

Opening the Black Box of Information Interventions:

Evidence from Environmental Health Practices in India

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AEA at ASSA

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Global sanitation behaviors

From 1990...

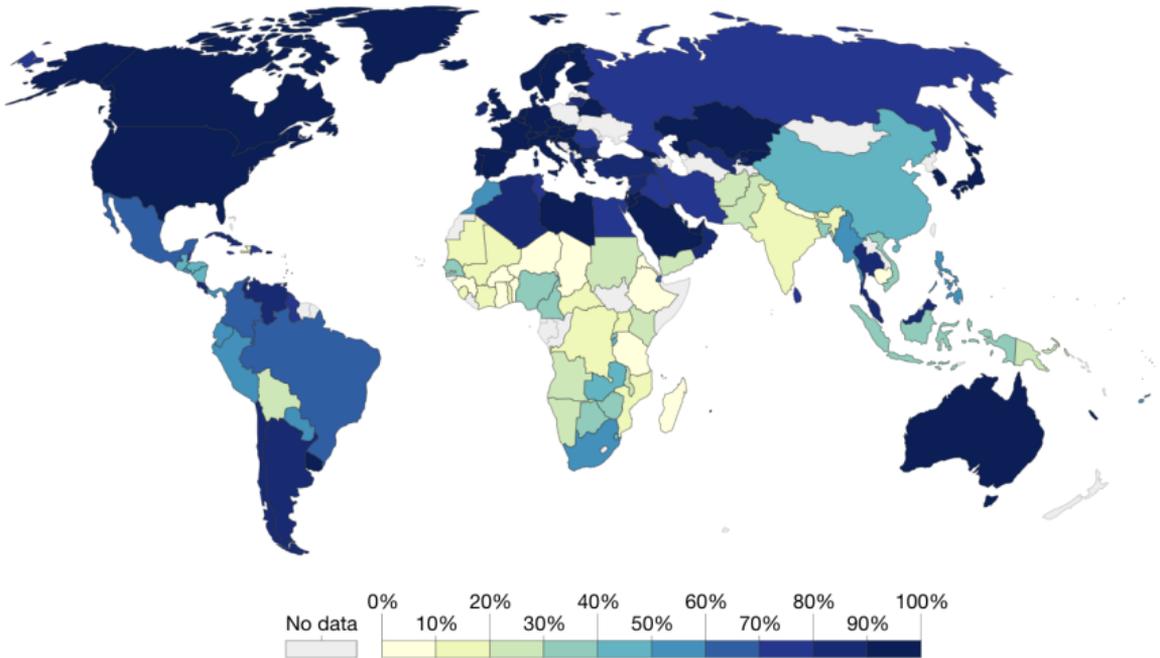


Figure: Percent of population with access to improved sanitation, 1990. (Source: WB-WDI)

