
# Agenda

1:00 Overview
Brian Roe, Ohio State U.

1:05 Welcome
Julie Schilf, US EPA Region 5

1:15 CET's Wasted Food Solutions Efforts in Ohio*
Coryanne Mansell, Center for EcoTechnology

1:45 Evaluating the Effectiveness of the 'Save More Than Food' Campaign*
Brian Roe, Ohio State U.

2:15 General Q&A and Discussion

* 20-minute presentations followed by presentation-specific Q&A

# Evaluating the Effectiveness of the SAVE MORE THAN FOOD Campaign

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b – Solid Waste Authority of Central Ohio
c – Wageningen University


# Introduction

- **A million lbs.**/day of food sent to landfill in Central Ohio
  - *From SWACO's waste characterization study*
- SWACO convened the **Central Ohio Food Waste Initiative**
  - *> 60 partner organizations participated*
  - *Led to development of a Food Waste Action Plan*
- The **Save More Than Food (SMTF)** campaign:
  1. Developed with partner + general public feedback
  2. Focuses on reasons FW is important to people
  3. Provides actions to reduce food waste

# Testing SMTF in Upper Arlington, Ohio

EPA Region 5 | SWACO FROM WASTE TO RESOURCES | City of Upper Arlington | The Ohio State University

The goal of the research partnership was to

**evaluate the effectiveness of the Save More Than Food campaign materials** in

1. Raising resident food waste awareness
2. Increasing knowledge of how to make changes in their own lives
3. Taking action to reduce food waste at home

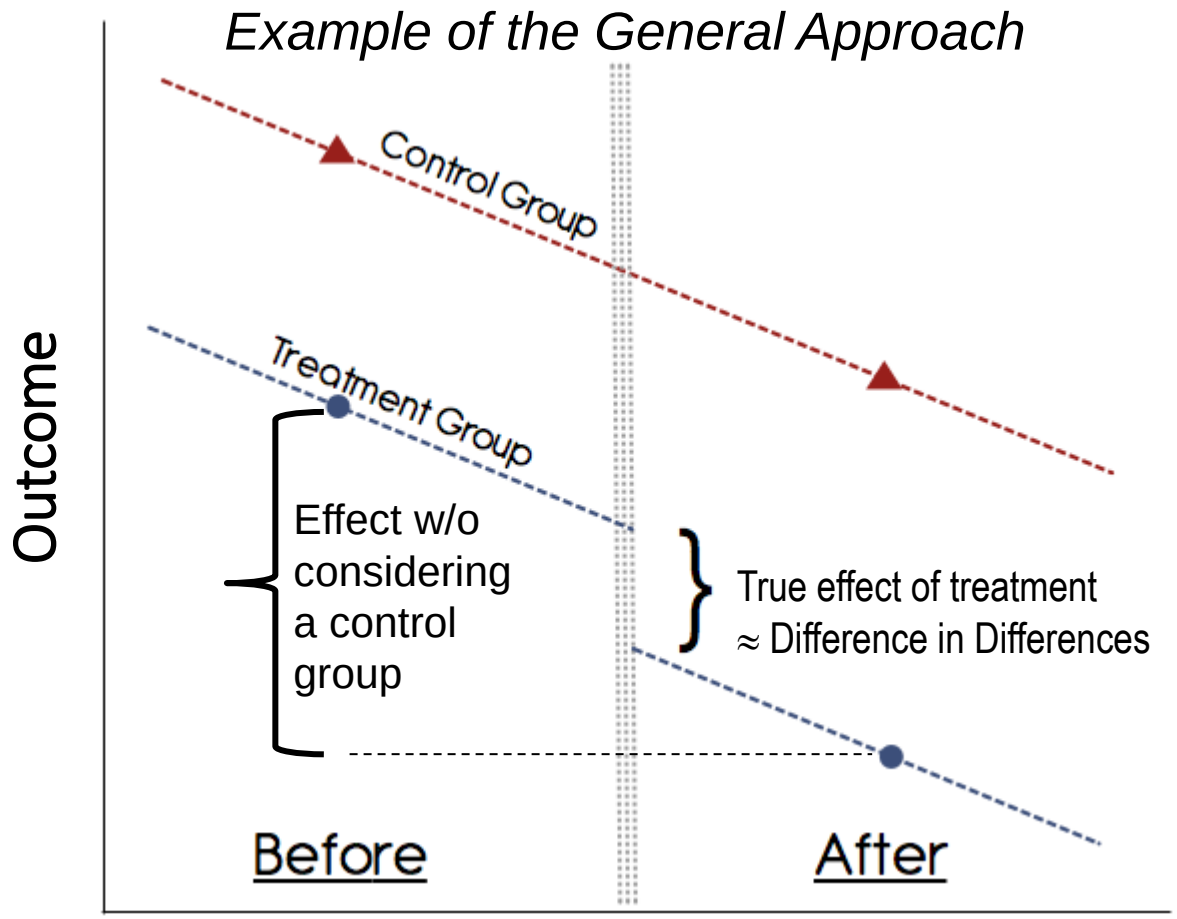
# Evaluation Approach

Difference in Differences

- Difference b/w Control and Treatment
- Difference before and after campaign
- Difference in these differences ≈ effect

Possible Control Groups

- 3 areas within Upper Arlington
  - Align with curbside waste pick up day
  - Received different campaign materials
  - **Control 1**: Area that received the least intensive campaign materials
    - *Weakness*: spatial spillovers of campaign materials across community
- **Control 2**: National sample of households
  - Received same online survey as Upper Arlington participants
  - *Weaknesses*: different motivation for survey participation, no curbside audit data



# Some Treatment Materials

**Treatment 1**: Food storage focus



**Treatment 2**: Storage + Compost focus


**Control**: General SMTF materials

# Data Collection Approaches

Spring 2021 and Summer 2021

# Survey Data Collection

**Nationwide**

*Recruit via Qualtrics' vendors' panels*

**Baseline survey:**

1. Screener questions
2. Consent
3. Demographic questions
4. Directions to monitor next week's waste

**Follow-up Survey:**

1. Causes for past week food waste
2. Food waste knowledge and effort questions
3. Waste amount for applicable food categories

**Upper Arlington**

*Recruit via US mail and social media*

**Baseline survey:**

1. Screener questions
2. Consent
3. Demographic questions
4. Directions to monitor next week's waste
5. Past participation questions (Summer)
6. Gift questions (Summer/Treatment Areas)
7. Contact information

**Follow-up Survey:**

1. Causes for past week food waste
2. Food waste knowledge and effort questions
3. Attitude, prevention, statements evaluation questions about food waste
4. SWACO campaign exposure questions
5. Waste amount for applicable food categories

