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Are households credit constrained? Evidence from an RCT on sanitation loans in rural India

Britta Augsburg (IFS), Bet Caeyers (IFS), Sara Giunti (IFS) and Bansi Malde (Kent University)

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Motivation

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- **Lack of finance** :
  - acknowledged as major impediment of poor households' ability to improve their wellbeing
  - can affect poor households' decisions ranging from profitable, income-generating investments to choices about migration, family planning and human capital investments (Conning & Udry, 2005).

Motivation

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- **This paper:**
  - Are households in rural India credit constrained for sanitation investments?

The sanitation challenge

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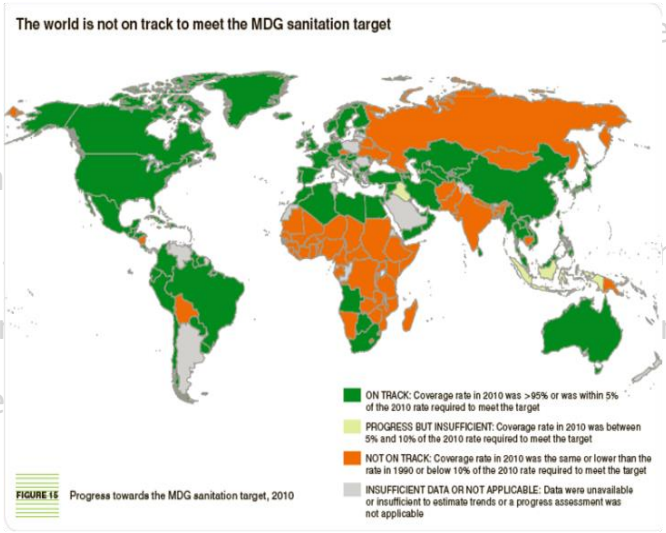
- **Sanitation** - the provision of facilities and services for the safe disposal of human urine and faeces

- Wide agreement that sanitation is very important:
  - In 2013, BMJ readers chose the “sanitation revolution” as greatest medical advance since 1840
  - Ghandi: “Sanitation more important than independence”
  - Modi: “Toilets before temples”

The sanitation challenge

- **Sanitation** - the … safe disposal of human urine and faeces
- Wide agreemen…
  - In 2013, BM… …n" as greatest medical advance since 1840
  - Ghandi: "Sa… …nce"
  - Modi: "Toile…



Orange:
Coverage rate in 2010 same or lower than in 1990

- But at the same time a **huge challenge in developing countries**:
  - WaterAid: "the biggest global development challenge of the 21st Century"
  - NY Times: "the lack of adequate toilets is one of the greatest untold development challenges facing the international community"
  - ~2.5 billion w/o access to improved sanitation
  - **with slow progress**

The sanitation challenge

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- With **severe consequences**:
  - Lack of/bad sanitation hampers economic growth: India: 6.4% of GDP (US$53.8 billion), Nigeria: 1.3% of GDP (US$3 billion) [WSP estimates]
  - Important contributor: morbidity (worms, diarrhoea) → associated with short- and long-term effects on human capital
  - Significant mortality: ~4billion cases of diarrhoea per year, 1.8million deaths; Most vulnerable group: children (UNICEF: 1,800 deaths per day)

- Efficient policy design unclear.
- **Can relaxing credit constraints help?**
- Some argue yes:
  - WSP (2015): USD 80 million in financial leading has resulted in more than 315,000 household sanitation loans reaching more than 1.4 million people.
  - **Microfinance** postulated as a **potential, promising, solution** to (help) tackle the sanitation challenge (including WSP, USAID, Water.org)

This paper

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- **Are households indeed credit constrained (for sanitation)?**
  - If they are not, providing credit for sanitation might **not** lead to desired outcomes
  - … even if credit is taken up.
  - Since:
    - households might just shift from other credit sources to this newly offered (cheaper?) credit source.
    - Money is fungible.

