

# 2017 Oregon Wasted Food Study: Residential Sector Waste Sort, Diary, and Survey Study



## Summary of Findings

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# Executive Summary

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Significant amounts of financial and environmental resources are used to produce food for human consumption. At the same time, it has been estimated that as much as 40 percent of the food grown in or imported to the US for human consumption is never eaten.<sup>1</sup> Reducing the amount of food that is wasted offers significant potential for economic and environmental benefits.

Wasted food, that is, throwing away food that could have been eaten, is preventable. Indeed, prevention - avoiding the wasting of food in the first place - has far greater potential to reduce environmental impacts than recovery methods such as composting or anaerobic digestion. For example, The Drawdown Project<sup>2</sup> identified reducing food waste as having the third greatest potential for reducing greenhouse gas emissions worldwide from among a suite of 100 different actions involving buildings, transportation, land use, agriculture and materials. Project Drawdown estimates that if current levels of food waste were cut in half, global emissions could be reduced by 70.53 gigatons of carbon dioxide equivalent. In this country, the US EPA estimates that one ton of prevention has a greenhouse gas benefit equivalent to 6 – 7 tons of food waste recovery.

Given the large scope of potential benefits from prevention, the Oregon Department of Environmental Quality funded a study to better understand how much food is wasted at the household level in Oregon, the behaviors and habits that prevent or generate wasted food, and what Oregonians perceive as the opportunities and barriers to reducing wasted food. The complete study consisted of three phases. This report summarizes the third phase, a multi-part study of wasted food from households. In this portion of the study, 299 households in five communities (three urban and two rural) were recruited to participate in four activities: household waste sort (trash and compost), kitchen diary tracking of food waste, and pre- and post-diary surveys.

**Household Study Design in Brief**

**Phase III – Mixed Methods**

- Waste Sort
  - Curbside trash and organic waste (to compost) sorted
- Kitchen Diary
  - Seven day record of all food discarded in household
- Pre- and Post-Diary Surveys

The Oregon Wasted Food Study builds on household level studies by Natural Resources Defense Council and the United Kingdom’s Waste and Resources Action Programme (NRDC 2017; UK WRAP 2015), assessing types and levels of foods thrown away, comparing data from diary tracking exercises to physical sorts of curbside waste, and gauging self-reported attitudes and behaviors related to food. While deliberately designed to be comparable to these earlier studies, this study is a first in the US, drawing a sample from urban and rural areas, and areas with municipal food waste collection (composting) programs and those without. The Oregon Wasted Food Study also pioneered the use of an online diary tracking form and a tiered incentive structure to encourage completion of the diary exercise.

## Research Objectives

The **research objectives** for this study were to develop baseline metrics for:

- Quantities and types of edible, wasted food;

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<sup>1</sup> Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill, Natural Resources Defense Council, August 2012

<sup>2</sup> For more info on the Drawdown Project see, <https://www.drawdown.org/solutions/food/reduced-food-waste>

- Self-reported perceptions of reasons food is wasted, barriers to preventing wasted food, and alternative behaviors;
- Knowledge and attitudes in relation to motivations to reduce wasted food in Oregon.

Additionally, the study was intended to help better understand structural barriers that contribute to the generation of wasted food, through analysis of these metrics in relation to each other.

The following research objectives emerged from analysis of earlier qualitative interviews (Phase 1) and statewide phone surveys of the residential sector (Phase 2) and informed our analyses here to:

- Better understand the role of composting in the generation of avoidable wasted food;
- Understand how certain demographics and behaviors correlate to levels of avoidable wasted food

## Key Findings

The study's key findings are organized by research objective, below:

### *Quantities and types of edible wasted food*

**Edible food – that is, food that could have been eaten, but was discarded due to spoilage, food safety concerns, individual preference, or cooking knowledge – made up 68.2% of food disposed** to the landfill/incinerator and curbside compost streams (4.9 lb. per household or 1.9 lb. per person) in the waste sort. Inedible parts – egg and nut shells, bones, inedible fruit peels (e.g., banana peels) – of food were 31.8% of food thrown away. In the diary tracking method, the percent of edible food thrown away was similar, making up 71% (6.3 lb. per household or 2.3 lb. per capita) of all food thrown out to all destinations and 68% (4.1 lb. per household or 1.5 lb. per capita) of food disposed to landfill/incinerator and curbside compost.

**Among food types, fruits and vegetables were the largest single category of edible wasted food thrown away to landfill and curbside compost streams in the waste sort, constituting 23.5% of all food waste.** Prepared foods<sup>3</sup> and leftovers were the second largest edible category, at 12%.

Solid waste professionals typically rely on the weights of landfill- and recovery-bound trucks to estimate the amount of material wasted. **But in the case of food, the formal solid waste collection system only accounted for 70.9% of wasted food, based on kitchen diaries.** 14.2% of wasted food is managed onsite in home composting systems, 10.8% is disposed of down the drain, and 4.0% is fed to pets or animals, or managed in other ways. Some of the most commonly wasted edible foods are liquid: soup, coffee, and milk are three of the five most commonly wasted foods.