# Demographics

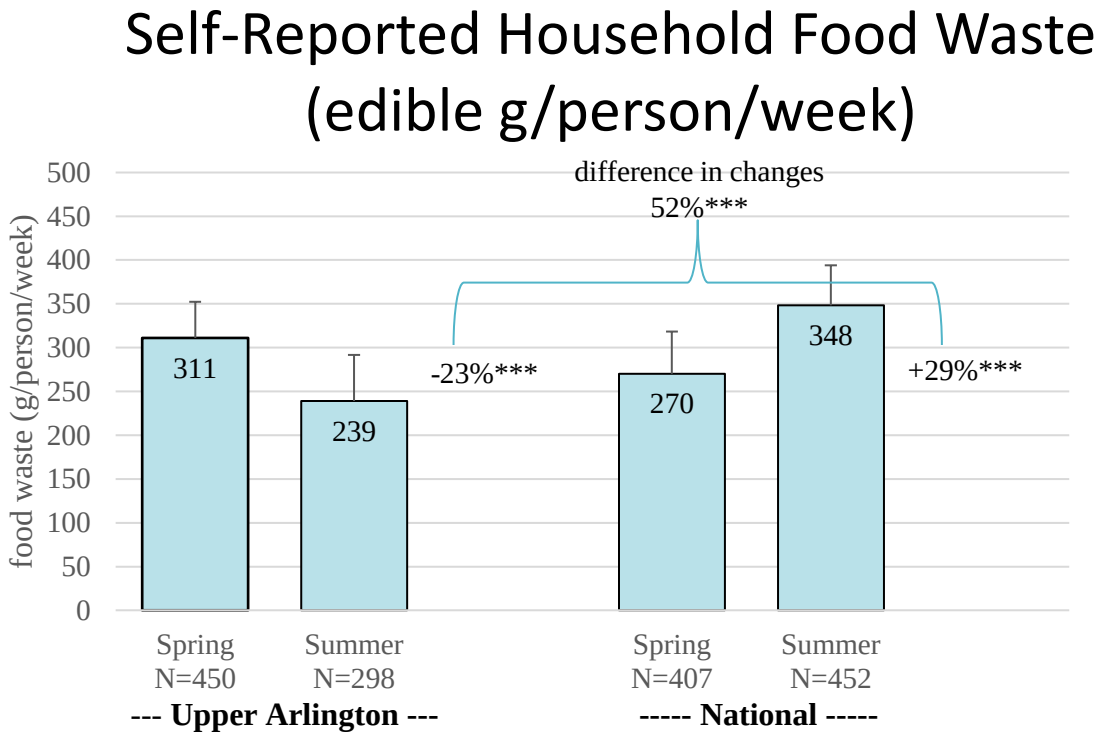
Statistically significant demographic differences between UA and National sample averages. **UA respondents were**:

- Younger
- More formal education
- Larger households
- Higher Income
- More fulltime employment/student
- >90% identified as white, non-Hispanic

| Characteristic[A] | Upper Arlington[B] | National | |
|---|---|---|---|
| Age | | | |
| <35 | 8.7 | 17.8 | |
| 35 – 64 | 65.2 | 42.3 | $\chi^2(2) = 120.1$ |
| 65+ | 26.1 | 39.9 | $p < 0.001$ |
| Household Size | | | |
| 1 | 19.2 | 27.4 | |
| 2 | 34.2 | 43.3 | |
| 3 | 19.7 | 11.4 | |
| 4 | 20.0 | 7.4 | $\chi^2(4) = 108.8$ |
| 5+ | 9.9 | 10.5 | $p < 0.001$ |
| Education | | | |
| High School or less | 0.6 | 14.4 | |
| Some College | 5.3 | 26.7 | |
| College Degree | 40.2 | 33.6 | $\chi^2(3) = 443.3$ |
| Grad/Professional | 53.8 | 25.3 | $p < 0.001$ |
| Employment | | | |
| Full Time or Student | 52.5 | 37.0 | |
| Part Time | 14.7 | 8.4 | $\chi^2(2) = 108.9$ |
| Other | 33.1 | 54.6 | $p < 0.001$ |
| Income | | | |
| <$50,000 | 5.3 | 31.2 | |
| $50 – 99,999 | 15.8 | 35.4 | |
| $100k - $149,999 | 19.4 | 17.2 | |
| $150,000+ | 39.0 | 12.5 | $\chi^2(4) = 603.2$ |
| No Answer | 20.5 | 3.6 | $p < 0.001$ |
| Self-identified Race | | | |
| Asian | 4.9 | 6.6 | |
| Black | 0.0 | 6.2 | |
| White | 90.7 | 82.3 | $\chi^2(3) = 77.1$ |
| Other affiliations | 4.4 | 4.8 | $p < 0.001$ |
| Identify as Hispanic | 1.6 | 5.9 | $p < 0.001$ |
| Food Shopping | | | |
| Less than weekly | 12.8 | 22.3 | |
| Weekly | 57.6 | 50.2 | $\chi^2(2) = 35.6$ |
| More than weekly | 29.7 | 27.5 | $p < 0.001$ |

*Notes*: A – characteristics of household or survey respondent. B – percent in each subgroup. Final column reports the chi-square test statistic for significant differences between Upper Arlington and the National samples for the characteristic. Upper Arlington sample size ranges from N=1151 (age) to N=1159 (employment, race, ethnicity and food shopping) to N=1181 (income, education and household size). National sample size ranges from N=1066 (age) to N=1112 (employment, race, ethnicity and food shopping) to N=1168 (income, education and household size). The Upper Arlington figures include 342 participants who responded to both Spring and Summer surveys, while there were no known repeat responders to the National survey. 59% of Upper Arlington's responses were to the Spring survey while 43% of National responses were to the Spring survey.

# Results: Food Waste (UA vs. National)

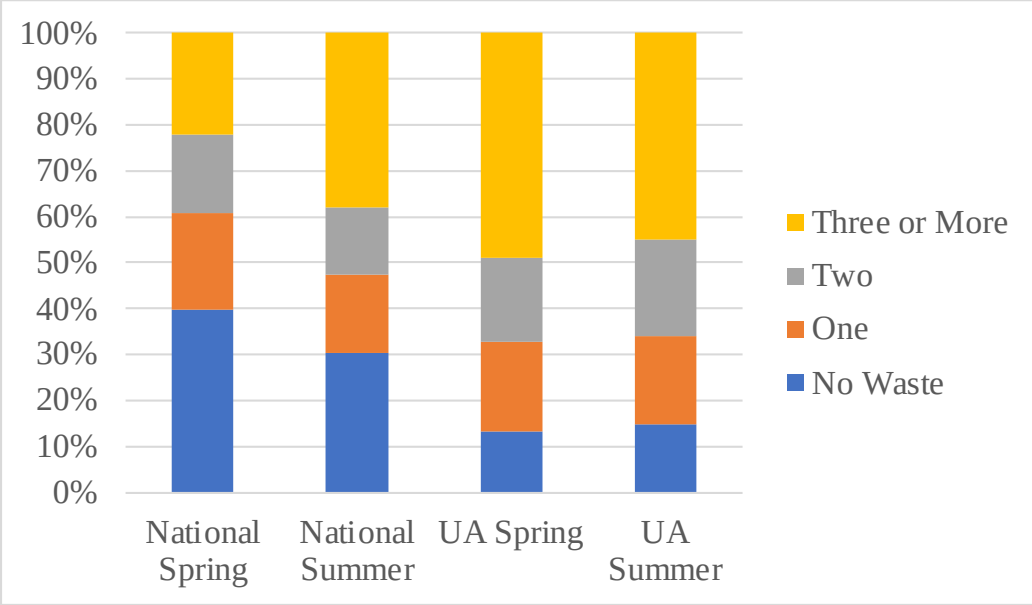



*Notes*: Regression-adjusted means for a typical responding Upper Arlington household: **2 people where the respondent was age 35 – 65 and female**. Error bars depict 95% confidence intervals. *** depicts changes that are statistically different from zero at the 1% level. Surveys did not assess inedible food scraps. The 'difference in changes' is the difference in seasonal changes between Upper Arlington and the National samples.