- Especially relevant in our context, where loan is not linked to any specific type(s) of toilets, and enforcement of loan use is basically non-existent. Different to other papers:
  - *Sanitation*: BenYishay et al. (2016) shows that credit increases WTP, but linked to specific toilet, material delivery included in price
  - *Health*: Devoto et al (2012) – piped water connections; Tarozzi et al (2014) – bednets
  - *Education*: review by Lochner & Monge-Naranjo, 2012)

This paper...

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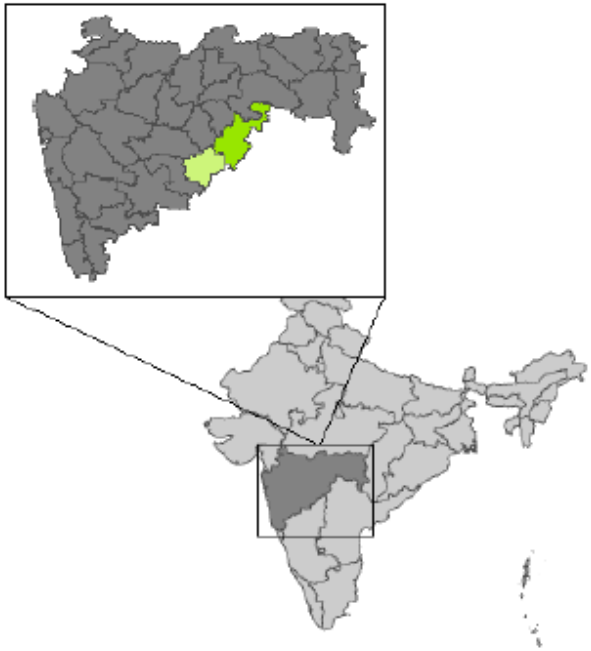
- ➔ Cluster randomised controlled trial in rural Maharashtra, India
- ➔ Treatment: sanitation loan provided by a leading MFI to its clients

- **Roadmap**:
  1. Is sanitation credit taken up?
  2. Does the total amount borrowed increase? Do households switch to other sources of credit?
  3. Are sanitation investments made?
  4. Is the sanitation credit crowding-out other investments?

Context



- Rural Maharashtra, India: Latur and Nanded districts
  - Relatively poor and lagging districts, particularly in sanitation
    - 40% of household heads had no education; poor access to services such as health, etc
  - Only 17% of households had a toilet in 2012-13 (DLHS-4 data)
  - Main activity: Agriculture

Intervention

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- Implementing Partner: Large **MFI** operating in 6 states in India
- Provides loans on a joint liability basis
- Exploit a planned expansion of sanitation loan activities to study areas

- **Loan conditions**:

Amount:	Up to Rs 15,000
Interest rate:	22% (later 18%) per annum on a declining balance
Loan maturity:	2 years; payments were to be made on a weekly/bi-weekly basis
Collateral:	None, but joint-liability
Other costs:	Processing fee of 1.1% of loan amount and Rs 306 for life insurance premium

Study design & Data sources

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- **Cluster RCT**. Cluster: Gram Panchayat (GP, or *village*)
  1. Provision of sanitation credit (40 GPs)
  2. Control (business as usual) (41GPs)
- **Target Population:** Existing clients of partner MFI
- Random allocation stratified by MFI branch and size of GP (large/small) to increase power

- **Data sources**
  1. End-line survey (Aug-Sep 2017), 2.5yrs after loans made available:
     - 2,841 clients (on average 24 per GP, 74% of all clients with loans outstanding before start of experiment, Nov 2014): 1,253 in treatment and 1,588 in control group.
     - For 1,134 of them, we have a baseline survey (Dec '14/Jan'15)
  2. Administrative data from the implementing MFI
  3. Credit bureau data

A typical client

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- Hindu (66%), scheduled caste/tribe (41%)
- 5 household members.
- Household head:
  - male household head (91%), 45 years of age
  - married (92%)
  - 6 years of education.
- Majority of households (96%) live in a dwelling they own (65% semi-pucca, 19% pucca), 27% had a toilet at start of experiment
- 59% of the MF clients hold a Below Poverty Line (BPL), 26% APL card.
- 54% receive wages from agricultural labour and/or from cultivation or agri-allied activities.

