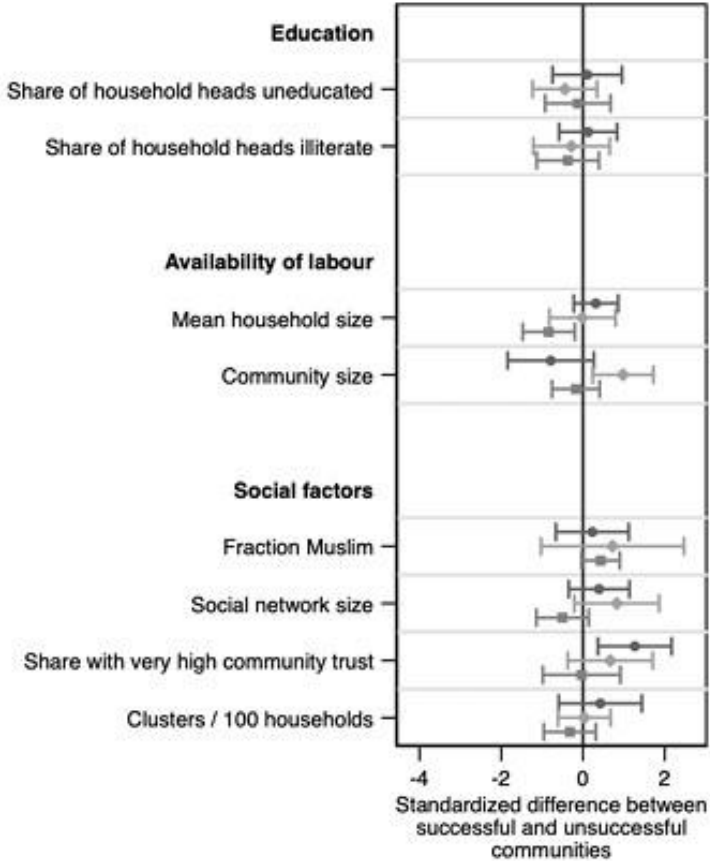
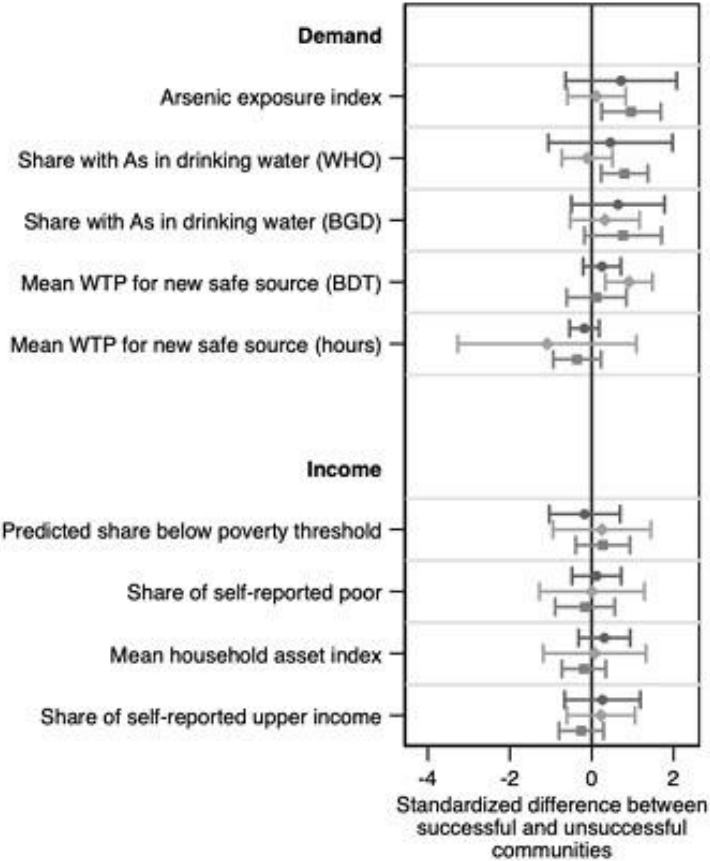
Cost-effectiveness: summary

	Cost-effectiveness relative to waiver	
	Cash	Labour
Installation costs only	0.92	0.92
NGO monetary costs only	2.43	1.03
NGO costs and community contributions	2.47	1.07
NGO costs, community contributions and community time costs	2.63	1.11