### *Reasons food is wasted, barriers to preventing waste and alternative behaviors*

Both diary entries and responses to the pre- and post-diary surveys given to participants highlighted reasons that food is wasted and pointed to barriers to prevention. Responses were grouped into “immediate” loss reasons and “root” loss reasons. Immediate loss reasons are reasons most immediate to the time of discard – moldy or spoiled, don’t like or tired of eating, not good as leftovers, past date, too little to save, worry about illness, improperly cooked, etc. “Root” loss reasons are reasons that led to the

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<sup>3</sup> “Prepared foods” are defined as items that have many food types mixed together as part of preparation (e.g., lasagna, sandwiches, burritos, casseroles).

immediate loss and farther removed from the time of discard – made too much, bought too much, did not know how to use, lost track of in fridge or cupboard, too busy, etc.

One common theme was the role of mismanagement in wasting food. In the diaries, **the most common immediate loss reason for discarding edible food was because it had become moldy or spoiled (32.1%)**. Immediate loss reasons were combined into factors that consolidated similar themes, and food being moldy or spoiled was the predominant reason in the ‘yuck’ factor (other yuck factor reasons included improperly cooked, damaged, and worries about potential illness, contamination). **Mismanagement (lost track of food, schedule changes) was cited most often as the root reason why food landed in the ‘yuck’ category.**

**“Made too much” was the root reason most frequently cited (23%)** by diary participants when they reported about food that was discarded because it was hard to reuse or the respondent simply tired of eating it. The second most common root reason for food loss that respondents lost track of it in the fridge (23.6%). **Thinking others would eat a food was the most cited reason (38.1%) for making too much, followed by “made too much by accident” (24.8%).**

While mismanagement was the most commonly cited root reason for wasted food, respondents did report engaging in one management strategy that is thought to help reduce the wasting of food. **A majority of respondents reported that they check their supply of food to estimate quantity needed before shopping.** Of those who did not, a majority said they would like to do this more. The proportion of those who did not estimate quantities but would like to plan more also increased significantly, from 66.1% to 81.5%, after tracking wasted food with the diary.

Respondents, however, also reported that they did not engage in other recommended approaches for managing food. A little more than half reported that they **do not store items to be eaten first in a special area of the refrigerator.** **Very few participants planned almost all of their meals,** yet most households eat similar meals each week. Of those who do not plan meals, almost three quarters indicated they would like to do that more.

Schedule changes (another theme in the mismanagement root reason) seem to play a significant role in food being wasted. About half (52.3%) of diary participants either agreed or somewhat agreed that work and social life make managing food difficult.

While prepared food and leftovers were the second largest portion of wasted edible food identified in this study, respondents reported using leftovers most of the time. **The average proportion of leftovers reported to be eaten was quite high at 73.4%.** After using the waste-tracking diary, this rate rose slightly, but significantly, to 77%.

It appears that most respondents either prefer not or do not have the time to engage in extra food preparation steps that might reduce waste. The most common approach for handling leftovers, for example, is to eat them as is, for another meal. **Most respondents do not use vegetable peels and stalks in cooking,** with 38.4% in the pre-diary survey saying they never did and another 25% saying rarely. **Fewer respondents indicated that they used bones:** 43.1% of respondents said they never used bones, and 21.8% said they rarely used them pre-diary. There was no significant change in these rates after completing the waste-tracking diary.

*Knowledge and attitudes in relation to motivations to reduce wasted food in Oregon*

Survey questions addressed beliefs and emotions related to wasted food. Almost three-quarters (73.7% pre-diary) of respondents agreed that they *should* reduce the amount of food they throw away, yet **almost two-thirds (64.3%) believe they throw out less than the average American**. In the pre-diary survey, 39.8% said they threw out a lot less, 24.5% said a little less, and 17.6% said the same as the average American. Interestingly, the diary experience did not change opinions much. Post-diary survey responses show 43.5% saying they throw out a lot less, 27.2% a little less, and 14.1% the same.

**Guilt is a predominant emotion in people's experiences of waste**, and this study found that some practices seem to help alleviate the guilt associated with wasting food. Two-thirds (68%) of respondents felt less guilty about storing leftovers than simply throwing them away, even if they are thrown out later. Similar numbers (67.6%) feel less guilty about throwing out food if it has been in the fridge for a long time. Nearly three-quarters (71.8%) feel less guilty about throwing out food that is composted.

Levels of perceived behavioral control (i.e., how much a person thinks they can make an effect on a situation) are also mixed:

- Less than a quarter (16.2% pre-diary) thought they *could* throw out a lot less,
- The sample was split on how easy or difficult it would be, and
- A little more than half (59.2%) disagreed that their household's actions would *not* make a meaningful difference in food thrown out in the country (i.e., they thought their household could make a difference).

About two-thirds of respondents (65.8%) reported that reducing the food they throw out would save natural resources. Respondents were split on whether wasted food affected their household financially. In responding to questions about how easy it would be to reduce the amount of food going to waste, 10.2% of pre-diary respondents said it would be easy, 37% said it would be somewhat easy, and 26.9% said somewhat difficult. There was no significant change in these rates after completing the waste-tracking diary.