- Characteristics **balanced**
- **Attrition 6%** (also balanced)

Estimation

$$Y_{ivs} = \alpha_0 + \alpha_1 Sanitation\_Loan_{vs} + \beta X_{ivs} + \theta_s + \varepsilon_{ivs}$$

- Y_{ivs} is outcome for household *i* in GP *v* in strata *s*
- Sanitation_Loan$_{vs}$ =1 if in treatment GP in 2014
- **Controls**, X_{iv}:
  - Toilet ownership at BL (chosen as it explains most the variation in toilet ownership among control households at endline)
  - Presence of child aged 3-4 in HH (related to sample stratification)
- ϑ_s is a strata dummy
- **Inference:** Standard errors clustered at the GP level

Roadmap

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1. Is sanitation credit taken up?
2. Does the total amount borrowed increase? Do households switch to other sources of credit?
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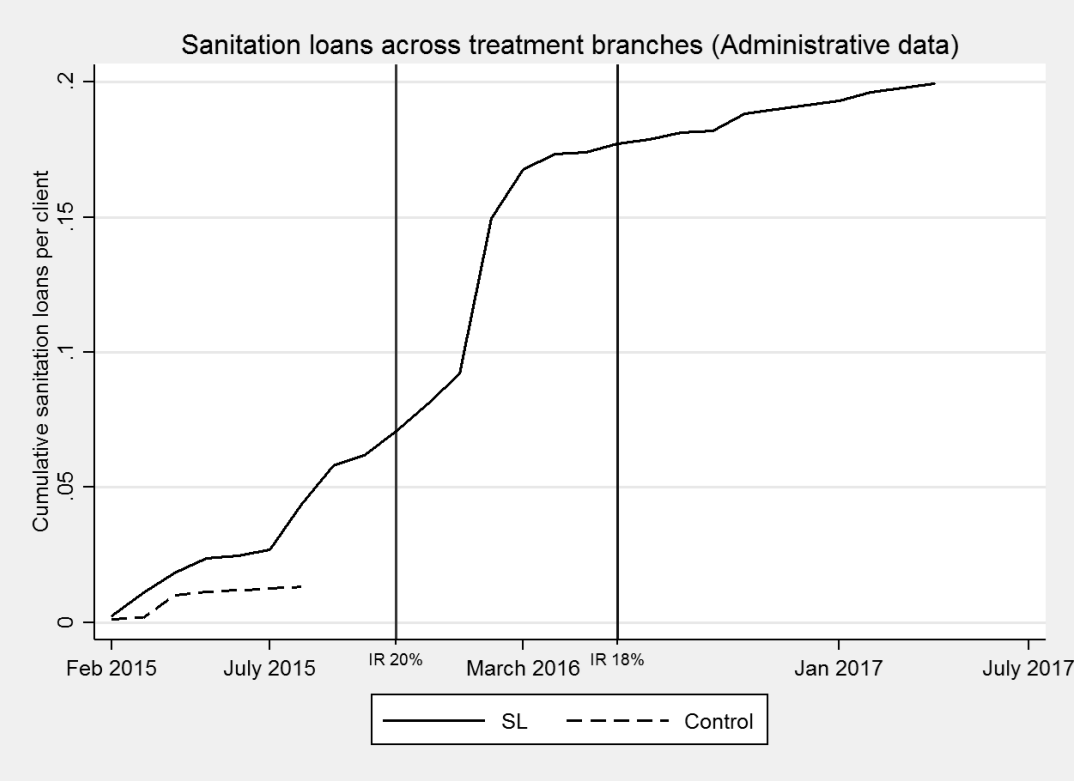
Is sanitation credit taken up?