Global sanitation behaviors

...to 2015

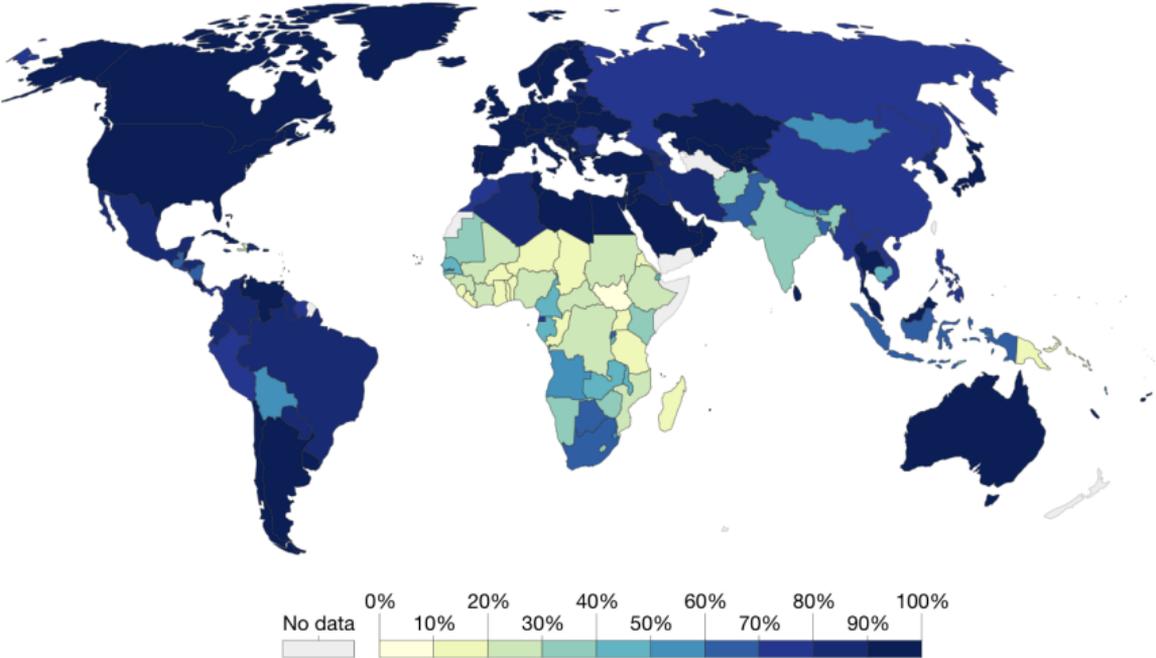


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 - Experimental setting: Latrine promotion in Orissa
- 3 Mechanisms of latrine adoption
 - Information and knowledge
 - Risk preferences
 - Social influence
- 4 Conclusion

The importance of improved sanitation

Why do sanitation behaviors matter?



- **Health:** Unimproved sanitation and diarrhea (Dickinson et al, 2015; Gertler et al., 2015; Hammer & Spears, 2016)
- **Externalities:** Public health concerns (Geruso & Spears, 2018; Pattanayak et al., 2009)

Why do sanitation behaviors matter?



- **Health:** Unimproved sanitation and diarrhea (Dickinson et al, 2015; Gertler et al., 2015; Hammer & Spears, 2016)
- **Externalities:** Public health concerns (Geruso & Spears, 2018; Pattanayak et al., 2009)
- **Safety and security:** Especially for women/girls, particularly at night
- **Long term consequences:** Long term health (stunting) and human capital accumulation (Orgill-Meyer & Pattanayak, 2017; Spears et al., 2013)

Sanitation in India

Sanitation in India

National, rural, urban

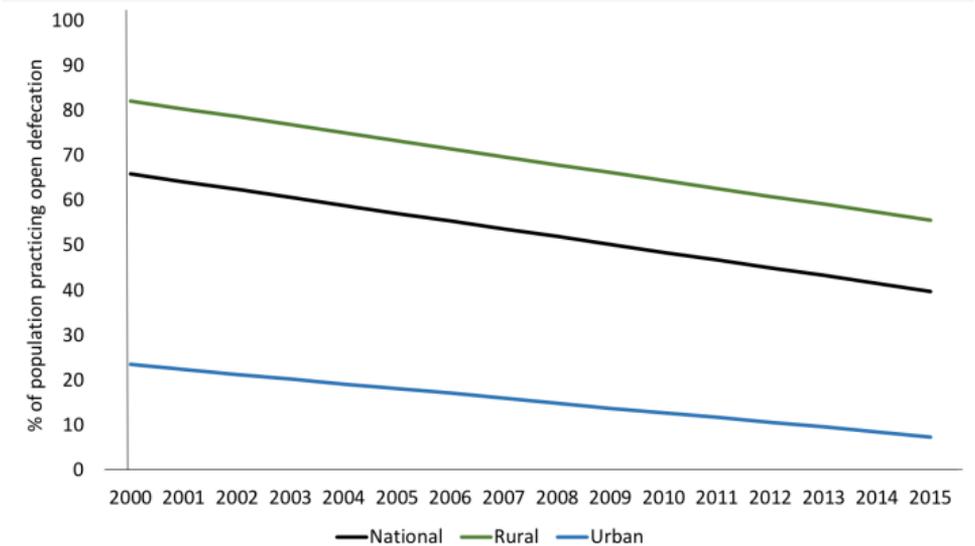


Figure: Open defecation rates in India, 2000-2015 (data source: WB and UNICEF JMP)

Experimental setting: Latrine promotion in Orissa

Orissa, India



Orissa, India



Data collection in Orissa

Experimental latrine promotion and panel building



Data collection in Orissa

Experimental latrine promotion and panel building



- 40 villages, 1086 households
- Surveys conducted with same households at each round
- Intervention components: walk-of-shame, defecation mapping, fecal calculation; subsidies for BPL households
- Low inter-wave attrition (<4%)

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Latrines in Orissa



Figure: Latrine built in 2006, Orissa

Latrines in Orissa



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Figure: Cement baipalli pan

Mechanisms of latrine adoption

Mechanisms from the literature

- **Budget and price:** Resource allocation to environmental health technologies; role of subsidies (Dupas, 2014; Farsi et al., 2007; Pattanayak et al., 2009; Pattanayak et al., 2016)