### *Structural barriers that contribute to the generation of wasted food*

Several findings point to structural factors outside of the home contributing to wasting of food in the home. These findings suggest actions that could be taken at the retail or producer level to reduce wasted food. **A majority of households said they use date labels when shopping to determine their choices for meat and dairy but otherwise, do not use date labels often**. For foods that have passed their “use by”, “sell by” or “best by” date, most respondents (19.9% to 64.4% depending on food type) indicated that they smelled or looked at the food to determine whether it was still acceptable to eat. Smaller percentages of respondents (13.4% to 28.7%, depending on food type) reported simply throwing food away or composting food that has passed its “use by”, “sell by” or “best by” date (without smelling or checking it). In the diary portion of this study, households reported that 8.4% of edible food wasted was attributed to it being “past date” (as opposed to spoiled, or other immediate reasons).

While date labels may not be as large and direct a driver of wasted food as some have suggested, results of this study suggest date labels nevertheless are a non-trivial contributor to food waste. This could be promoting waste by households using date labels to throw out food when its quality/safety is not compromised or by households failing to pay attention to date labels as a guide to food safety and waiting until food spoilage can be detected with sight and smell. If date labels were applied to specifically provide

food safety information and were understood by consumers to provide that information, they might then be used to reduce waste or manage food in the pantry and refrigerator.

When food was thrown out because too much was bought, the most frequently cited reason was that the package was too large. In the pre-diary survey, 62.9% of households reported that they sometimes, often or always buy food in larger quantities than desired due to the way food is packaged. This points to an opportunity to reduce wasted food by offering smaller quantities, but priced comparably by unit, at the retail level or for more sales of bulk foods where customers can choose exactly how much they would like to buy.

Sales (retail discounts) also can lead households to buy more than they planned with 76.4% of households reporting that they sometimes, often or always buy more of a product than planned because of sales. To continue discounts but to discourage wasted food, discounts can be on smaller quantities or could be in the form of getting a coupon for future use (e.g., in the UK, there are buy-one-get-one-free promotions for buying a loaf of bread now and getting a free loaf at a later date).

#### *Better understand the role of composting in the generation of avoidable wasted food*

While this study was not structured to track amounts of food composted versus thrown away, the surveys did ask participants about how they felt about composting. **Nearly three-quarters (71.8%) said they feel less guilty about throwing out food that is composted.** After completing the waste-tracking diary, 18% of respondents said that something they learned from the exercise was that they could now identify wasted food that could be composted, that they good job at composting, or that composting reduces wasted food. These reactions indicate that composting is seen as a direct means to reduce waste, rather than as less preferable to preventing waste.

#### *Understand how certain demographics and behaviors correlate to levels of avoidable wasted food*

One theory driving actions to promote wasted food prevention is that families with young children and single person households likely waste more food than other households. Interestingly, **this study did not find significant differences in per capita levels of wasted food generated based on any of the demographics assessed (i.e., household size or type, income, and money spent on food at home and away from home).** Study results suggest that Oregonians' levels of wasted food are similar to that of other Americans.

Throughout diary and survey results, there are few statistically meaningful differences between households of different demographic characteristics. Part of this may be due to the relatively small sample size. It also suggests, however, that there are few strong differences between different types of households. Households of all types waste food. Wasting of food is a common or shared experience across the state of Oregon, a finding that has implications for everyone interested in reducing the economic and environmental impacts of food waste.

# Research objectives

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This is a report on the methods and results of a waste sort, diary, and survey study, the third part of the residential sector portion of the Oregon Wasted Food Study<sup>4</sup>. This study is funded by the Oregon Department of Environmental Quality and conducted by Community Environmental Services at Portland State University, in collaboration with the Survey Research Lab, also at Portland State University.

The research objectives for this waste sort, diary, and survey study are to develop baseline metrics for:

- Quantities and types of edible, wasted food;
- Self-reported perceptions of reasons, barriers, and alternative behaviors;
- Knowledge and attitudes in relation to motivations to reduce wasted food in Oregon.

Additionally, we set out to better understand structural barriers that contribute to the generation of wasted food, through analysis of these metrics in relation to each other.

The following research objectives emerged from analysis of our earlier qualitative interviews and statewide phone surveys of the residential sector and informed our analyses here to:

- Better understand the role of composting in the generation of avoidable wasted food;
- Understand how certain demographics and behaviors correlate to levels of avoidable wasted food.

These results will inform an overall study report that will bring together the residential and commercial sector parts of the Oregon Wasted Food Study, to be published separately. That report will also:

- Provide state, cities, and counties with basic methods for establishing wasted food baseline and assessing shifts in behaviors and levels of awareness.
- Inform changes in practice to reduce wasted food throughout the food supply chain (e.g., unit sizes, packaging, merchandising, sourcing, pre-production planning tools, behavior change campaigns, etc.)

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<sup>4</sup> The Oregon Wasted Food Study consists of four parts: 1) an interview study of households, 2) a state-wide phone survey of households 3) a waste sort, diary, and survey study of households and 4) a set of 15 case studies of the institutional and commercial sector. All are publicly available at <https://pdxscholar.library.pdx.edu/>

# Methodology

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## Study design

This part of the Oregon Wasted Food Study consisted of four activities:

1. A pre-diary survey of a household's demographics, attitudes, and behaviors;
2. A waste sort of a household's curbside trash and compost;
3. Diary tracking of all food disposed in a household which includes weighing food thrown away, recording weights and other details of the food, and;
4. A post-diary survey.

