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Premium

How to get farmers to not burn crop residue

Kelsey Jack, Namrata Kala, Rohini Pande, Seema Jayachandran write: An effective policy solution will be one that takes into account their preferred method and recognises that they are making a financial calculation.

Written by [Kelsey Jack](#), [Namrata Kala](#), [Rohini Pande](#), [Seema Jayachandran](#)

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The government can subsidise ex-situ equipment.

In a few weeks, millions in India will breathe much more polluted air as farmers across northern India burn stubble to clear fields for the winter wheat sowing season. It is both a health and an environmental hazard that repeats every year — one that a [2018 Lancet study](#) found to be the number one reason for premature deaths in India. Cash payments — despite failed past attempts — remain a promising way to address this health emergency in the short run.

Annually, Indian farmers set some **92 million tonnes** of crop residues on fire. Many are aware of the health costs to themselves and others. But they are caught between



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farmers often can't afford other methods of crop residue management.

In this setting, imposing and collecting fines for burning is not viable. Politically, penalising farmers who face financial distress is unlikely to pass muster especially in the run-up to state elections. Instead, based on a recent study, we see the potential in providing farmers financial incentives to not burn.



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We studied crop residue management in 171 villages in Punjab in 2019 and ran a **randomised evaluation** of a cash payment programme through J-PAL South Asia that rewarded farmers who did not burn their paddy stubble in kharif 2019.

Our study revealed four important lessons for policy. The first two are about how farmers view the decision to burn and the other two are about how cash transfers can help.

First, farmers perceive the alternatives to burning as too expensive, even though the **central government has subsidised equipment** for crop residue management. For them, the subsidies have not changed the calculus that moving away from burning hurts their bottom line.

Second, farmers state a preference for ex-situ management equipment such as balers over in-situ machinery such as the Happy Seeder and the Super SMS: They prefer to remove the paddy stubble from the field rather than working it into the field.

The good news is that the cash transfers we offered succeeded in getting some farmers to switch from burning to residue management, in no small part because they began to change the financial calculus and allowed farmers to use the removal method they preferred.

The third lesson that emerged from our study pertains to the best format of cash transfers: It was critical to offer some of the payment upfront. In principle, one could ask the farmer to manage stubble without burning, verify that, and then pay him only afterwards. However, this approach did not work in our study. Cash rewards worked only if a portion of the payment was given at the beginning.

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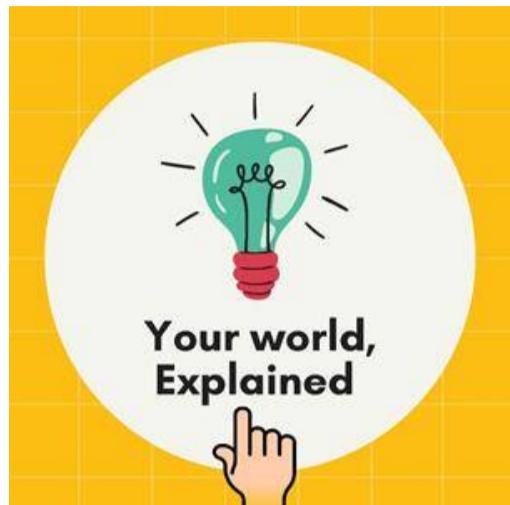


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afterwards. It also gives farmers some financial cushion given they need to pay for the equipment rental. They need cash to manage the stubble, so providing it to them after they have demonstrated they managed it properly is too late.



The final lesson is that the rewards farmers are offered need to cover their costs of managing stubble without burning. In our study, we offered Rs 800 per acre to most farmers, which accounted for about a quarter of the costs of equipment rental. That sufficed to get some farmers to change behaviour — the programme succeeded in reducing burning. But the majority of farmers who were offered that payment level still burned

their paddy stubble. The problem was that they were still being expected to cover the remaining costs themselves — upwards of Rs 2,000 per acre.

Our study results suggest that a subsidy of about Rs 2,500 per acre should be able to achieve a marked reduction in burning. This was the amount the states of Punjab and Haryana had planned to pay farmers in 2019. Widespread health benefits mean that subsidising the entire cost for farmers to make the switch away from burning their paddy stubble is worth it for society.

In light of these four lessons, there are different ways forward in dealing with the issue of crop burning in the short run.

First, of course, the government could restart conditional cash payments. Our study shows that this strategy can work, if the policy is designed correctly.

Other options are also on the table, though it will be important to test both the design and impact of these options to ensure they actually reduce burning.

The government can subsidise ex-situ equipment. Policies that may reap benefits in the longer run include **further encouraging the operation of biogas plants**, which could reduce the net cost of ex-situ management because farmers can sell the crop residue, or to encourage innovation of new, much cheaper and more appealing farm equipment for in-situ management.

An effective policy solution will be one that takes into account farmers' preferred method of crop residue management (ex-situ right now) and recognises that they are making a financial calculation.

Testing effectiveness before these policies are scaled up is important for avoiding spending on things that don't work.

Finding effective ways to make farmers prefer crop residue management to burning would bring large gains to society: The budget allocation to such policies will pay for themselves many times over with improved health and economic productivity for everyone.

This column first appeared in the print edition on October 12, 2021 under the title 'Paying farmers not to burn crops will help'. Jack is associate professor of environmental and development economics, University of California Santa Barbara; Kala is assistant professor in applied economics, MIT Sloan School of Management; Pande is professor of economics and director of Economic



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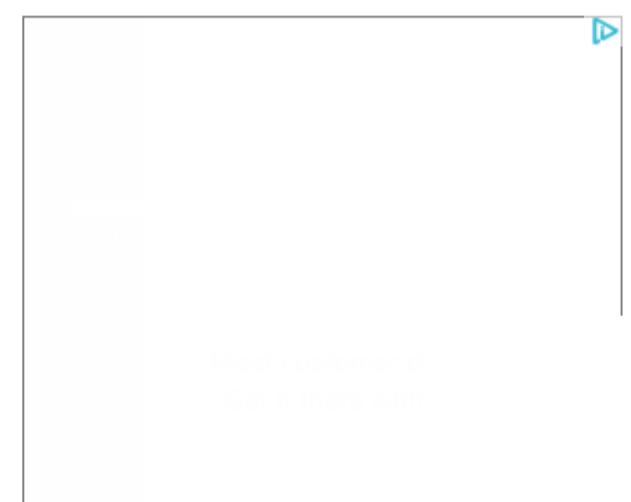


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