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- **Social influence:** Behavioral conformity throughout networks (Dickinson and Pattanayak, 2009; Miller and Mobarak, 2015; Moffit, 2000)

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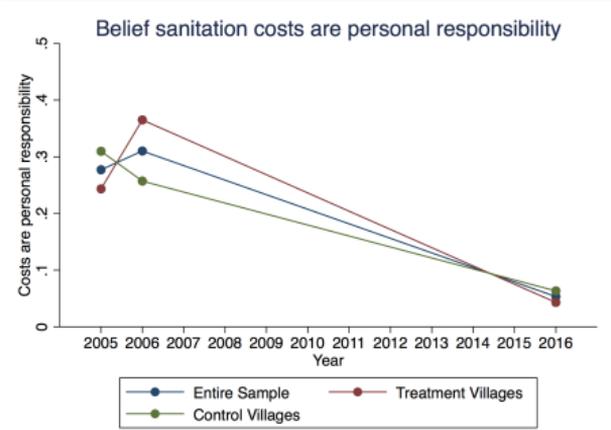
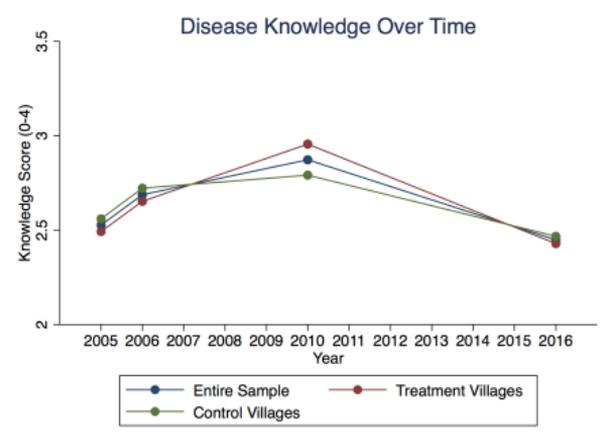
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Shifting knowledge and beliefs



Defining social/information networks

Spatially defined information networks

STATE : ORISSA DISTRICT : BHADRAK 079 TEHSIL/TALUK / BLOCK : TINIDI 07A
VILLAGE : SATIUTI VILLAGE CODE : 1524000

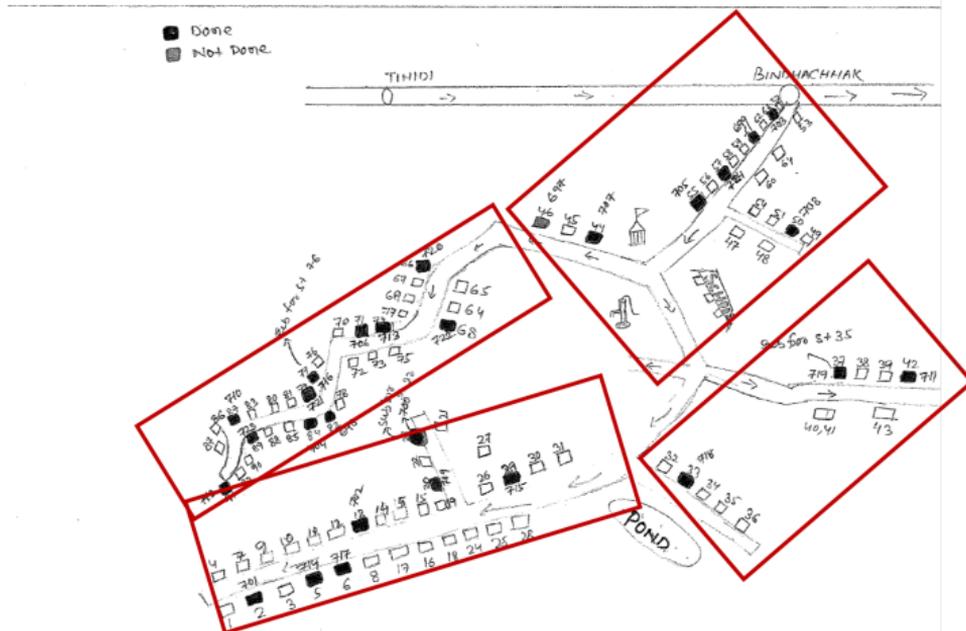


Figure: Satiuti Village, Bhadrak, Orissa

Mechanisms recap

- **Knowledge:** Indicator for at least 50 percent of sanitation-health relationship questions correct
- **Beliefs:** Indicator for household responsibility for sanitation-related expenses
- **Risk preferences:** Indicator for certainty preference on standard gamble question (in 2005)
- **Social influence:** Mean neighborhood latrine ownership (excluding own household)