Households were recruited for all four elements, although some participating households did not ultimately participate in all of them.

The National Resources Defense Council's (NRDC) 2017 three cities study<sup>5</sup> and UK Waste and Resources Action Programme's (WRAP) 2015 residential diary and survey study<sup>6</sup> informed the design and content of the Oregon study. These earlier studies provided baseline measurements, methods for collecting wasted food data, and survey content that we sought to compare to our results in both urban and rural settings in Oregon. Similar to these studies as well, the Oregon Food Study conformed to the World Resources Institute's (WRI) Food Loss and Waste Accounting and Reporting Standard (see, the appendix).

## Recruitment and sample

Participants were recruited along selected residential waste hauler routes in five sites; three urban (Gresham, Salem, Portland) and two rural (Woodburn and Redmond). Waste hauling routes were used as the boundary for the recruitment area in order to collect the waste of participants in a given site on the same day. Urban and rural populations were defined using Oregon Office of Rural Health criteria, where urban is <10 miles from a center of 40,000 or more people and rural is >10 miles from a center of 40,000 or more people. In Oregon there is a third population, in frontier areas, where there are six or fewer people per square mile. We were not able to include residents in frontier areas in this study.

These sites were also chosen in part for their access to curbside compost collection as the potential effect of this service is of particular interest to the DEQ. Portland and Salem are the only two sites with established curbside compost collection that includes food scraps as part of regular service. Gresham does not have curbside food compost collection. Woodburn has yard debris collection and just introduced the inclusion of food scraps at the start of our study, so not all residents were aware that they could compost their wasted food. Redmond has curbside collection of yard debris by subscription only and had just begun allowing produce only scraps in the bin.

Recruiters completed Collaborative Institutional Training Initiative or National Institutes of Health training for human subjects research and were trained to use a specific protocol and script, as well as procedures to ensure personal safety. Any residence, single or multi family, on the hauler route was eligible to be in the

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<sup>5</sup> Hoover, D. (2017) Estimating Quantities and Types of Food Waste at the City Level. Downloaded from [www.nrdc.org](http://www.nrdc.org)

<sup>6</sup> Qusted, T & Parry, A. (2017) Household Food Waste in the UK, 2015. Downloaded from [www.wrap.org.uk](http://www.wrap.org.uk)

study. Recruiters wore safety vests and lanyards identifying them as PSU employees. They went door to door in pairs, leaving door hangers with website and contact information if no one answered. Recruitment occurred over September 16, 2017 - October 23, 2017. 3462 households were approached, yielding 299 participants for a response rate of 8.6%.

## Incentive structure

As previous food tracking diary studies have found it challenging for participants to complete a full week of tracking all of the food they throw out, we combined a tiered incentive with a flexible time frame to maximize completion rates. All participants were given a two-week period in which they could complete seven days' worth of diary entries. If participants completed the pre- and post-diary surveys, had waste out for collection, and completed seven consecutive days of diary entries, they received a \$90 gift card. If they did all of the above but completed seven *non-consecutive* days of diary entries over the two-week period, they received a \$60 gift card. Towards the end of the data collection period, participants who had started diaries online but did not complete seven days, and had completed the pre-diary survey, were given an extension of another week to complete their seven days and they could still receive their \$60 incentive. All entries had to be completed by November 22, 2017, to avoid including the Thanksgiving holiday in the records. 170 participants received the \$90 gift card and 11 received the \$60 gift card. Since curbside waste collection was not always in control of the participant (e.g., when a hauler picked up waste before our collectors), this requirement was not ultimately included when distributing incentives but households did need to complete the surveys and diary activities. All participants recruited were allowed to keep the kitchen scale they were given to track their food.

## Waste collection and sorting

To avoid any change in behavior that could affect the amount of food disposed, participants were asked to put their trash and yard debris bins out as they normally would on their usual collection day. Only residents of multifamily buildings ( $n = 13$ ) were given a special orange bag in order to differentiate their waste from other residents. The waste collection for any given site was completed before the site's diary tracking period began. The wasted food collected and sorted was *not* the waste reported in the diary.

Two teams of collectors, with CES identified trucks or U-hauls, set out in the evening before the regularly scheduled hauler collection and early in the morning, before haulers arrived in October 2017. Collectors bagged all waste and tagged it with the participant ID number. Of the 299 participants recruited, 230 had trash collected and 58 had curbside compost collected.

All waste was sorted at the Metro Central facility in NW Portland. Teams of 6-8 trained sorters catalogued all of the waste collected from a given site, both trash and compost at the same time. Data for each household was recorded, including the total weight of the household's waste. Food was sorted into eleven categories, mirroring those used by the NRDC (Hoover, 2017) but separating out eggs from dairy so the data would be comparable to DEQ's Waste Composition Study data. See, Table 1, for descriptions of categories with examples. It is important to note that for the 10 edible food categories, edibility refers to the original quality of the food, not the state it was in when thrown away or when sorted. For example, a spoiled piece of chicken is not currently edible but is classified as an edible food in the study as it was originally edible. If only the chicken bone was thrown away, this was classified as an inedible part as it was not ever intended to be eaten.