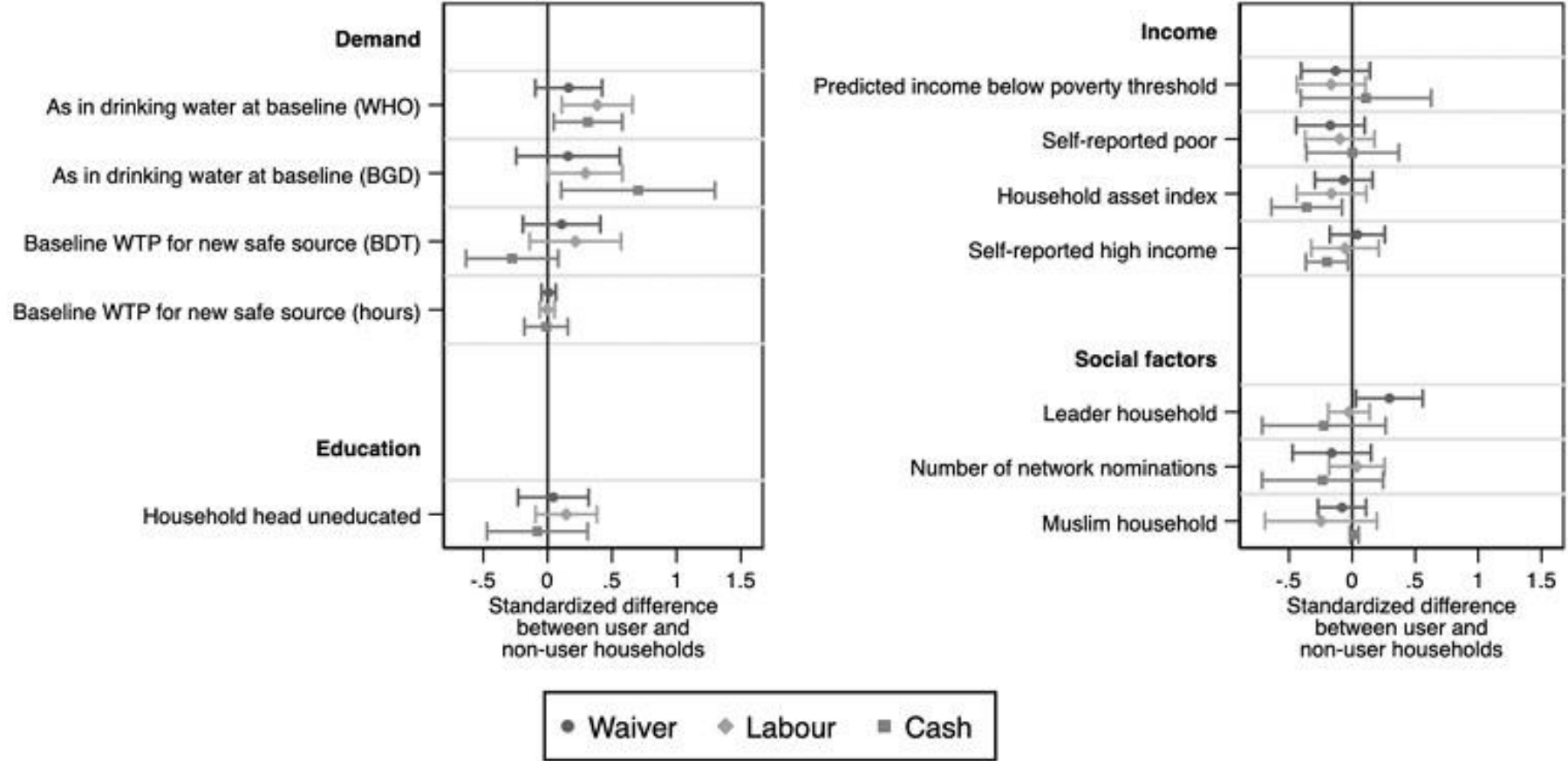
External validity?



Which communities install wells?