- Reduction in reported household food waste from spring to summer in UA **(-23%)**
- Increase in household food waste from national survey **(+29%)**
- Campaign was effective in reducing the amount of edible waste reported on surveys completed by volunteers

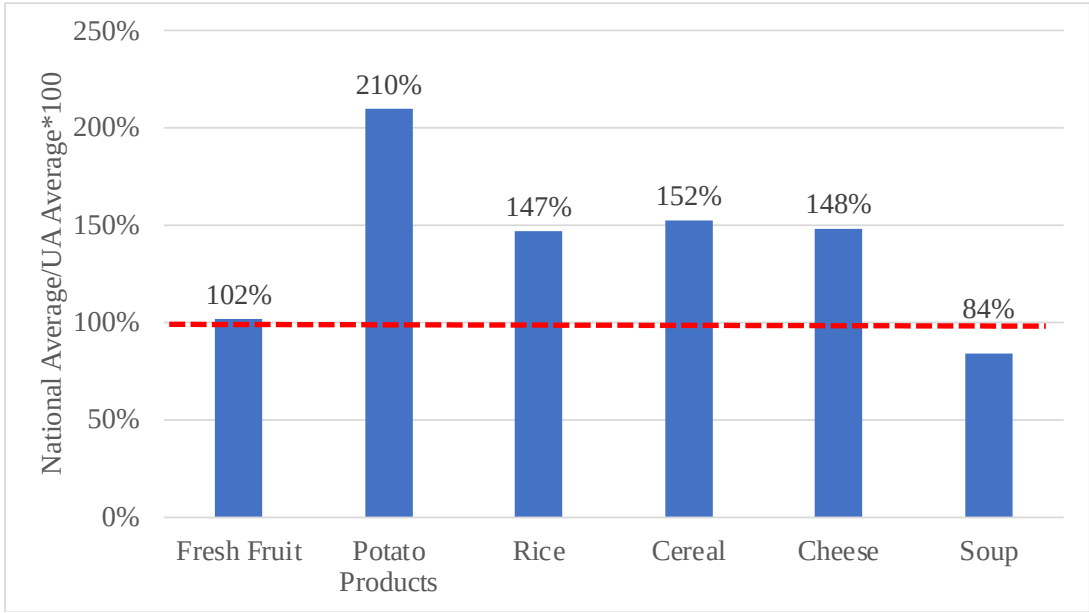
# Self-Reported Food Waste (UA vs. National)

# of Waste Categories Reported by Sample & Season




UA participants more likely to mark that there was some amount of waste in more categories than the National participants.

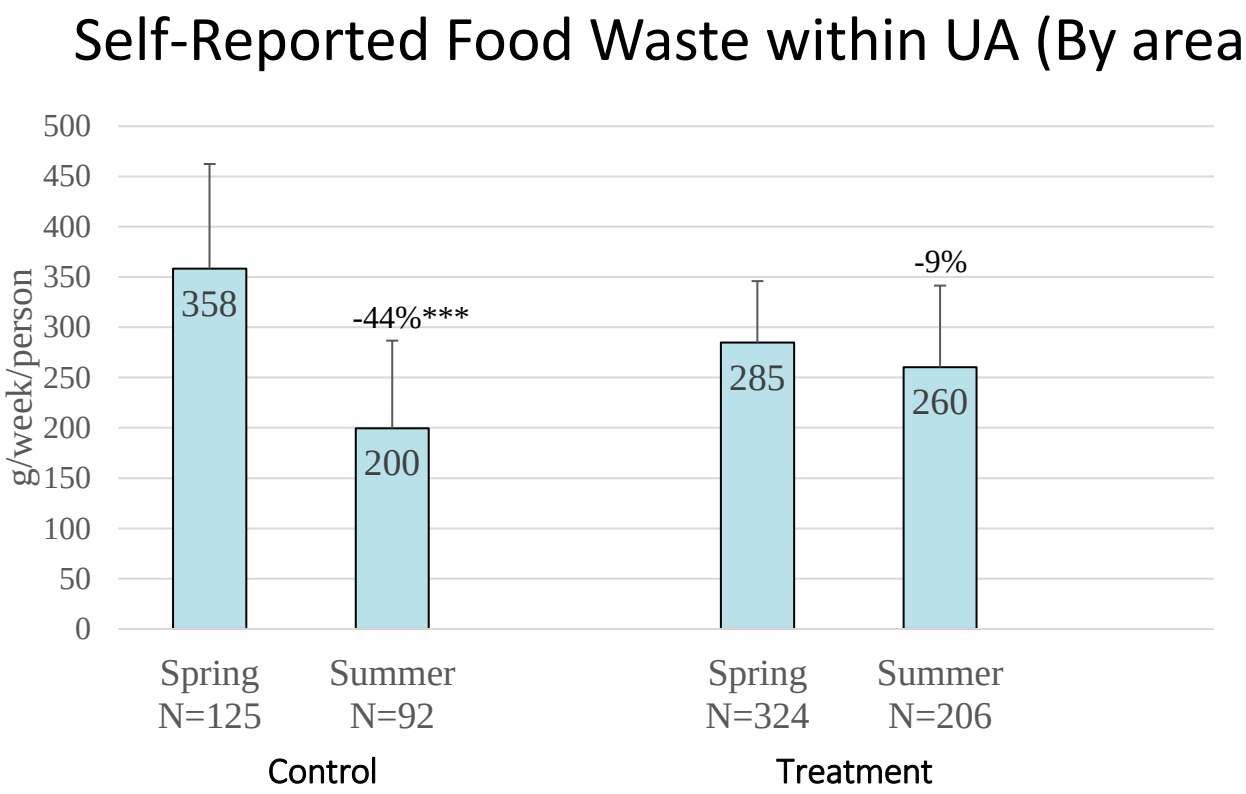
Waste Reported: National Sample as a % of UA




For categories with reported waste, UA participants indicated similar or lower amount of waste (no difference in other 18 categories)