**Table 1: Categories Used For Household Waste Sorts**

Categories		Definition	Examples
1	Inedible	Items not intended for human consumption (small amounts of edible material associated with the inedible material are permitted to be included)	Egg shells, banana peels, pits/seeds, bones
2	Meat & Fish	Uncooked or cooked meat (with mostly edible components) unmixed with other types of food	Bone-in or boneless chicken piece, salmon fillet
3	Dairy	Solid dairy products unmixed with other food types or in original form	Cheese, yogurt
4	Eggs	Egg products unmixed with other food types or in original form	Fried egg, whole eggs, liquid egg whites
5	Fruits & Vegetables	Solid uncooked or cooked vegetables and fruits (with mostly edible components) unmixed with other types of food	Potatoes, spinach, berries, salad with only vegetables
6	Baked Goods	Baked goods and bread-like products unmixed with other food types or in original form, including pastries	Bread, tortillas, pastries
7	Dry Foods	Cooked or uncooked grains, pastas, legumes, nuts, or cereals unmixed with other food types or in original form	Rice, cereal, pasta
8	Snacks, Condiments, Sauces	Includes confections, processed snacks, condiments, and other miscellaneous items	Condiments, candy, granola bars, sauces, jellies
9	Liquids, Oils, Grease	Items that are liquid, including beverages	Sodas, milk, oil, juice
10	Prepared Food & Leftovers	Items that have many food types mixed together as part of cooking or preparation	Lasagna, sandwiches, burritos, entrees
11	Unidentifiable	Used only if necessary	

Used with permission of NRDC (Hoover, 2017)

## Diary Data Collection

A scale and instructions for completing the diary were dropped off when waste was collected. Participants were asked to weigh and record all food and beverages discarded in their home for the entire household, and away from home, for seven days. However, food thrown away outside of the home was not expected to be weighed nor were participants expected to track their entire household's food disposed outside of the home. In each entry, participants were also asked a series of questions about the food beyond its description and weight: what meal the food came from, why it was thrown away, and where it was discarded. There was an option to mark if no food was thrown away that day. The complete list of questions and response choices are:

- Date
- Was food disposed that day? Yes, No

- Time of Meal: Breakfast, lunch, dinner or other
- Place Discarded: Home, away from home
- Description of Food/Beverage Being Discarded: Text entered by participant (e.g. apples, bananas, sandwich, coffee grounds, etc.)
- Weight of Food Being Discarded: pounds and ounces (up to a tenth of an ounce)
- State of Food at Time of Disposal: Unprepared, cooked or prepared food, inedible parts, liquids (coffee, milk, tea, etc.), other\*
- Immediate Loss Reason: Past date on label, moldy or spoiled, didn't like or tired of eating, worry that it might cause illness, improperly cooked, too little to save, not good as leftovers, unable to store or save (only offered only to those throwing away food outside of the home), other\*
- Root Loss Reason: Bought too much, made too much, lost track of it in the fridge or cupboard, too busy, didn't know what to do or how to use, other\*
- Reason bought too much: On sale, package too large, don't know, other\*
- Reason made too much: Thought others would eat, made a larger batch to eat throughout the week, don't know, other\*
- Discard Destination: Trash, compost picked up at curb, home or other compost, down the drain, fed to pets/animals, other\*

\* See, the appendix

The follow-up questions to “bought too much” and “made too much” loss reasons were not included in the paper version of the diary due to lack of space. Follow-up questions to these reported loss reasons can aid in understanding motivators to reduce wasted food and are recommended as a future area of research. In this study, maintaining a high participation rate was seen as a higher priority than creating a more complicated and burdensome paper diary for participants.

If a participant opted for the paper version of the diary, a packet with 10 copies of empty diary records and self-addressed stamped envelope was included with the instructions and scale. For those who preferred to participate online, an email with a personalized diary link was sent. This link could be used to enter up to 10 entries at one time and the link could be used without limit. The diary form was programmed in Qualtrics and internal testing was conducted to ensure clarity of terms and correct functioning of the form. Items had a forced response so participants could not skip items. One error was discovered and corrected during data collection: the food description item was not a forced response, and some participants had skipped it. The diary form can be seen in the appendix.

Participants did not necessarily need to make diary entries every day in the online form. They could track their food for several days or the entire week on paper or through photos and enter all of the data online at once, though this was not explicitly stated or encouraged. The photos were thought to help with participant recall, which has been a reported issue with similar diary methods used to track food intake, for example. This meant that the date an entry was recorded in Qualtrics did not always match the day food was tracked (e.g., when participants tracked food but entered it later). After the two-week period ended and seven days of entries were received, a personalized link to the post-diary survey was sent.

## Pre- and Post-Diary Surveys

The Portland State University (PSU) Survey Research Lab (SRL) assisted the PSU Community Environmental Services (CES) with the implementation of two surveys associated with the kitchen diary

study. The surveys were conducted both before and after households completed the kitchen diary task. The surveys were gathered September through December 2017 and resulted in a total of 216 completed pre-diary surveys and 184 completed post-diary surveys.