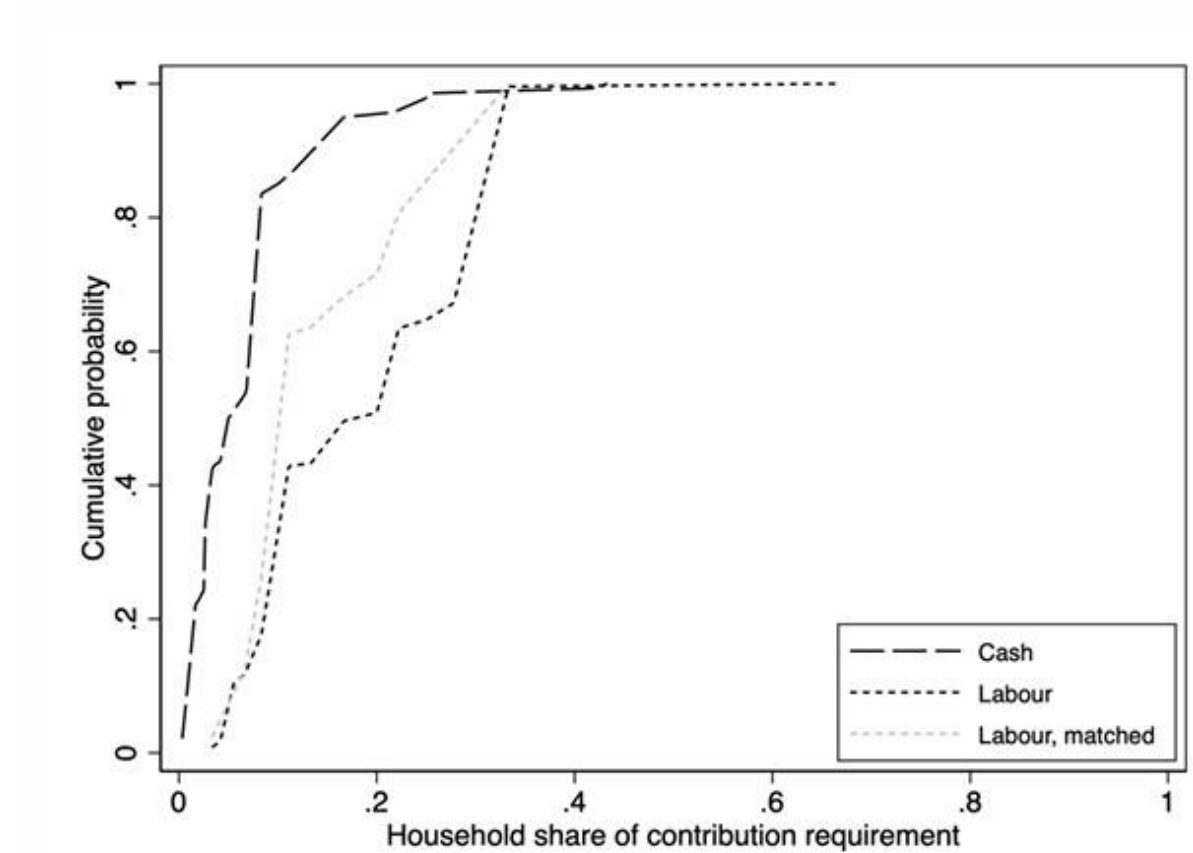


Which households use installed wells?



