



Environment for Development

RESEARCH BRIEF

January 2024

Disentangling the chicken or egg problem of household waste sorting and segregated waste collection

Merely providing a collection service that ensures waste segregated at source is not mixed during transportation is not enough to induce households to segregate. Information campaigns are a must.

*This research brief is based on the EFD Discussion Paper titled *Disentangling the chicken or egg problem of household waste sorting and segregated waste collection: A randomized control trial in India* by authors Shivani Wadehra, Zihan Nie, and Francisco Alpizar*

About the study

- We aim to disentangle this chicken-egg problem with a large-scale intervention that provides a guaranteed segregated collection service.
- We evaluate different approaches to promote waste segregation at source
 - Specifically, we examine the effect of a one-shot segregation promotion campaign involving information and in-house sorting devices.
 - For a subgroup of the campaign treatment, we also provided periodical reminders to the households.
- We also explore the financial viability of such segregated collection service.

Key Messages

- **Providing the segregated collection service alone, without the household level campaign, has little impact on households' segregation behavior.**
- **The vicious circle that has trapped India and many other developing countries into the undesired “no-collection, no-segregation” state cannot be broken by one-sided effort. A combined approach with both the collection service and household campaign might be the only way out.**
- **The one-shot information campaigns given the guaranteed segregation service brings about very large effect on waste segregation.**
- **The effect did not fade away, it rather grows over time.**
- **And the effect persists even 6 months later.**

Background and Methodology

The provision of some public goods is determined by the complementary actions of private and governmental actors. A mismatch between individual and governmental action could result in wasted resources. This is the case of proper waste management. If households segregate waste at home but governments fail to collect it separately, then all private effort is lost. If governments collect waste separately but households fail to segregate at home, then all governmental effort is lost. Worldwide, municipal solid waste on average consists of 44% organic and 38% recyclable materials (Kaza et al., 2018) and municipal solid waste in developing countries tends to contain more organic content, with a share of 50% or higher (Aleluia & Ferrão, 2016). In India, solid waste consists of around 50% organics and 20% recyclables, and the rest are inerts (chemically or biologically unreactive wastes such as sand) (Annepu, 2012). This makes the segregation of

organics from recyclables a priority in general, and in India in particular, for efficient management of waste. Despite multiple efforts over the years, only a small fraction of households segregate their waste at home (e.g., 12% in the city of Palwal, our study site).

In this paper, we aim to disentangle this chicken-egg problem with a large-scale intervention that provides a guaranteed segregated collection service and then evaluates different approaches to promote waste segregation at source. We do this using a carefully designed field experiment that actively monitors the waste-sorting behavior of 1,242 households. Our experiment took place in Palwal, India. We worked with local ragpickers to provide a credible door-to-door collection service of segregated, potentially recyclable inorganic materials, alongside their regular mixed (organic and contaminated materials) waste collection service that was available to all households in our sample. Given the collection service, we then evaluated to what extent

household-side interventions can promote waste segregation. Specifically, we examine the effect of a one-shot campaign involving information and in-house sorting devices. For a subgroup of the campaign treatment, we also provided periodical reminders to the households.

We monitored the households' actual waste segregation for 7 weeks, roughly one week before the initial treatment and six weeks after it. This continuous monitoring allowed us to explore how any potential effect resulting from the one-shot campaign evolves over time. We also conducted a follow-up survey 6 months after the conclusion of the experiment to explore to what extent the changes induced by the intervention were sustained even without the collection service.

Results The provision of guaranteed segregated waste collection increases waste sorting at home by about six percentage points to 18%. This increase is gradual, as households learn slowly about the ragpicker's collection service. On the other hand, the one-shot campaign greatly improved the share of segregating households by 46 percentage points, compared to a control that was not exposed to the campaign but also enjoyed the segregated waste collection service. Contrary to our expectations and results from previous studies, the initial effect did not fade away over time. Instead, the share of households that segregated their waste steadily increased after the one-shot campaign. The reminders further improved the segregation rate on top of the rising trend. During the last rounds of the waste monitoring, before we stopped the collection service, the reminder group had over 90% of households sorting their waste. Even more striking is that 6 months after we stopped the collection service, the share of households who reported to be segregating in the treatment groups was still about 20 percentage points higher than the control group. This persistent

effect implies potential habitual changes induced by our experiment.

We also show that such guaranteed services has the potential to be financially feasible when organized as we did as a private collection service. And it is potential more beneficial if incorporated into the existing waste collection system.

Policy Implications

First, we see only a slight increase in the segregation rate over time in our control group, suggesting that providing the segregated collection service alone, without the household-side campaign, has little impact on households' segregation behavior. Part of the chicken and egg story seems to be right: providing the service is not enough.

Second, we find that the one-shot campaign including the provision of information and dustbins brings about a very large effect on waste segregation behavior. Even in the absence of reminders, the effect does not fade away but rather grows over time. Previous research in similar settings (e.g. Wadehra and Mishra, 2018) also finds that household intervention alone wouldn't have much success either.

Taken together, it seems that the vicious circle that has trapped India and many other developing countries into the undesired "no-collection, no-segregation" state cannot be broken by one-sided effort. A combined approach with both the collection service and household campaign might be the only way out. Thirdly, our results show that reminders have an incremental effect over the course of the experiment, implying that some households might need more sustained information campaigns to change their behavior.

Finally, such services can be financially viable even for developing countries.

The Environment for Development initiative is a capacity-building program in environmental economics focused on international research collaboration, policy advice, and academic training. It consists of centres in Central America, Chile, China, Colombia, Ethiopia, Ghana, India, Kenya, Nigeria, South Africa, Sweden (University of Gothenburg), Tanzania, Vietnam, Uganda, and the US (Resources for the Future). Financial support is provided by the Swedish International Development Cooperation Agency (Sida).