



## The persistence of air purifier non-adoption in Bangladeshi households

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Through two large-scale field experiments with over 3,400 middle-income households in Dhaka, Bangladesh, we find that residential air purifiers face fundamental adoption barriers that persist even when traditional constraints are removed:

- **Less than 1% of middle-income households own air purifiers** despite ambient PM<sub>2.5</sub> levels averaging 75  $\mu\text{g}/\text{m}^3$  (15 times the WHO's annual guidelines).
- **Households systematically underestimate indoor pollution** - while 70% recognise outdoor air as severely polluted, the same percentage believe indoor air is not a serious problem.
- **Willingness to pay is only 8-16% of the retail price**, even after correcting misperceptions.
- **Usage remains minimal even with free purifiers** - households use them less than two hours daily on average.

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## The adoption puzzle persists despite removing multiple barriers

Our experiments systematically removed potential adoption barriers, yet found minimal impact on purifier valuation or usage:

### Information doesn't drive adoption

Free air quality monitors corrected indoor pollution misperceptions (+10% increase in perceived severity) after two to three months' exposure during experiment one. Free purifiers, on the other hand, reduced uncertainty about effectiveness- receivers were 73% more likely to perceive purifiers as effective. Yet neither intervention alone nor together increased willingness to pay for purifiers- it remained at very low levels.

### Credit constraints don't explain low adoption

In experiment two, we offered 12-month interest-free loans, but that had zero impact on willingness to pay. This makes sense: 34% of our sample owns air conditioners (two to three times more expensive than purifiers). It was always unlikely that credit constraints were behind non-adoption.

### Experiment two (five-minute demonstrations)

During experiment two, we visited households and demonstrated a monitor, a purifier, or both. Monitor demonstrations increased perceived indoor pollution severity by 20%. Purifier demonstrations, on the other hand, increased certainty about effectiveness by 25%. Households that were given a five-minute demonstration of both the devices simultaneously saw PM2.5 drop 44% in real-time. Still, we did not observe any increase in willingness to pay.

### Even free distribution with incentives fails

Households given both monitors and purifiers used purifiers for only 110 minutes daily. Offering households an hourly incentive up to 12% of their monthly income increased usage by only 60 minutes. This minimal usage (less than 10% of the day) generated only 14% PM2.5 reductions. No health improvements were detected over three months. Perhaps this was because three months is a small time to detect such usage.

## Policy implications

### Residential air purifiers are not a viable solution

Our results strongly suggest that residential air purifiers cannot meaningfully protect urban populations from ambient air pollution in developing countries,

even with subsidies and information campaigns. The behavioural barriers are too substantial.

### **If pursuing air purifiers, consider non-household settings**

The limited success in firms (Garg, Jagnani, and Lozano-Garcia, 2025) suggests workplace interventions might be more effective if:

- Employers bear operational costs and maintenance
- Centralised decision-making ensures consistent use
- Productivity and profit increases provide direct incentives

## **Conclusion**

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The likelihood of households protecting themselves from air pollution through the adoption of private technology appears unrealistic. Even when we remove financial constraints, correct misperceptions, and pay people to use purifiers, usage remains too low to generate health benefits.

Rather than pursuing ineffective household-level interventions, policymakers should focus on reducing pollution at its source and protecting citizens in public and workplace settings where compliance can be ensured.