## Survey Development and Data Collection

SRL, PSU Community Environmental Services (CES), and DEQ reviewed the questions from the statewide phone survey previously conducted for the larger study (second portion of the Oregon Wasted Food Study) and other kitchen diary surveys from other studies by the National Resources Defense Council (NRDC, United States) and the Waste & Resources Action Programme (WRAP, United Kingdom), in order to develop the Oregon Wasted Food Statewide Survey. The pre-diary survey replicated the phone survey of Oregon households that was conducted in the summer of 2017, with a few questions added that gathered more details about food disposal and management. The post-diary survey repeated some questions from the pre-diary survey to determine if behaviors and beliefs changed after completing the diary task, as well as questions to gather feedback about participant experiences with the diary task.

The complete surveys can be found in the appendix of this report. The survey instruments were programmed in Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)) web survey software, and internal testing was conducted prior to implementation to ensure the appropriate wording of questions, the correct functioning of all skip patterns, and the accurate recording of data. CES created a paper version of the survey to be used by households that preferred that modality.

The pre-diary survey was completed online by households from September 27, 2017 through December 4, 2017. The post-diary surveys were completed online from October 23, 2017 through December 14, 2017. Paper surveys were gathered during similar timeframes and data entered by CES staff.<sup>7</sup> Of the 299 households recruited to participate in the study, 216 completed the pre-diary survey for a response rate of 72.2%. Of those, 184 also completed the post-diary survey for a response rate of 61.5%. The proportion of households that completed the post-diary survey out of those who had completed the pre-diary survey was 85.2%.

## Participant Reminders and Support

To encourage completion of the study tasks by as many recruited participants as possible, extensive participant support was offered. A website was set-up detailing the goals and tasks in the study, instructions for completing the diary, and answers to anticipated FAQs. Participants were asked in their consent form to identify their preferred method of communication. A phone number and email account dedicated to the study was given to all participants, and a research assistant would respond to participant questions within two business days. The Principal Investigator's office number was also listed in the consent form. If participants preferred texting, a research assistant could also be reached by SMS message using the study's textmagic.com account, from which all texts to participants were sent. Participants who opted for the online survey and diary format were contacted at least by email, as their email was required to send them their personalized links to the survey and diary forms.

All participants who agreed to contact by email received a welcome email with a link to a website with instructions about the entire study that they could refer to at any time, along with a link to their pre-diary survey. Nudges were sent by email and text, and calls were made to encourage participants to complete the

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<sup>7</sup> A small number of participants completed pre-surveys and diaries later than requested.

pre-diary survey before their waste collection day. All participants received two reminders to set out their trash (and compost, if applicable) on their regularly scheduled collection day. Reminders were made two days before their regular collection day and the afternoon before collection. For example, if a participant usually has their bins out for collection on Tuesday mornings, they were contacted Sunday to remind them that researchers would be collecting Monday evening and Tuesday morning and asking them to put out their trash and yard debris bins Monday, by 6pm. They were reminded again Monday.

Nudges to start the diary and offers of assistance were sent if participants hadn't made an entry within the first week of the two-week diary period. Participants were also reminded to complete the post-diary survey, once the diary period was over and their post-diary survey link was sent, whether or not they had completed seven days of the diary.

As we could not know whether participants who opted for paper diaries had started the survey or diary in the same way we could with the online participants, these participants were contacted at the start of their diary period and when there were seven days remaining. Finally, these participants were reminded to complete and return surveys and diaries if we hadn't received them within a reasonable timeframe.

# Results

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## Notes on How Results are Reported and the Analytic Approach

For the surveys, frequencies for each response within a survey item are presented in figures and tables, with the exact wording of the survey item and the sample size of respondents asked each item included at the bottom of each figure and table. For most of the survey items, the data are summarized for the entire group of either 216 (pre-diary) or 184 (post-diary) respondents who participated in each survey, which are denoted by “N” to indicate the full sample. Other survey items are summarized for a subset of respondents who, based on a skip pattern in the survey, were the only ones asked those items. In those instances, the sample size will be denoted by “n” to indicate a subset of the full sample. In most figures and tables, the count and/or percentage of “missing” responses are included in the presentation to represent respondents who were asked a question, but who chose not to answer. Similarly, for the waste sorts and diaries, the data are summarized for the entire group; 230 for the waste sort and 185 for the diary. Where the sample is fewer due to incomplete data, the number of participants is noted.

For survey items presented in bar graphs, the percentages of respondents endorsing each option are always presented across the entire range from 0% to 100%. This is done so that all of the figures throughout the report can be compared both numerically and visually. The size of any bar across all graphs can be compared to the size of the bar in any other graph to understand the proportion of respondents endorsing various survey item responses. That means that a bar that represents 30% of respondents will be the same size no matter what figure the reader is looking at, ensuring consistency of interpretation across all survey items.