**Conjecture**: UA participants more motivated to report categories with small amounts of waste

# Food Waste (Survey within UA)

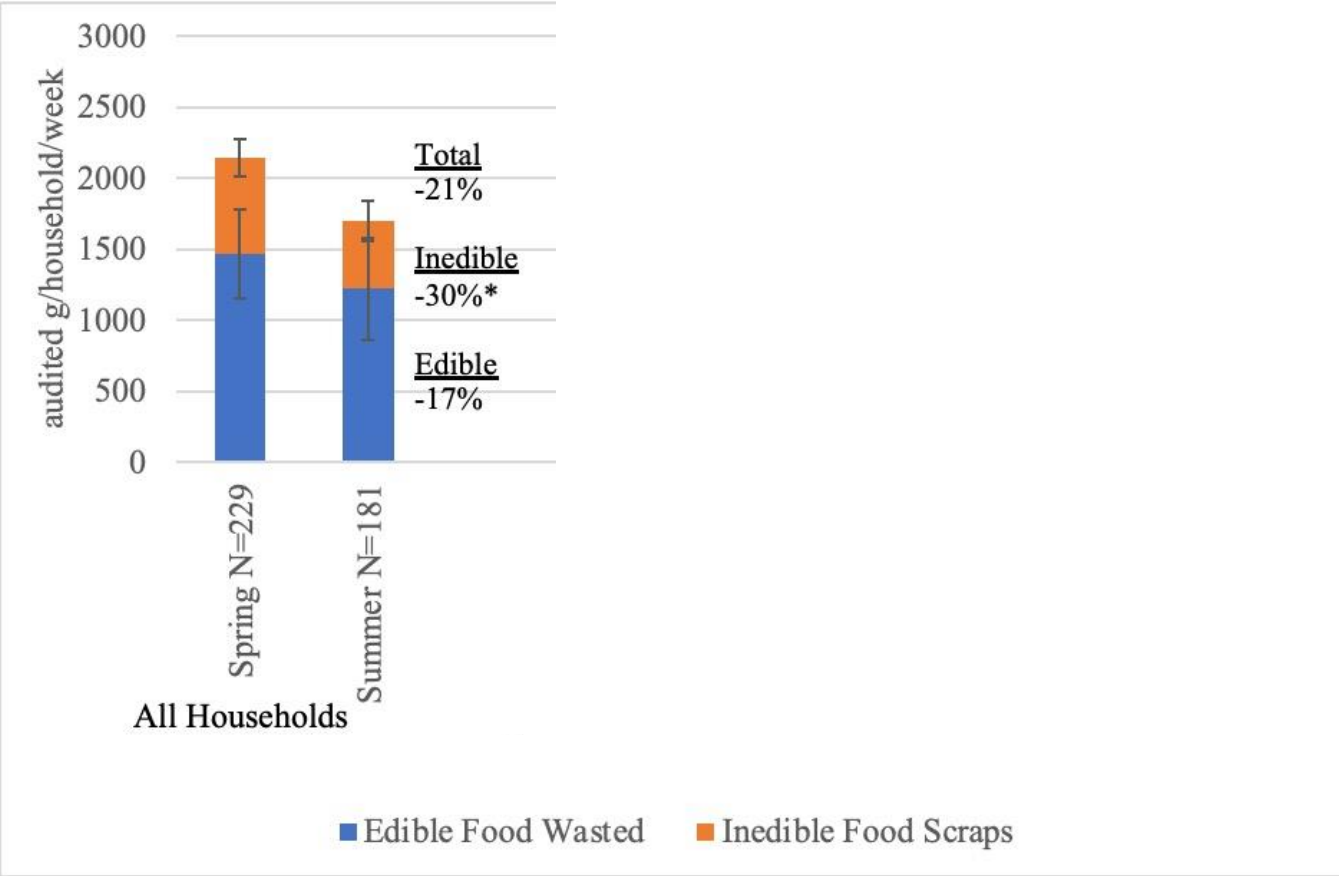



*Notes*: The difference in seasonal changes is not significantly different between the Control and Treatment areas.

1. Both groups reported a reduction in reported waste
2. **Control** area reported a greater reduction but not significantly different from treatment
   - More intensive use of campaign materials does not appear to translate to greater reduction in the self-reported amount of once edible food