Estimating equations

Heterogeneous impact:

$$Y_{it} = \alpha + \beta_1 K_{it} + \beta_2 T_{it} + \beta_3 K_{it} \times T_{it} + \nu X_{it} + \varepsilon_{it} \quad (1)$$

- Y_{it} : latrine adoption
- K_{it} : mechanism
- T_{it} : treatment indicator
- X_{it} : household controls

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Examining mechanisms:

$$K_{it} = \alpha + \rho_1 T_{it} + \rho_2 P_{it} + \rho_3 T_{it} \times P_{it} + \nu X_{it} + \varepsilon_{it} \quad (2)$$

- P_{it} : post intervention indicator

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Empirical results

Heterogeneous impact

Table: Regression results: Latrine adoption

	Knowledge	Cost responsibility	Risk preferences	Social influence
K_{it}	0.00670 (0.0136)	0.0686** (0.0274)	0.00622 (0.0150)	0.475*** (0.148)
Treatment	0.162** (0.0623)	0.220*** (0.0621)	0.183** (0.0690)	0.0329* (0.0178)
$K_{it} \times$ Treatment	0.114** (0.0565)	-0.00760 (0.0578)	0.0515 (0.0456)	0.314** (0.158)
Constant	0.0348** (0.0146)	0.0212** (0.00955)	0.0313* (0.0178)	0.0295*** (0.00793)
Controls	Y	Y	Y	Y
Observations	1048	1084	1084	1078
R^2	0.119	0.111	0.105	0.349

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Empirical results

Examining mechanisms

Table: Regression results: Treatment and mechanisms

	Knowledge	Cost responsibility	Social influence
Treatment	-0.0418 (0.0300)	-0.0394 (0.0392)	0.00245 (0.00154)
Post	0.125*** (0.0432)	-0.0525 (0.0380)	0.0346*** (0.0122)
Treatment × Post	0.0144 (0.0652)	0.173*** (0.0489)	0.227*** (0.0605)
Constant	0.501*** (0.0218)	0.250*** (0.0265)	-0.00576* (0.00324)
Controls	Y	Y	Y
Observations	2132	2168	2156
R^2	0.021	0.051	0.312

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Table: Regression Results: Combined Mechanisms

	Latrine Adoption
Social influence	0.813*** (0.0451)
Cost responsibility	0.0485** (0.0187)
Knowledge	0.0248 (0.0192)
Risk preferences	0.0359 (0.0216)
Constant	-0.0182 (0.0277)
Controls	Y
Observations	1043
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Conclusion

- Heterogeneous treatment effects show the relevance of sanitation-health knowledge and social influence
- Treated households change their beliefs surrounding the financial responsibility of sanitation technology following the intervention
- Treated neighborhoods have higher densities of latrine ownership following the intervention
- These mechanisms are also significantly related to latrine adoption
- Non-health mechanisms of adoption are important to discussions of motivating demand for and use of environmental health technologies like latrines

Thank you

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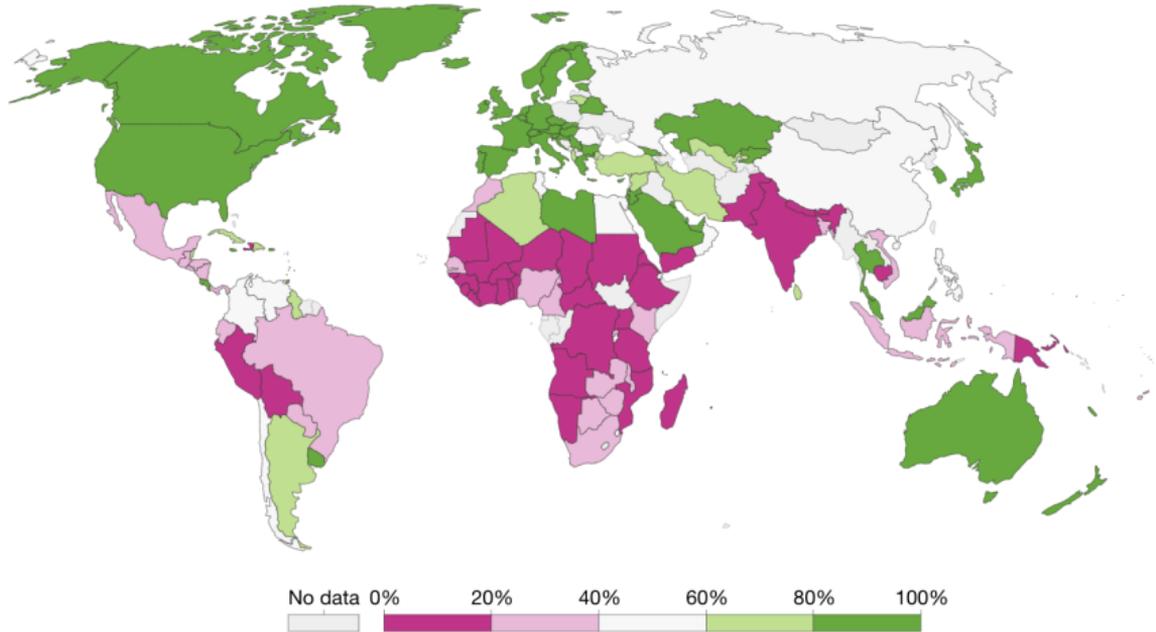