- Very few loans given in control areas

Is sanitation credit taken up?

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	(1) Full sample	(2) CB sample
SL	0.184***	0.195***
	(0.0356)	(0.0367)
Strata FE	Yes	Yes
Household covariates	Yes	Yes
controlmean	0.0132	0.0141
N	2841	2514

Notes: Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet uptake status at baseline, dummy =1 if HHs has a child aged 3 or 4.

- 18-19% sanitation loan uptake

Roadmap

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Does the total formal borrowing increase?

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- Use of credit bureau data (**complete picture** of formal lending)

	(1) Total amount	(2) Total amount 2015
SL	7200.9	4790.3*
	(4540.9)	(2684.2)
Strata FE	Yes	Yes
Household covariates	Yes	Yes
controlmean	89747.0	37543.8
N	2514	2514

Notes: Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet uptake status at baseline, dummy =1 if HHs has a child aged 3 or 4.

- Significant increase in 1st year of intervention (insufficient power to detect overall impact)
- No switching between formal credit sources observed
- (RBI regulations not binding for these households: borrowing < Rs 100,000)

How about informal borrowing?

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- Use of survey data
- Important caveat: likely an underestimate of informal lending, as we observe stark difference in reported formal lending between data sources

Total formal amount borrowed...		
...during intervention	Credit bureau data	89,747
	Survey data	32,302
...in 1st year of intervention	Credit bureau data	37,544
	Survey data	11,540

- Reporting capped for three loans (but only hit by 22% of clients, balanced between T&C)

# loans	Freq.	%
0	868	30.39
1	696	24.37
2	664	23.25
3	628	21.99

How about informal borrowing?

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	(1) Total amount	(2) Amount from formal	(3) Amount from informal
SL only	1457.4	1213.4	244.0
	(2426.4)	(2368.8)	(1204.3)
Strata FE	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes
controlmean	34930.1	31819.6	3110.5
N	2528	2528	2528

Marginal effects; Standard errors clustered at the village level in parentheses.

Covariates: Toilet uptake status at BL, dummy =1 if HHs has a child aged 3 or 4.

- Impact on informal borrowing insignificant (positive coefficient and likely under-reported)

Roadmap

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Are sanitation investments made?

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	(1) Own toilet	(2) Own toilet
SL only	0.0886***	0.0916***
	(0.0277)	(0.0255)
Strata FE	Yes	Yes
Interviewer FE	Yes	Yes
Household covariates	Yes	Yes
controlmean	0.458	0.417
N	2514	2514

Marginal effects; Standard errors clustered at the village level in parentheses.
Covariates: Toilet uptake status at BL, dummy =1 if HHs has a child aged 3 or 4.

- 9ppt increase in sanitation (toilet) ownership

A note on loan to toilet conversion

- **Impacts on toilet uptake much lower than loan uptake**
- Taking ratio of toilet uptake to loan uptake (equivalent to Wald estimator) indicates that around 50% of loans resulted in a new toilet:

	Impact on...		
	...SanLoan	...Toilet ownership	Conversion
SL	18.1pp	9pp	50pp

- Two explanations for low loan-to-toilet conversion explored:
  1. *Loans used for improvements/repairs*
  2. *Loan diversion*

Are sanitation investments made?

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1. *Loans used for improvements/repairs* – LITTLE EVIDENCE
2. *Loan diversion*

- Impact estimates on toilet quality (limited data) do not suggest improvements
- Client self-reported loan use for upgrade and repair is minimal (1% and 4%)

	Sanitation loan used for...			
	...Upgrade		...Repair	
	N	Mean	N	Mean
Control	85	0.000	85	0.024
SL	254	0.031	254	0.017

Are sanitation investments made?

