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SANITATION SUBSIDIES

Encouraging sanitation investment in the developing world: A cluster-randomized trial

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Poor sanitation contributes to morbidity and mortality in the developing world, but there is disagreement on what policies can increase sanitation coverage. To measure the effects of alternative policies on investment in hygiene facilities, we assigned 380 communities in rural Bangladesh to different marketing treatments—community mobilization and information; subsidies; a supply-side market access intervention; and a control—in a cluster-randomized trial. Community education alone did not increase hygiene behavior (mean coverage increased by 1.1 percentage points, $P = 0.82$). Subsidies increased coverage by 3.3 percentage points, $P = 0.30$. Subsidies to the majority of the landless poor increased ownership among subsidized households (+22.0 percentage points, $P < 0.001$) and their unsubsidized neighbors (+8.5 percentage points, $P = 0.001$), which suggests that the poor are influential in their communities. Subsidies also reduced open defecation by 34 percentage points ($P < 0.001$).

One billion people, or about 15% of the world's population, currently practice open defecation (OD), and another 1.5 billion do not have access to improved sanitation (5). Despite the existence of simple, effective solutions such as pour-flush latrines, poor sanitation causes 250,000 deaths per year (6) and may contribute to various health problems such as stunting or tropical enteroparasitoses (7).

The issue has attracted attention and resources from governments and development institutions. In 2012, the United Nations Children's Fund (UNICEF) spent USD 260 million on programs focused on water, sanitation, and hygiene for children (7). The World Bank's Water and Sanitation Program plans to invest USD 260 million in government and private funds to improve sanitation for 50 million people during the 2011–2015 period (8). In India, where over half the population practices open defecation (2), Prime Minister Narendra Modi declared " toilets first, temples later" during a 2010 speech and pledged to eliminate ODF by 2019 (2,9–10).

However, disagreement remains over how best to increase sanitation coverage. Policy-makers must allocate scarce resources among

strategies such as demand generation, i.e., information campaigns, behavior change programming), direct provision of tablets to schools, households, or religious institutions (2), individual or community-based health workers or practitioners ensure that activities may undertake iterative motivation or mass education (3,15). For example, the Government of India's Total Sanitation Campaign (TSC) used the rhetoric of "community-led," "people-centred," and "demand driven" to build one toilet for every 10 rural residents between 2001 and 2003 (16), but critics argue that the program as implemented was "ultra-top-down" (17,18). Recent studies of TSC had minimal impacts on sanitation coverage and ODF status (22).

At the root of this disagreement is uncertainty about the reasons for low coverage. If the major constraints are poverty and the adverse action problem posed by negative health externalities, then economic theory suggests that subsidies are necessary. If the key constraints are lack of information about the benefits of sanitation and the absence of strong community norms against OGI, then programs such as Community-led Total Sanitation (CLTS), which seek to change norms and create social pressure, could be sufficient without subsidies. Even when households are willing to pay for hygienic latrines, experts disagree as to how much of an incentive, e.g., cash, toilet components, are

or lack of information about quality or installation methods, may increase adoption (28).

We measured the effects of alternative policies on investment in hygienic latrines using a cluster-randomized trial in 280 rural communities (38,254 households in 107 villages) in the Yansu district of northeast Guangxi, China. Although sanitation coverage has increased markedly in rural Guangxi in recent decades (7), progress in Yansu, located in the poorest region of the country, has been slower. At baseline, 38% of households reported that their primary defecation site was either no latrine (50%) or an unimproved latrine, and only 30% had regular access to a hygienic latrine. The intervention was conducted in 2002, and we collected follow-up data in 2003 (the 50).

We modelled the concern of how to deliver treatment, community education and health information campaigns, called the Latrine Promoter Program (LPP), motivation and health information combined with subsidies for the purchase of hygienic latrines; a supply-side market seems to be the most effective way to increase latrine use. Involving village leaders and providing information on latrine quality and availability; and a control group receiving no interventions (C0).

LTP was a multi-step, neighborhood-level exercise to raise awareness of the problems caused by poor sanitation and to motivate the community to increase coverage of hygienic latrines. The design of LTP follows that of CLTS, an information and motivation intervention that has been implemented in over 60 countries worldwide (20). The non-governmental organizations that implemented this project, WaterAid Bangladesh and Village Education Resource Center (VERC), were instrumental in the creation of CLTS (21). The design of LTP conformed closely to the principles of CLTS, although LTP differed in emphasizing the importance of hygienic latrines, rather than simply end-use (22).

In villages assigned to the "voucher" treatment, households in the bottom three-quarters of the wealth distribution were eligible to participate in a public lottery awarding useful vouchers. These vouchers provided a 20% discount on the components of any of three models of latrine, priced either (a) voucher1 USD \$1, USD \$3, and USD \$2. Households were responsible for delivery and installation costs of USD 7 to 90. To study the extent of demand spillovers across neighbors, we randomized the share of lottery winners at the neighborhood level into low, medium, and high intensity, corresponding to approximately

The 'supply' treatment was intended to improve the functioning of markets by providing

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trial. Community motivation alone did not increase hygienic latrine ownership (+1.6 percentage points, $P = 0.43$), nor did the supply-side intervention (+0.3 percentage points, $P = 0.90$). Subsidies to the majority of the landless poor increased ownership among subsidized households (+22.0 percentage points, $P < 0.001$) and their unsubsidized neighbors (+8.5 percentage points, $P = 0.001$), which suggests that investment decisions are interlinked across neighbors. Subsidies also reduced open defecation by 14 percentage points ($P < 0.001$).

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