Figure: Percent of rural population with access to improved sanitation, 1990. (Source: WB-WDI)

Global sanitation behaviors

...to 2015

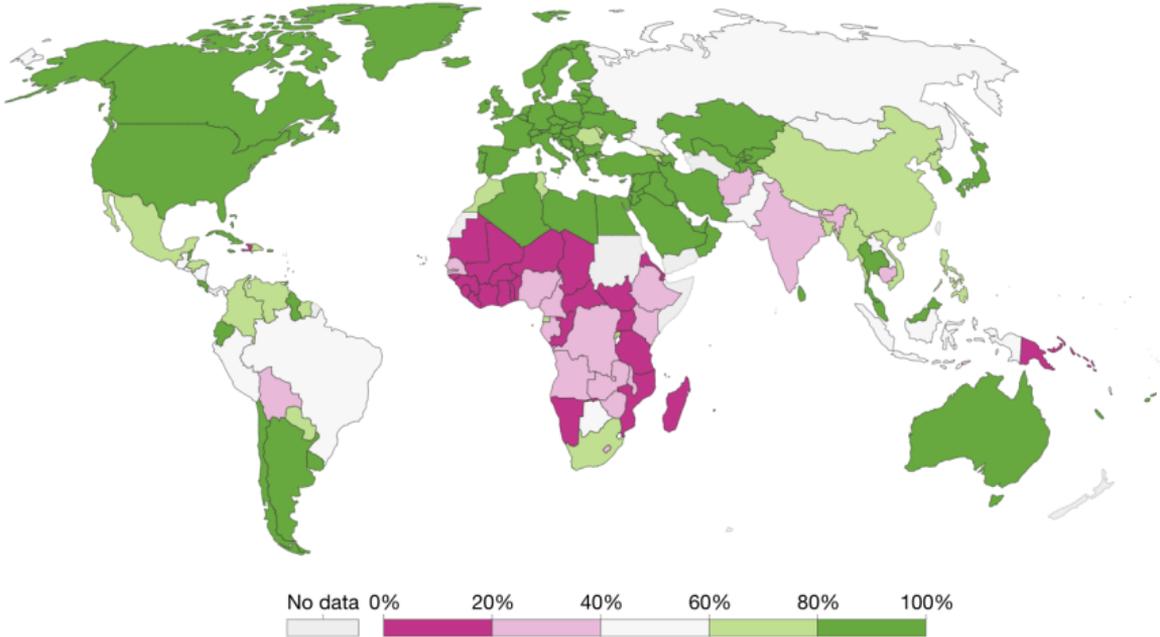