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1. *Loans used for improvements/repairs*
2. *Loan diversion* – LIKELY IMPORTANT EXPLANATION

- 31% of clients who took loan had a toilet at start of experiment and 30% had none but also don't have one at endline at EL:

		Toilet owned post-loan (endline) No	Toilet owned post-loan (endline) Yes
Toilet owned pre-loan (baseline)	No	178 (31%)	224 (39%)
	Yes	0 (0%)	171 (30%)

- 16-18% report to have used loan for other purpose, even in the MFI's own admin data:

	Survey sample	Admin sample
Construct a new toilet	67.19	70.19
Upgrade existing toilet	2.22	2.59
Repair existing toilet	2.85	3.02
Other purpose	15.69	17.93
Sanitation investment + other purpose	12.04	6.26

Discussion

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- Households in this context seem to be credit constrained for sanitation, in the sense of being unable to borrow for sanitation
- The sanitation loan allows households, on average, to invest in a toilet
  - Note that the average toilet built costs around Rs. 30,000, which is twice the amount of the loan
  - Households use savings to cover shortfall
- About 50% of loans not used for sanitation.
  - Preliminary evidence suggests that remaining loans not used for business investment, possibly consumption various purposes.

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Thank You

Any Questions?

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APPENDIX Slides

Intervention Details

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- Implementing Partner: Large MFI operating in 6 states in India
- Provides loans on a joint liability basis:
  - Typical joint liability group has 5-10 members
  - 3 or so JLGs form a kendra (centre)
  - Villages may have multiple kendras (2 kendras per village on average)
- Only provider of micro-loans for sanitation in study area
- Clients of MFI account for about 7% of households in village
- Exploit a planned expansion of sanitation loan activities to study areas

Sanitation Loans

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- Loan conditions:

Amount:	Up to Rs. 15,000
Interest Rate:	22% (later 18%) per annum on a declining balance
Loan maturity:	2 years; payments were to be made on a weekly/bi-weekly basis
Collateral:	None, but joint-liability

- Loans available to **clients that have been with MFI for at least 1 year**
- Each client can only take 1 sanitation loan
- There are caps on the amount that can be borrowed from the MFI at a specific point in time:
  - Rs. 35,000 for new clients, and Rs. 40,000 for those who have been clients for at least 3 years
  - RBI regulations limit number of loans that a client can hold, and total amount they can borrow from MFIs at any point in time

Loan products outstanding as of July 2016

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Purpose of loan	Category of Loan	Nr of loans	Tenure (weeks)	Interest rate (min;max)	Average amount of loan in Rs. (min;max)	Average outstanding amount as of July 2016 (min;max)
Animal Husbandry	IGL: Pragati, Pragati Plus and Supplement	15,321	Varies between 26, 52 and 104 weeks *	23.5 (22;25)	21700 (5000;45000)	15690 (29;45000)
Assets	IGL: Pragati, Pragati Plus and Supplement	21	52 for laon<15000 104 otherwise	24.9 (22;25)	20100 (10000;30000)	8140 (245;15800)
Consumption	Emergency	408	12 loans for 6 weeks and 396 for 11 weeks	0	1000 (1000;1000)	548 (22;1000)
Education	Education	6,517	52 **	18.6 (18;22)	9800 (5000;10000)	8890 (13;10000)
Production	IGL: Pragati, Pragati Plus and Supplement	5,311	Varies between 26, 52 and 104 weeks	23.6 (22;25)	20000 (5000;45000)	13300 (100;45000)
Sanitation	Sanitation	3,731	104	20.8 (18;22)	14500 (10000;15000)	11400 (3400;15000)
Service sector	IGL: Pragati, Pragati Plus and Supplement	707	Varies between 52 and 104 weeks^	23.8 (22;25)	20600 (5000;45000)	13000 (245;45000)
Trading	IGL: Pragati, Pragati Plus and Supplement	6,654	Varies between 26, 52 and 104 weeks^^	23.6 (22;25)	20300 (5000;45000)	13500 (245;45000)
Transportation	IGL: Pragati, Pragati Plus and Supplement	2,068	Varies between 26, 52 and 104 weeks^^^	23.6 (22;25)	21600 (5000;45000)	14800 (245;45000)
Water Connection	Water loan	107	52	20 (18;20)+++	5000 (5000;5000)++	3100 (1680;12600)