# Food Waste (Audits among volunteers)

Total (Edible Food Wasted + Inedible Food Scraps) by Season

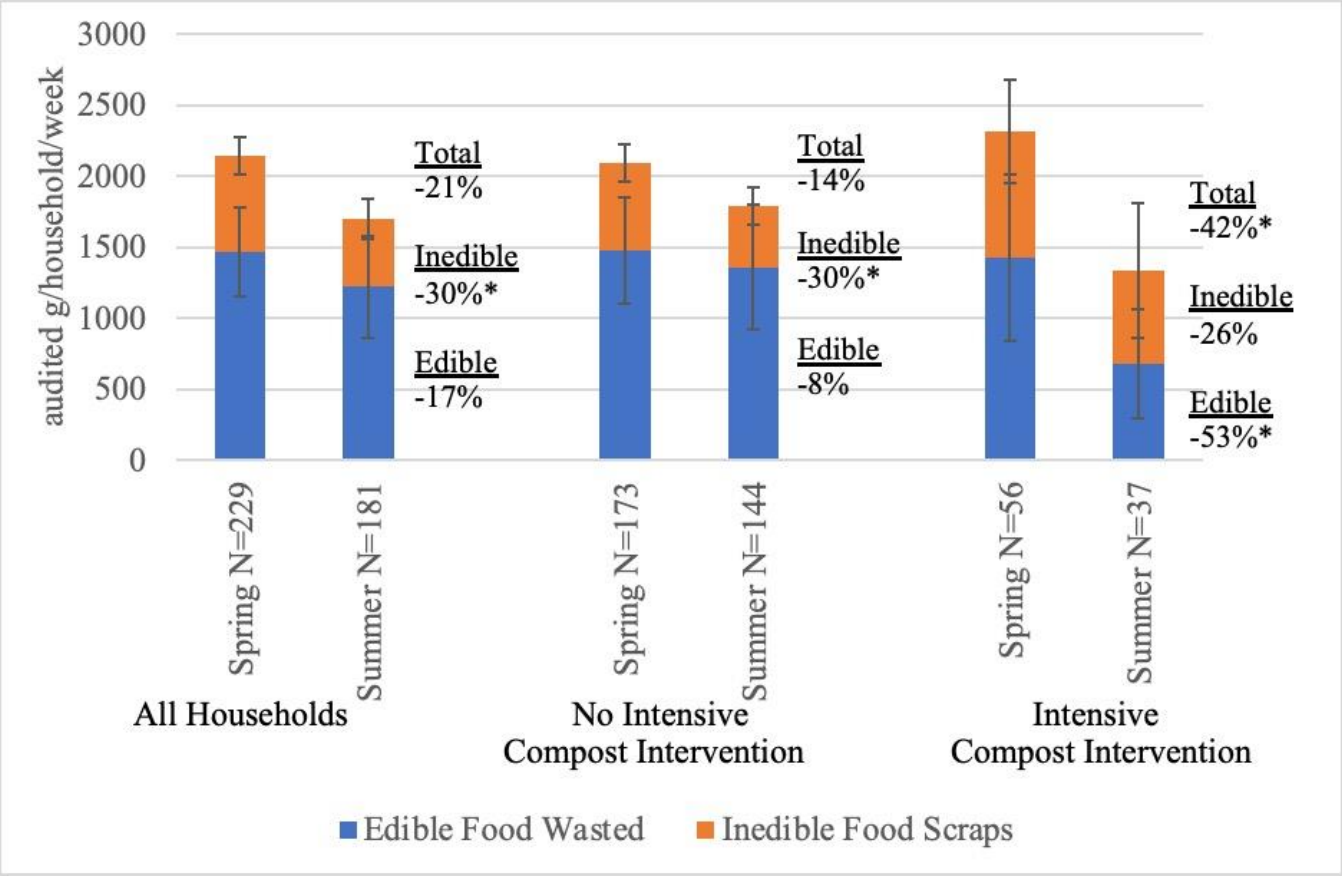



1. For all UA households,
   - Overall reduction is **21%**
   - **30%** reduction among inedible food scraps
   - **17%** reduction among once edible food that was wasted
     - Compare to 23% reduction measured via survey

* Before/after reduction is statistically significant

# Food Waste (Audits among volunteers)

Total (Edible Food Wasted + Inedible Food Scraps) by Season

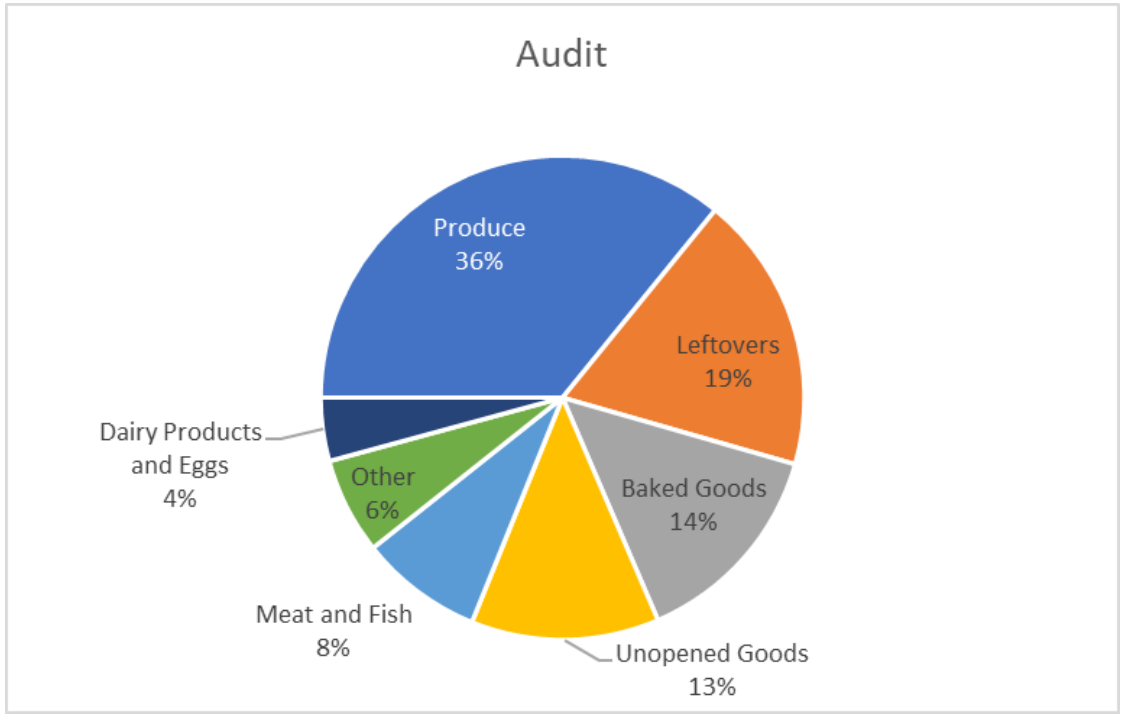


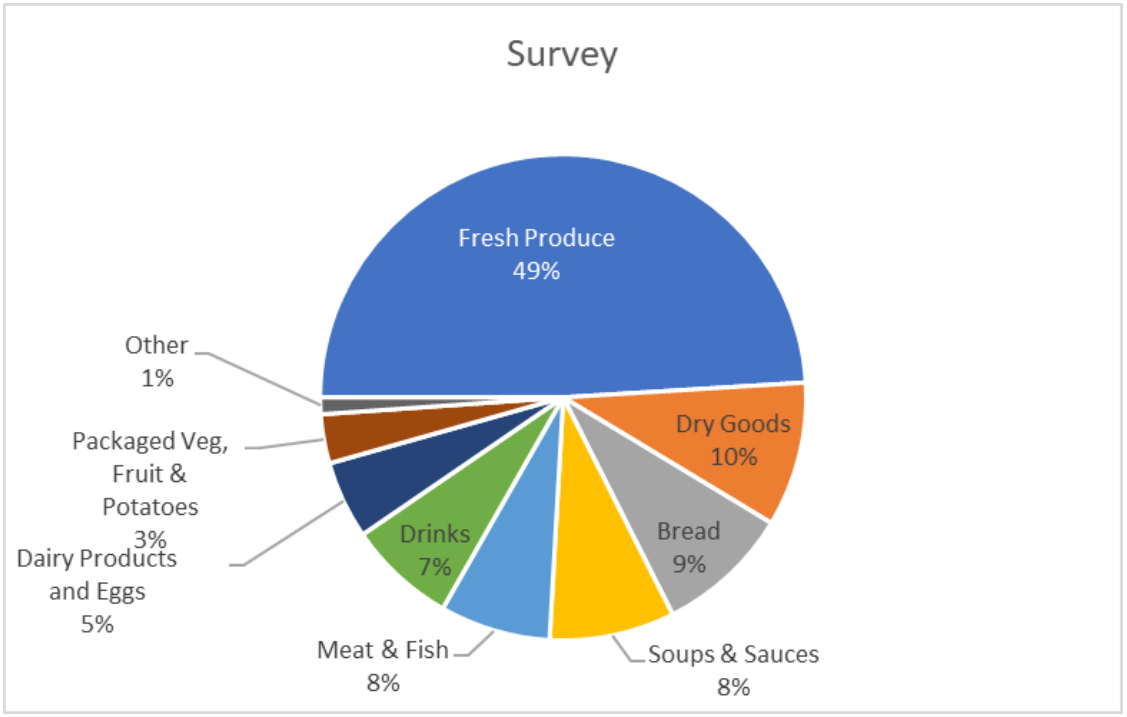

* Before/after reduction is statistically significant

1. For all UA households,
   - Overall reduction is **21%**
   - **30%** reduction among inedible food scraps
   - **17%** reduction among once edible food that was wasted
2. For **Composting Treatment** households
   - Overall reduction was greater (**42%**, statistically significant)
   - Statistically significant reduction in once edible food (**53%**)
   - **26%** reduction in food scraps
3. Survey underestimation
   - 640g/person via audit
   - 266g/person via survey