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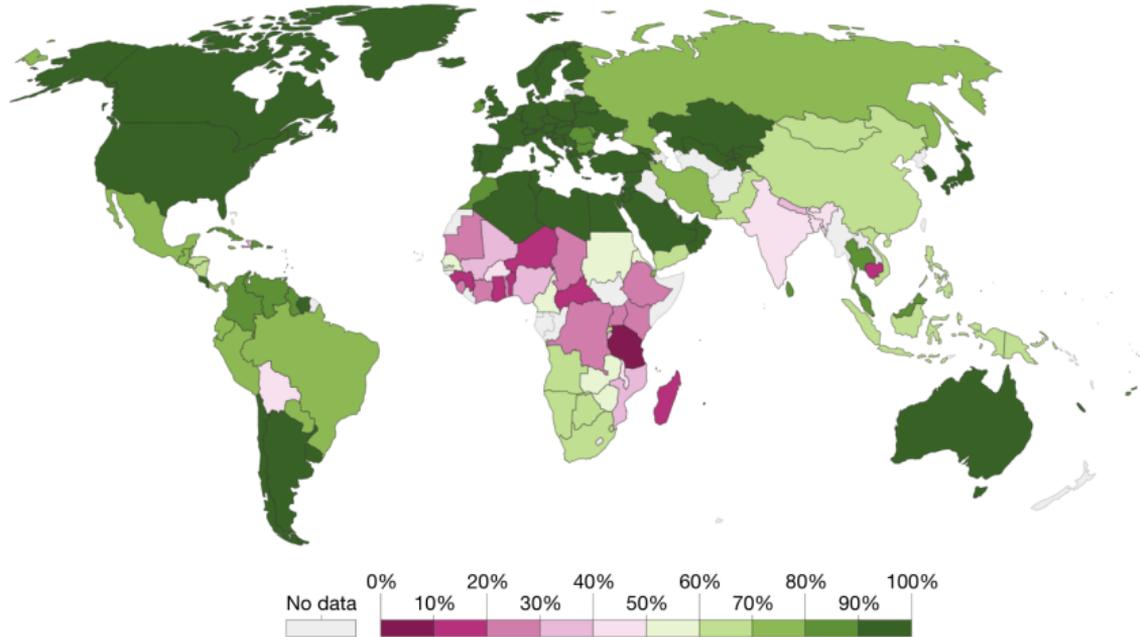


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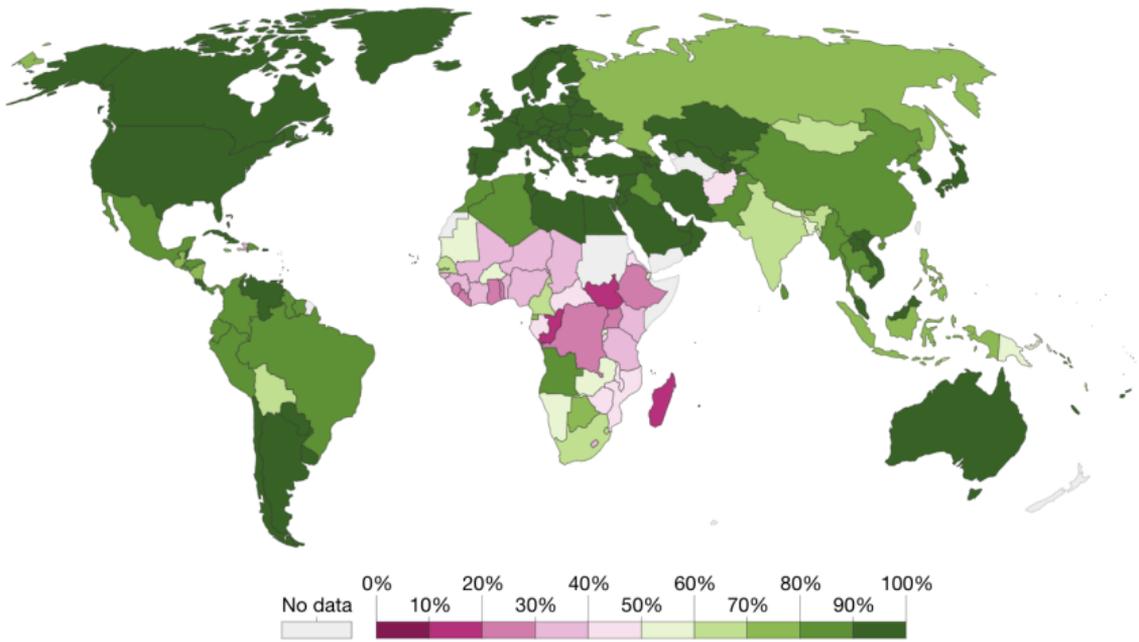