* It varies irrespective of Loan amount and Interest Rates.
** 6 loans of 6517 loans for education were given for 26 weeks.
*** 3 loans were given for 12 weeks
^There were 3 loans for 26 weeks also for loan amount less than 15000. Tenure is always 104 weeks if loan amount exceed 25000
^^loan >15000 were never given for 26 weeks.
^^^ loan >15000 were never given for 26 weeks and loan for more than 25000 were always given for 104 weeks.
++ there was a loan of Rs 30000 in this category which is not included in this analysis.
+++There was one loan in this category which was given @ 25%.

Sample Description and Balance

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	Treatment Status			
	Whole Sample	Control	SL only	N
Nr of HH members	5.04	5.02	5.05	2841
	(0.037)	(0.084)	(0.073)	
HH owns BPL card	58.6	59.0	58.0	2841
	(0.92)	(2.08)	(2.61)	
Primary activity HH: agriculture	53.5	52.1	55.3	2841
	(0.94)	(4.13)	(3.29)	
Primary activity HH: Waged employment	26.8	27.5	25.9	2841
	(0.83)	(2.35)	(2.37)	
Primary activity HH: Self-employment	10.9	11.7	9.98	2841
	(0.59)	(2.12)	(1.44)	
Dwelling structure: Pucca House	18.9	17.8	20.3	2841
	(0.73)	(2.46)	(2.01)	
Dwelling structure: Semi-pucca house	65.3	65.6	64.9	2841
	(0.89)	(3.10)	(2.66)	
Floor materials: poor	35.2	35.9	34.4	2841
	(0.90)	(3.23)	(2.74)	
Floor materials: bricks or stones	29.0	27.5	31.0	2841
	(0.85)	(3.15)	(3.19)	
Floor materials: improved	13.2	13.6	12.6	2841
	(0.63)	(1.98)	(1.88)	

Note: Standard Errors in parenthesis, clustered at the gram panchayat, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Household survey.

Sample Description and Balance

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	Treatment Status			
	Whole Sample	Control	SL only	N
HH head religion: Hinduism	66.6	67.6	65.4	2841
	(0.88)	(3.56)	(3.90)	
HH head religion: Islam	20.2	18.6	22.3	2841
	(0.75)	(3.89)	(4.04)	
HH head religion: Buddism	12.4	12.8	11.8	2841
	(0.62)	(2.39)	(2.29)	
HH head caste: Backward	32.9	33.9	31.6	2841
	(0.88)	(4.08)	(3.50)	
HH head caste: Scheduled	40.9	41.6	40.1	2841
	(0.92)	(4.16)	(4.42)	
HH head caste: General	25.5	24.1	27.4	2841
	(0.82)	(4.04)	(4.24)	
Gender HH head (fraction male)	90.5	89.7	91.4	2841
	(0.55)	(1.04)	(0.92)	
Age HH head	45.4	45.3	45.5	2841
	(0.19)	(0.48)	(0.35)	
Years of education HH head	5.92	5.85	6.01	2841
	(0.088)	(0.20)	(0.20)	

Note: Standard Errors in parenthesis, clustered at the gram panchayat, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: Household survey.

Sample Description and Balance

Institute for Fiscal Studies

	Treatment Status			
	Whole Sample	Control	SL only	N
HH owned a toilet at baseline (panel)	26.2	25	27.5	1134
	(1.31)	(3.15)	(2.87)	
HH owned a toilet at baseline (reconstructed)	26.6	25.1	28.5	2841
	(0.83)	(2.06)	(2.14)	

Note: Standard Errors in parenthesis, clustered at the gram panchayat, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Household survey.