# Waste Composition

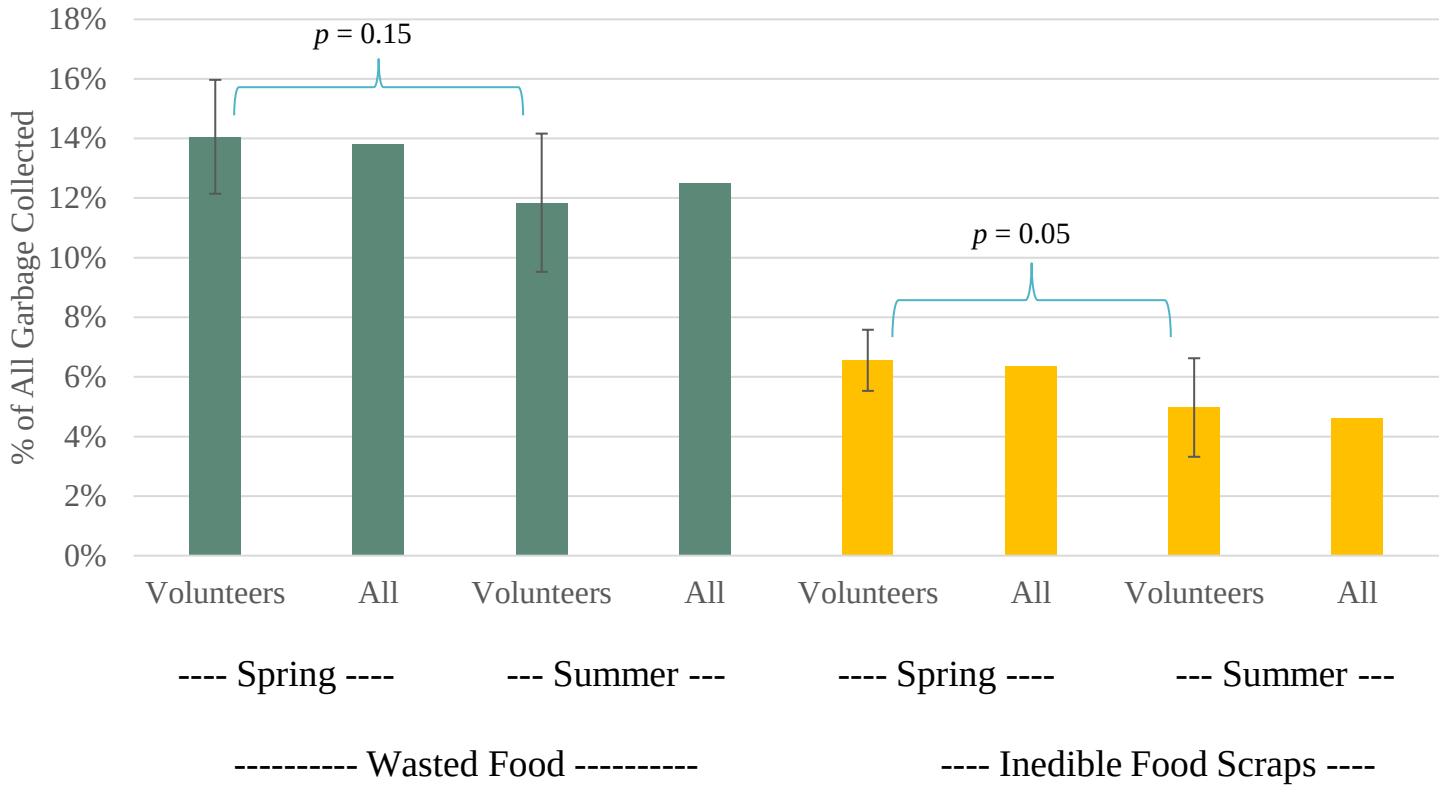
- **Fruits and Vegetables** were the largest fraction of all food wasted in both survey and audit
- Most of self-reported produce waste was either **completely unused** or **partly unused**




**Considering focusing interventions on produce waste reduction**

# Audits of Non-Volunteers mirror Volunteers' Waste Patterns




*Notes*: The sample size for volunteers equals 229 and 181 for spring and summer, respectively. 'All' refers to route-level samples drawn from households who did not volunteer for the individual waste audits with one route sampled in each of the four research areas across Upper Arlington. Error bars represent 95% confidence intervals. *P*-values are from a *t*-test of the null hypothesis that spring and summer proportions are identical.

# Awareness of the Campaign (survey results)

1. Large increase in campaign **awareness** from
   - Spring (**6.5%**) to Summer (**41.8%**)
2. Statistically insignificant **awareness** difference between areas
   - Control area (**30** percentage point increase) vs. Treated areas (**37** percentage point increase)
3. Perceived **effectiveness** of campaign was significantly greater in Treated areas (**64%**) vs. Control area (**46%**)
4. Marginally more success in 'perceived to **create actions** to reduce food waste' in Treated areas (**46%**) vs. Control area (**31%**)
5. **Paid and unpaid materials** had strong impacts in creating awareness

| Source | % of Mentions |
|---|---|
| Community newsletter | 27.1% |
| Mailed materials | 24.5% |
| Emailed materials | 18.3% |
| Facebook | 8.8% |
| Printed flyer | 7.5% |
| Not sure | 5.6% |
| Television | 1.6% |
| Twitter | 1.6% |
| Internet search | 1.3% |
| Online advertisement | 1.0% |
| Word of mouth | 1.0% |
| Instagram | 0.7% |
| LinkedIn | 0.7% |
| None of these | 0.3% |

*Notes*: 197 respondents mentioned 306 sources of campaign awareness.