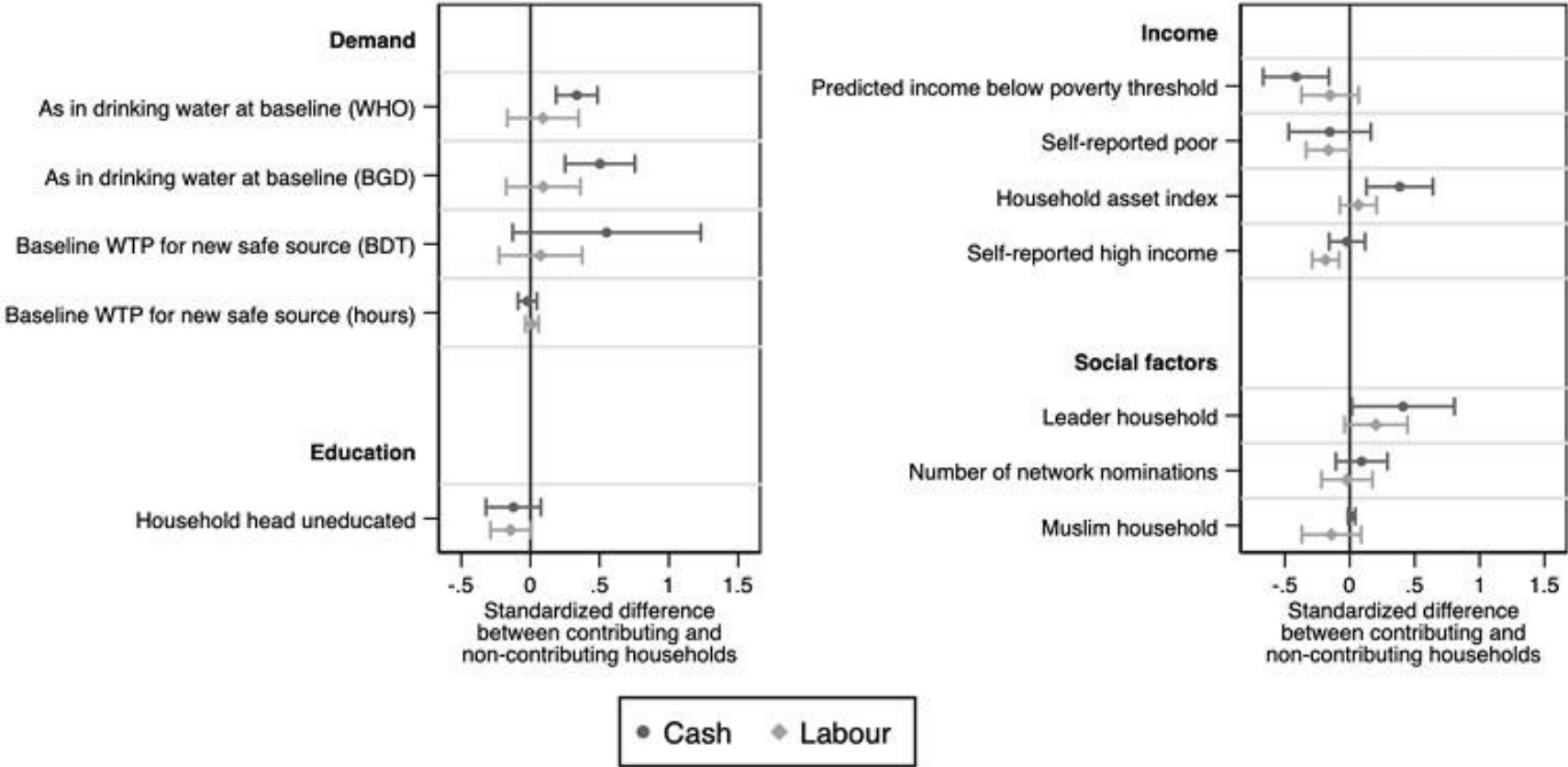
Notes: Compares users to non-users within communities successfully installing at least one well.

How are costs shared across households?



Notes: Contributing households only.

Which households bear the costs?



Notes: Compares contributing to non-contributing households within communities successfully installing at least one well.

Summary of results

Contribution requirement	Effect on take-up relative to waiver	Program reduces As relative to control?	Effect on impact relative to waiver
Cash	-	No	-
Labour	=	Yes	=

Replacing cash requirements with labour may increase welfare in poor rural communities

- ❑ Common to find low monetary value of time in poor, rural communities (Kremer et al. 2011)
- ❑ Advantages of labour relative to cash likely to reverse as incomes grow.
- ❑ The majority of study households value their time below the market wage, except in the top wealth quintile.
- ❑ If feasible: consider requiring labour contributions rather than cash.

Should we impose community contributions at all?

- ❑ Cash contribution requirements lead to worse outcomes on most measures.
- ❑ Labour contribution requirements do not consistently yield better short-term outcomes than the contribution waiver.
- ❑ Contribution waiver is most cost-effective, considering overheads, more so when we internalize community costs.

Should we impose community contributions at all?

- ❑ Cash contribution requirements lead to worse outcomes on most measures.
- ❑ Labour contribution requirements do not consistently yield better short-term outcomes than the contribution waiver.
- ❑ Contribution waiver is most cost-effective, considering overheads, more so when we internalize community costs.

Thanks to the Swedish Research Council, the International Growth Centre
and the International Initiative for Impact Evaluation for support... ..and
thank you for listening! Questions? comments? suggestions?
ahasan@ngof.org

Thank You

WASH Economics Conference 2026

CWAS
CRDF
CENTER FOR WATER AND SANITATION
CEPT UNIVERSITY

CEPT
UNIVERSITY
FACULTY OF PLANNING

IFS
Institute for Fiscal Studies

LONDON
SCHOOL OF
HYGIENE
& TROPICAL
MEDICINE

Gates Foundation