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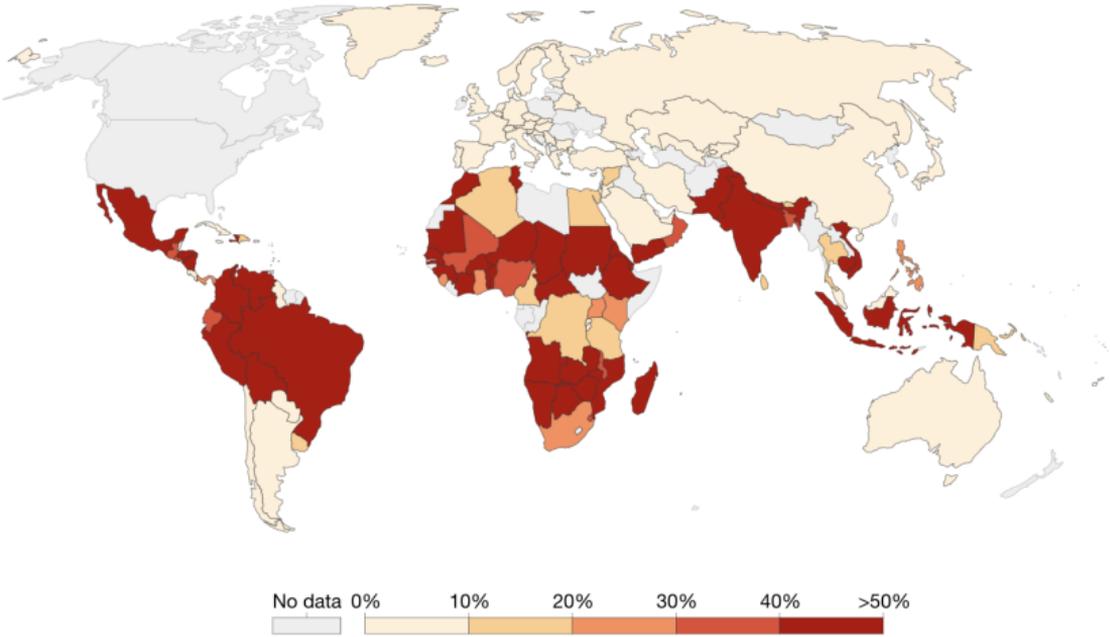


Figure: Percent of rural population practicing open defecation, 1990. (Source: WB-WDI)

Global sanitation behaviors

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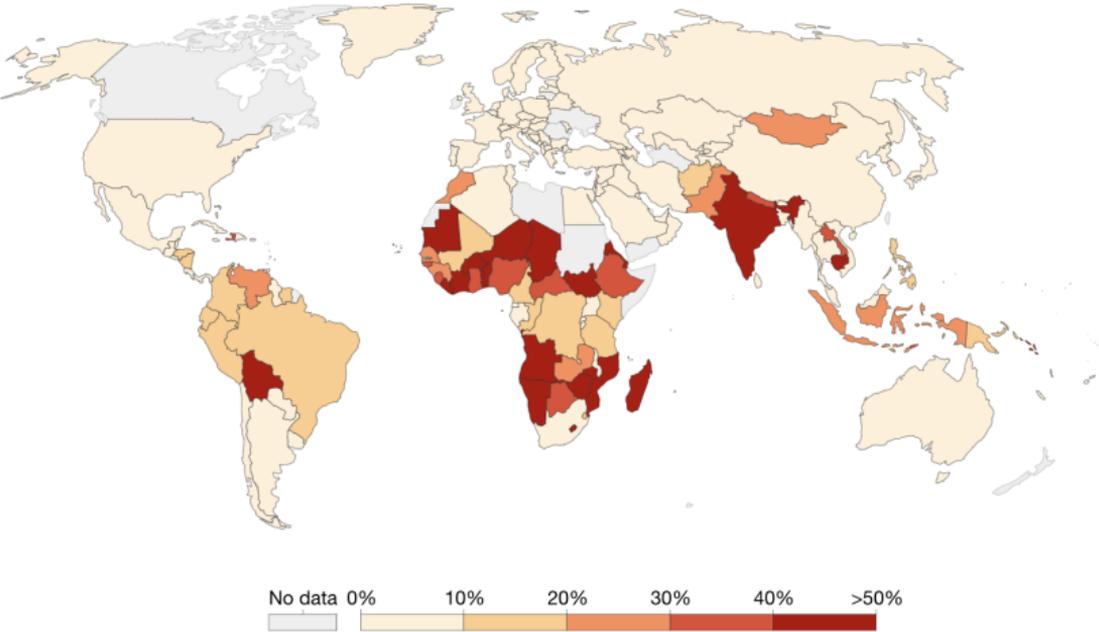