# Attitudes (survey results)

1. Attitudes changed little between Spring and Summer within UA
   - Average attitude never change more than 6%
   - Control for demographic incidental differences between treatment and control areas
2. Only **2 of 11** attitudes yielded a statistically significant treatment effect
   - Effective in drawing attention to the food waste as an issue warranting participant concern (**Item 4**)
   - Effective in help mitigating food waste due to large or bulk purchases (**Item 7**)

| Attitudes | Period | Mean | N | Treatment Effect | p-value |
|---|---|---|---|---|---|
| 1. Throwing away food is bad for the environment | Spring | 2.44 | 768 | -0.326 | 0.148 |
| | Summer | 2.50 | 536 | | |
| 2. You throw away food if the package date has passed | Spring | 1.78 | 768 | -0.200 | 0.263 |
| | Summer | 1.71 | 536 | | |
| 3. You feel guilty when you throw away food | Spring | 2.55 | 768 | -0.327 | 0.151 |
| | Summer | 2.50 | 536 | | |
| 4. You don't have enough time to worry about the amount of food you waste | Spring | 1.13 | 768 | -0.288 | 0.021** |
| | Summer | 1.17 | 536 | | |
| 5. Some food waste is necessary to make sure meals taste fresh and good | Spring | 1.55 | 768 | -0.096 | 0.562 |
| | Summer | 1.65 | 536 | | |
| 6. It would be difficult to reduce your household's food waste any further | Spring | 1.72 | 768 | -0.220 | 0.211 |
| | Summer | 1.73 | 536 | | |
| 7. You waste more food when you buy things in large packages or when you buy in large quantities during a sale | Spring | 1.95 | 768 | -0.354 | 0.069* |
| | Summer | 2.05 | 536 | | |
| 8. Your household wastes more food than other households of similar size | Spring | 1.08 | 768 | -0.140 | 0.223 |
| | Summer | 1.11 | 536 | | |
| 9. You should make an effort to reduce food waste when possible | Spring | 2.69 | 768 | -0.356 | 0.134 |
| | Summer | 2.74 | 536 | | |
| 10. Your actions to reduce food waste make a positive difference for your family | Spring | 2.46 | 768 | -0.230 | 0.305 |
| | Summer | 2.54 | 536 | | |
| 11. Your actions to reduce food waste make a positive difference for your community | Spring | 2.58 | 768 | -0.281 | 0.222 |
| | Summer | 2.63 | 536 | | |

*Notes*: Scale: 1 = Disagree Strongly, 2=Disagree Somewhat, 3=Agree Somewhat, 4=Agree Strongly. Treatment effect controls for differences in spring and summer respondents' characteristics using regression. P-values indicate the statistical significance of the estimated treatment effect with values less than 0.05 deemed statistically significant and accompanied by a '**' and values between 0.10 and 0.05 deemed marginally statistically significant and accompanied by a '*.'

# Food Waste Knowledge (survey results)

1. Most participants view themselves as at least somewhat knowledgeable on all practices
   - Least knowledgeable about composting
2. Results reveal very little change between Spring and Summer
   - No significant treatment effects

| Knowledge about… | Period | Mean | N | Treatment Effect | p-value |
|---|---|---|---|---|---|
| Compost | Spring | 0.67 | 542 | -0.037 | 0.848 |
| | Summer | 0.69 | 388 | | |
| Food Storage | Spring | 1.06 | 529 | -0.137 | 0.304 |
| | Summer | 0.98 | 388 | | |
| Prevention Tactics | Spring | 1.11 | 537 | -0.203 | 0.138 |
| | Summer | 1.04 | 388 | | |

*Notes*: -2 = No knowledge at all, 0 = Somewhat knowledgeable, 2 = Very knowledgeable. Treatment effects control for differences in spring and summer respondents' characteristics using regression. P-values indicate the statistical significance of the estimated treatment effect with values less than 0.05 deemed statistically significant and values between 0.10 and 0.05 deemed marginally statistically significant.

# Waste Prevention Precursors (survey results)

No treatment effects are statistically significant

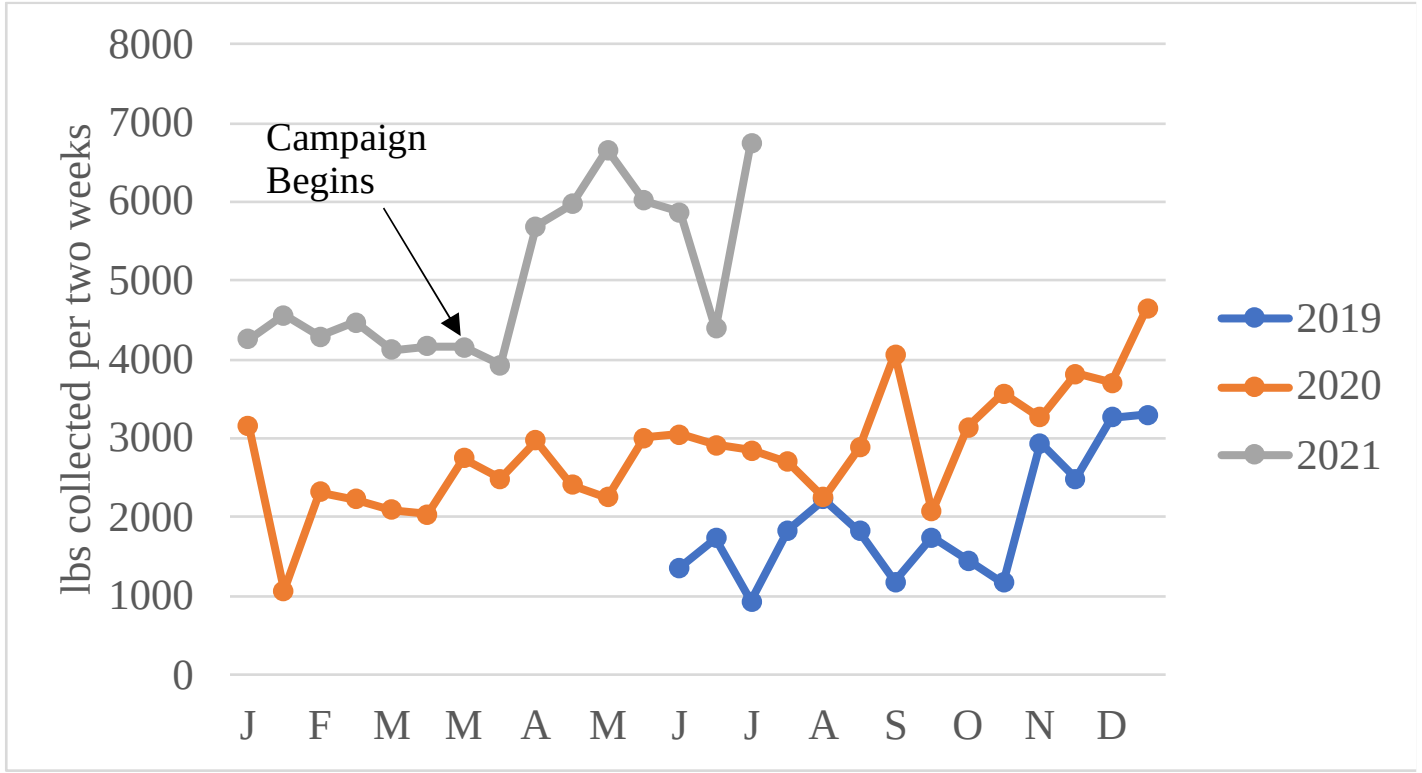
- Many rated their Spring use of these practices at the highest level
- Little room for improvement (Ceiling effects)

| Practices | Period | Mean | N | Treatment Effect | p-value |
|---|---|---|---|---|---|
| Shop with a list | Spring | 3.53 | 475 | 0.013 | 0.893 |
| | Summer | 3.42 | 325 | | |
| Create a meal plan | Spring | 3.14 | 349 | 0.091 | 0.503 |
| | Summer | 3.13 | 216 | | |
| Proper food storage | Spring | 3.40 | 463 | -0.055 | 0.538 |
| | Summer | 3.35 | 335 | | |
| Eat bruised or discounted food | Spring | 3.52 | 91 | 0.031 | 0.888 |
| | Summer | 3.53 | 66 | | |

*Notes*: 1 = Tried it once, 2 = Occasionally, 3 = Regularly, 4 = Every time. Treatment effect controls for differences in spring and summer respondents' characteristics using regression. P-values indicate the statistical significance of the estimated treatment effect with values less than 0.05 deemed statistically significant and values between 0.10 and 0.05 deemed marginally statistically significant.