The analysis plan included comparisons of respondents living in urban and rural areas, a few comparisons across household types and amount of money spent on food eaten at home, and comparisons across pre- and post-diary responses for items included in both surveys. For items involving categorical or ordinal data, significance testing was done using the chi-square test. The chi-square test considers whether the array of responses (e.g., a two-by-three table of households in urban vs. rural geographic areas being compared on a survey item with three possible responses) is different than would be expected by chance and results in a statistic (i.e.,  $X^2$ ) and a probability value. For items that involved numeric responses (i.e., interval data), significance testing was done using paired t-tests or ANOVA (Analysis of Variance) that also result in statistics (i.e.,  $t$  or  $F$ ) and a probability value. Paired t-tests and ANOVAs determine whether or not the difference between the means of respondent subgroups is greater than would be expected by chance. These tests also take into account the standard deviation (i.e., the spread of responses) around the mean when calculating statistical significance. Paired t-tests are used when two groups are being compared, while ANOVAs are used when comparing three or more groups.

Probability is denoted with a  $p$  and is considered statistically significant if it is less than 5% (a commonly accepted level of significance). In this report, significance is listed as  $p < .05$  or  $p < .01$  or  $p < .001$ , each of which indicates the probability that the difference is due to chance rather than being due to true differences across the groups. For example, a significance test with a  $p < .05$  means that the difference between the groups has a less than 5% probability of being due to chance. Stated another way, it means that there is a 95% probability that the difference between the two groups is due to something other than chance variation (i.e., people actually behave differently across the groups).

# Response Rate

Of the 299 households that signed up for the study, 27 asked to be removed from the study, resulting in a 91% retention rate. 164 households completed all four activities (surveys, sort, and diary) yielding a 55% completion rate. Completion of other activities is detailed below, as seen in Table 2.

**Table 2: Household Participation in Oregon Wasted Food Study; Waste Sort, Diary, and Surveys of the Residential Sector**

	Urban	Rural	Total
Households Recruited	169	130	299
Pre-Diary Survey	132	110	216
Post-Diary Survey	84	74	184
One-week Diary	110	72	182
Trash Sort	134	96	230
Compost Sort	53	5	58
Completed All Four Activities (Pre- and Post-Surveys, Waste Sort (Trash or Compost), Diary)	98	66	164

## Waste Sorts

A primary goal of this study was to establish baseline metrics for quantities and types of wasted food in Oregon. While the study design precluded recruiting a fully random, representative sample for the entire state, efforts were made to reduce selection biases by giving every household within a recruitment area an equal chance of participating. The rural sample of this study was purposefully oversampled in order to have adequate sample size for comparisons to an urban sample. In the larger study report to follow this one, data will be weighted to match the proportion of urban and rural populations in the state, so as to allow for comparison to DEQ's Waste Composition Study<sup>8</sup> data. As weighting data increases the sampling variance, standard deviation, and standard error, unweighted data is used in the analyses that follow. Total weights of food found in the waste sorts can be found in the appendix (see, Tables A1-3).

## Food Disposed in the Landfill- or Incinerator-bound Stream

To reflect one week's worth of household waste, weights were corrected according to frequency of trash pick-up as reported by participants in the post-diary survey. Participants who did not know the frequency of their trash pick-up or who did not complete the post-diary survey were assumed to have weekly or bi-weekly trash service, depending on the site. Weekly trash pick-up is the default service level for all sites except for City of Portland residents for whom the default service level is every other week. Multifamily residents in all sites who did not know their service level or who didn't report it were assumed to have weekly service as there is no default service level for multifamily units.

<sup>8</sup> Periodically, the Oregon DEQ conducts a statewide study of the composition of the waste in Oregon. Current and previous results can be found at <https://www.oregon.gov/deq/mm/Pages/Waste-Composition-Study.aspx>

Households threw away in their mixed landfill- or incinerator-bound garbage an average of 5.6 lb of food, of which, 4.1 lb was edible food, each week (see, Table 3). “Percentages of food” represent the amount of a given food category in proportion to the total food disposed. **Edible food represented 73.2% of the food disposed for the total sample.** The data is displayed in descending order with the category making up the highest percentage of all food disposed listed first. Inedible parts are the largest category, followed by vegetables and fruits, and prepared foods and leftovers. **Food constituted 37.2% of the trash collected, with edible food making up 27.2% of the trash weight.**

Independent samples t-tests were conducted to test for differences between the urban and rural groups. Only inedible parts of foods were thrown away at significantly different levels ( $t = -2.427, p < 0.05$ ) with the rural households throwing away to landfill 0.7 lb more inedible food on average than urban households. This could be related to the lack of curbside compost service in our rural sample sites, since the disposal options for most of these households are limited to the trash, home composting or feeding to pets.

Per capita weights were also analyzed and yielded results similar to the household level results, with inedible parts of food being the only significant difference between urban and rural samples – i.e., rural residents were found to throw away more inedible parts in the trash than urban residents. **The average per capita weight of food disposed to the landfill- or incinerator-bound waste stream was 2.1 lb per week, of which, 1.5 lb was edible food** (see, Table A4 in the Appendix).