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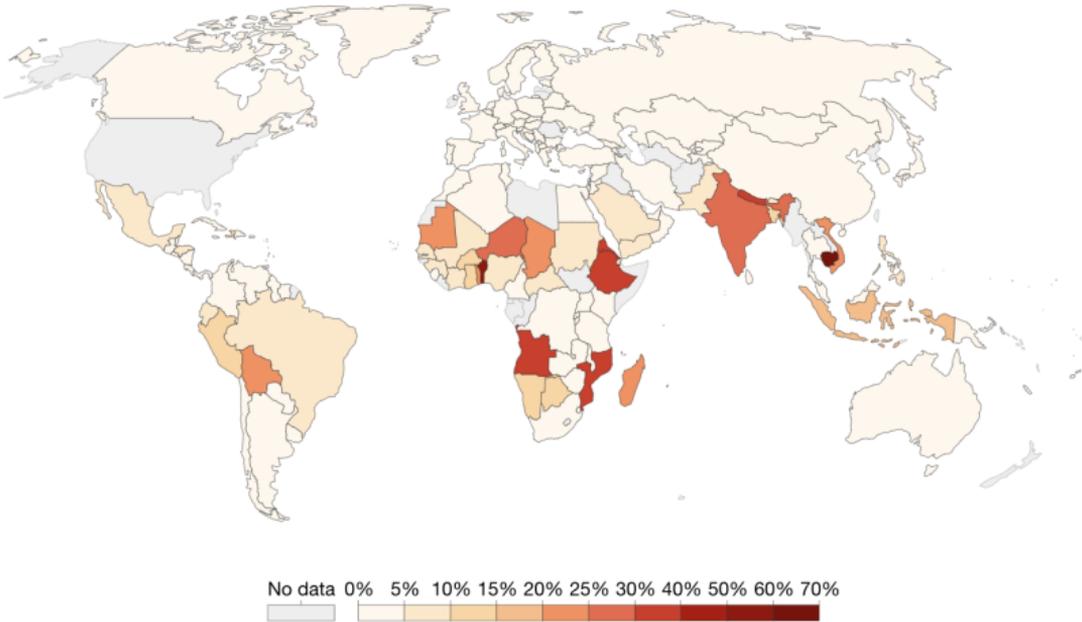


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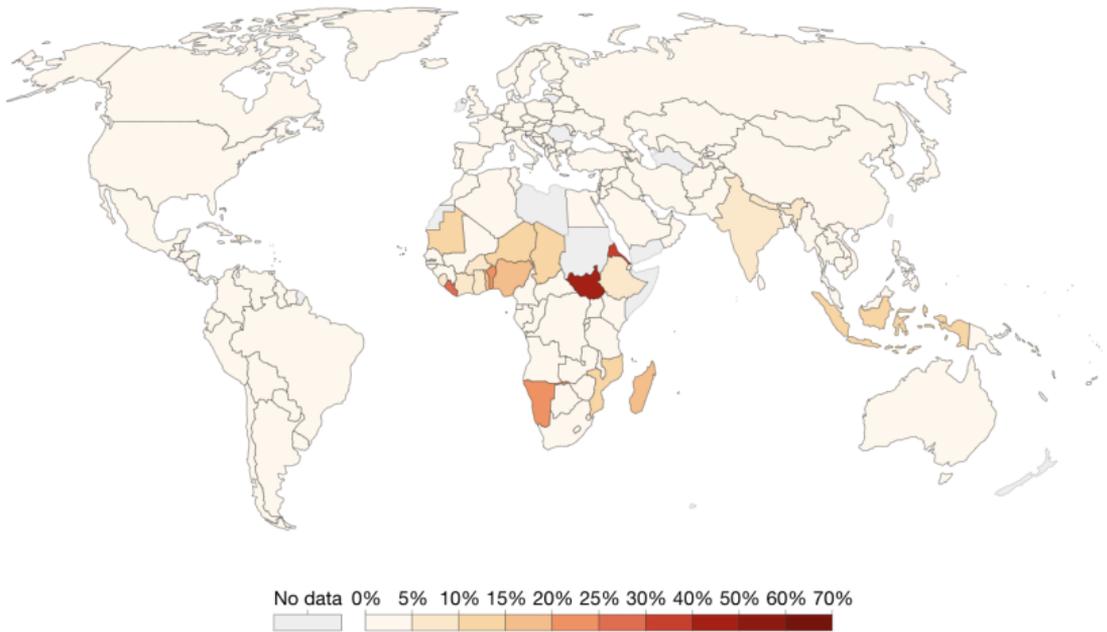


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Empirical results

Examining mechanisms

Table: Regression Results: Combined Mechanisms

	Entire Sample	Control	Treatment
Social influence	0.813*** (0.0451)	0.464*** (0.139)	0.809*** (0.0570)
Cost responsibility	0.0485** (0.0187)	0.0639** (0.0242)	0.0299 (0.0298)
Knowledge	0.0248 (0.0192)	0.0116 (0.0147)	0.0433 (0.0328)
Risk preferences	0.0359 (0.0216)	0.0176 (0.0168)	0.0607 (0.0439)
Constant	-0.0182 (0.0277)	-0.0182 (0.0167)	-0.0132 (0.0539)
Observations	1043	527	516
R^2	0.356	0.088	0.333

Standard errors in parentheses

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