# Community compost drop off program (physical measurements by the city)

1. Post-campaign uptick of compost participation conforms with survey results
2. Survey revealed significant increase in compost activity (any kind) from spring (50%) to summer (58%)
3. Capacity issues that previously hindered participation were addressed prior to Spring ‘21 campaign



# Conclusions

Campaign did yield significant changes in…

- The amount of food wasted
- Food diverted from landfill (audit)
- Compost drop off program participation
- Significant decline of self-reported edible food waste for both treated and control area in UA
- Resident's awareness of the campaign

Strong treatment effect of the campaign

- If we consider UA as the treated group and the National survey as the control

No or few significant impacts on residents'

- Knowledge and waste prevention practices
- Attitudes about food waste

# Recommendations

**For communities and practitioners:**

1. Keep supporting community level implementation of similar campaigns
2. Deploy the campaign through trusted community actors
3. Consider community-specific traits when deploying food waste reduction and diversion efforts
4. Focus behavior change efforts on the purchase and use of fresh produce unless community lacks fresh produce access
5. Ensure sufficient capacity to meet increased demand for food waste diversion

**For researchers**

1. Prioritize research to reduce survey fatigue
2. Refine categories of items and unit used to improve accuracy of waste reporting

# Questions?

roe.30@osu.edu

EPA Region 5

SWACO FROM WASTE TO RESOURCES

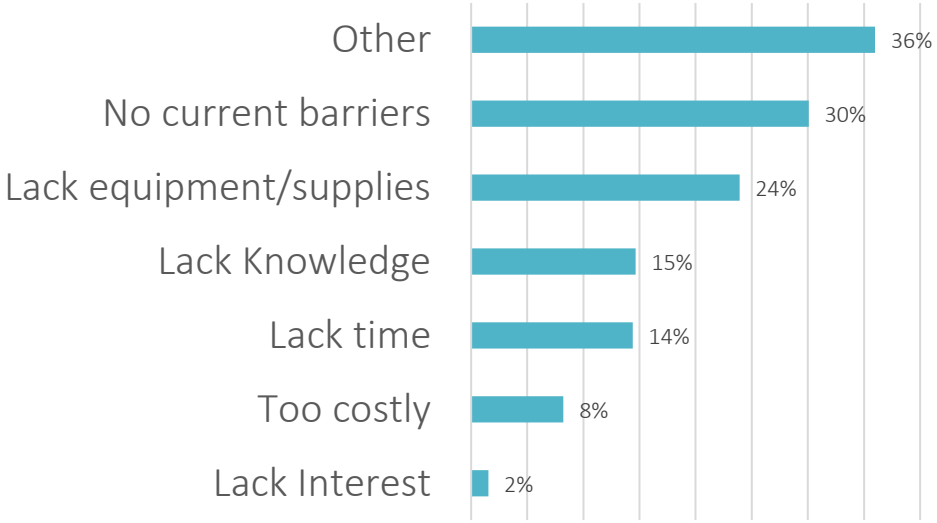
City of Upper Arlington

The Ohio State University

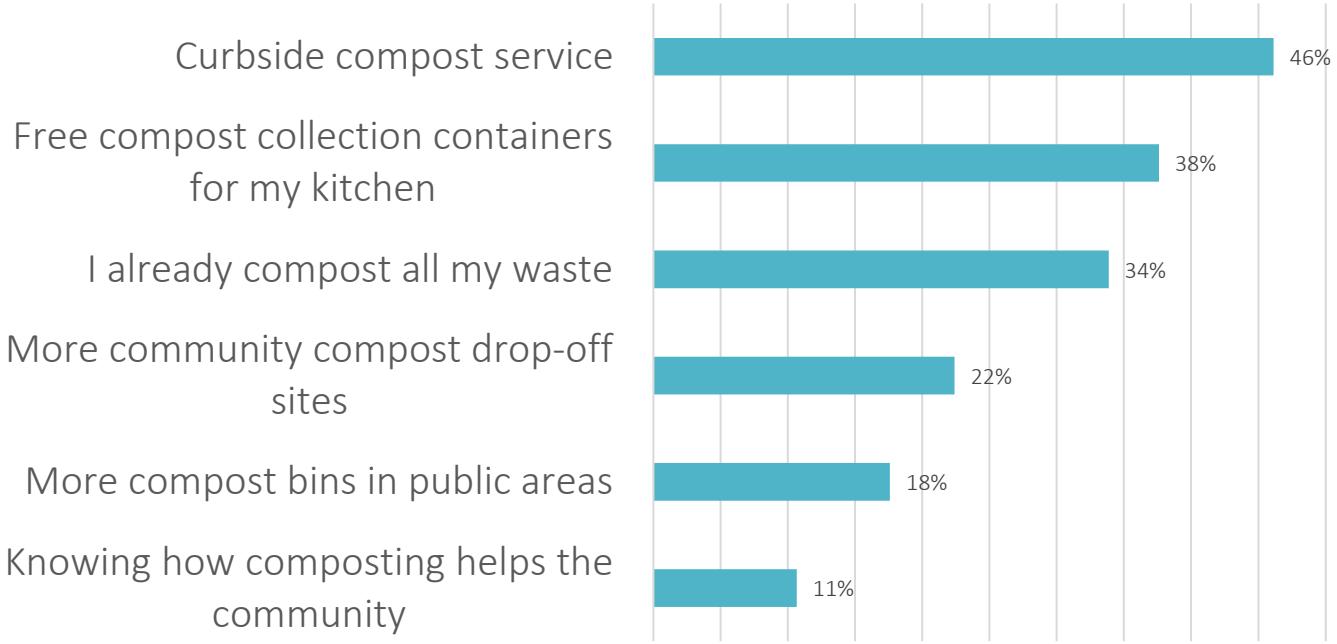
# Supplemental Slides

# UA Summer Survey: Composting

## Perceived Composting Barriers




## What Could Encourage More Composting



# Upper Arlington Survey Promotions

## Survey Promotion Postcard (Spring)


## Survey Promotion Postcard (Summer)

# Intensive campaign materials (Mar-Jun 2021)

## Reducing Food Waste at Home Magnet Mailer


## Food Storage Postcard


## Compost at Home Postcard