

Reducing Recycling Contamination in Gresham, Oregon

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Motivation

- Recycling contaminants are items which should not go into recycling such as plastic bags, take-away cups or pizza boxes.
- Contamination is costly to recycling facilities' operations and ultimately households.
- Contamination can spoil and reduce recyclable material and therefore poses an environmental cost.



Figure 1: Compost, garbage, recycling and glass carts in the Portland Metro area

Research Questions

How do incentives and information affect recycling behavior and contamination in Gresham, Oregon?

Background & Literature Review

- Educating residents on recycling increases collected recyclable material but does not reduce contamination (Oskamp et al. 1998).
- Monetary incentives do not influence the intention to recycle as much as when a consumer understands the benefits of recycling and a sense of societal expectation to recycle (Park and Ha, 2014).
- Commonly used strategies to reduce contamination in curbside recycling include cart tagging and rejecting contaminated carts (The Recycling Partnership, 2020).
 - Cart tagging refers to leaving information on recyclable materials at households' carts.
 - Cart tagging can be combined with auditing households' waste by lifting the lid of carts and providing personalized feedback on contaminants.
- Cart tagging has been effective in reducing the occurrence of materials emphasized as contamination, specifically plastic bags and film (Cascadia Consulting Group 2018).




Figure 2: Example of a good and oops tag for auditing.

Methodology

The study was conducted in collaboration with the City of Gresham, and we audited recycling carts of single-family houses. All recycling routes in Gresham (see Fig. 3) were analyzed for income based on property tax and race using census data. Four routes (n = 2069 households) which were not significantly different in terms of income and race were chosen for three interventions.

- Oops/Good Job tag based on identified contaminants in carts
- Information tag on recyclable material and no plastic bags
- Information tag on recyclable material and postcard for a gift card raffle (see Fig. 4)

We also included one control route without interventions. During each audit, we recorded the quantity and types of contaminants found in households' recycling carts including clamshell, to-go boxes and cups, plastic bags, bagged materials amongst other. We then compared the contamination rate and top contaminants before and after the interventions.

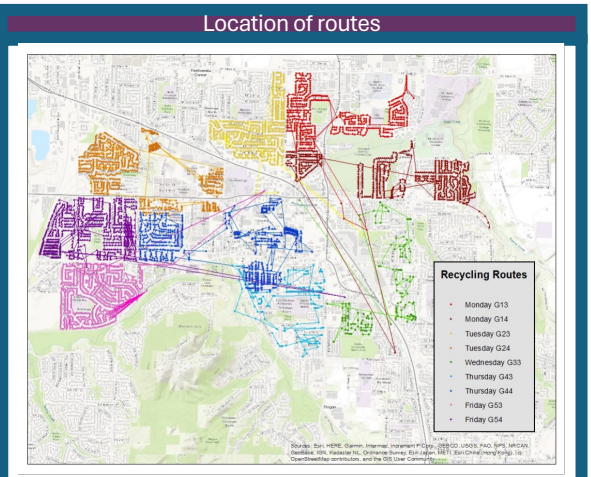


Fig. 3. Between Sept 2023 and April 2024 approximately 40.9% of all households on the routes G13, G53, and G54 were audited.




Figure 4: Incentive postcards were attached to recycling carts as one intervention.

Analysis of Data

	MOG13	FRG53	FRG53	FRG54	FRG54
Intervention	Oops/ Good Job tag	Info tag + Post-card	Control	Info tag	Info tag + Postcard
% contamination BEFORE intervention	32%	39%	36%	43%	42%
Top 3 contaminants BEFORE intervention	Bags Other Bagged	Bags Other Bagged	Bags Other Bagged	Bags Other Clamshells	Bags Clamshells Others
% contamination AFTER intervention	38%	39%	38%	33%	33%
Top 3 contaminants AFTER intervention	Bags Others Bagged	Bags Others Bagged	Bags Others Bagged	Bags Others Bagged	Bags Others Bagged

- Average contamination was about 38% before and 35.7% after interventions.
- For the control and the Oops tag routes we unexpectedly observed an increase in contamination over time.
- For the info tag + combined with the raffle incentive routes, we found a steady or sig. decreased contamination suggesting this may be an effective tool.
- Contamination reduction was particularly pronounced for route FRG54.
- The top contaminant remains plastic bags in recycling.

Future Work

Future work will investigate whether recycling behavior can be linked to socio-economic and demographic variables on the household (e.g. property taxes) or on the block level (from census data).

Additionally, we plan to bring our insights back to campus to improve recycling education and signage on campus.