**Table 3: Food Disposed to Landfill or Incinerator, Waste Sorts (Household Level)**

Food Category	Urban (n=134)		Rural (n=96)		Total (n=230)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible*</b>	<b>23.8%</b>	<b>1.2</b>	<b>30.2%</b>	<b>1.9</b>	<b>26.8%</b>	<b>1.5</b>
Vegetables & Fruits	24.0%	1.3	21.4%	1.3	22.8%	1.3
Prepared Foods & Leftovers	15.2%	0.8	13.3%	0.8	14.3%	0.8
Baked Goods	7.7%	0.4	10.9%	0.7	9.2%	0.5
Meat & Fish	7.7%	0.4	9.3%	0.6	8.4%	0.5
Snacks, Condiments, Sauces	7.6%	0.4	7.1%	0.4	7.4%	0.4
Dry Foods	7.6%	0.4	1.8%	0.1	4.9%	0.3
Liquids, Oils, Grease	3.4%	0.2	2.0%	0.1	2.8%	0.2
Dairy	2.5%	0.1	2.7%	0.2	2.6%	0.1
Eggs	0.2%	<0.1	0.9%	0.1	0.5%	<0.1
Unidentifiable	0.3%	<0.1	0.5%	<0.1	0.4%	<0.1
<b>Subtotal Edible Food</b>	<b>76.2%</b>	<b>4.0</b>	<b>69.8%</b>	<b>4.4</b>	<b>73.2%</b>	<b>4.1</b>
<b>All Food</b>		<b>5.2</b>		<b>6.3</b>		<b>5.6</b>
<b>Edible Food/Total Bag Weight</b>	<b>29.2%</b>		<b>25.1%</b>		<b>27.2%</b>	
<b>All Food/Total Bag Weight</b>	<b>38.4%</b>		<b>35.9%</b>		<b>37.2%</b>	

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds.

## Food Disposed in the Curbside Compost Stream

Fifty-eight households' curbside compost bins were sorted, 53 being from urban sites. For the whole sample, an average of 5.9 lb of food was thrown away in curbside compost, with 2.9 lb being edible food. Similar to the data reported for disposal to landfill, percentages of food reported represent the amount of a given food category in proportion to the total food disposed. **Edible food represented 49.1% of the food disposed to the curbside compost stream for the total sample.** Due to the very small number (5) of rural curbside compost samples, a t-test to assess differences between urban and rural samples was not conducted.

Food as a percentage of the total material set out in the curbside compost stream was not calculated, as bins and bags that were exclusively yard debris were not collected due to the large amount of yard debris set out during the autumn collection period. This, combined with the seasonal distortion on the total weight of compost set-out, means that a reliable *proportion* of food in the total compost stream cannot be determined from this data. However, *weights* of food in the compost stream and the proportion of types of food relative to the total weight of food disposed in curbside compost were calculated.

Per capita weights were also analyzed and were similar to the household level results (see, Table A5 in the appendix). **The average weight of food disposed per capita to curbside compost was 2.5 lb, 1.2 lb of which was edible food.**

**Table 4: Food Disposed to Curbside Compost from Waste Sorts**

Food Category	Urban (n=53)		Rural (n=5)		Total (n=58)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible</b>	<b>49.7%</b>	<b>3.1</b>	<b>84.00%</b>	<b>1.9</b>	<b>50.9%</b>	<b>3</b>
Vegetables & Fruits	27.0%	1.7	4.30%	0.1	26.2%	1.5
Unidentifiable	10.3%	0.6	<0.1%	<0.1	9.9%	0.6
Baked Goods	5.0%	0.3	11.70%	0.3	5.2%	0.3
Prepared Foods & Leftovers	3.3%	0.2	<0.1%	<0.1	3.2%	0.2
Dry Foods	2.8%	0.2	<0.1%	<0.1	2.7%	0.2
Meat & Fish	1.0%	0.1	<0.1%	<0.1	1.0%	0.1
Dairy	0.4%	<0.1	<0.1%	<0.1	0.4%	<0.1
Snacks, Condiments, & Sauces	0.4%	<0.1	<0.1%	<0.1	0.4%	<0.1
Eggs	0.1%	<0.1	<0.1%	<0.1	0.1%	<0.1
Liquids, Oils, & Grease	<0.1%	<0.1	<0.1%	<0.1	<0.1%	<0.1
<b>Subtotal Edible Food</b>	<b>50.3%</b>	<b>3.1</b>	<b>16.0%</b>	<b>0.4</b>	<b>49.1%</b>	<b>2.9</b>
<b>All Food</b>		<b>6.2</b>		<b>2.3</b>		<b>5.9</b>

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds.

## Food Disposed in Landfill/Incinerator and Curbside Compost Streams Combined

Taking the landfill and curbside compost streams together presents a more complete picture of the total food disposed curbside by households. Note, only 58 of the 230 households in the sample had compost sorted. As seen in Table 5, the **average household weight of food disposed to both waste streams combined was 7.1 lb. Edible food made up 68.2% of total food disposed, or 4.9 lb of edible food disposed weekly by each household, on average.**

**Per capita, food disposed to both waste streams combined was 2.9 lb, 65.5% of which, or 1.9 lb, was edible food** (see the appendix, Table A6). Independent-samples t-tests were conducted to assess differences in the mean household and per capita weights of food disposed between the urban and rural samples. No statistically significant differences were found.

**Table 5: Food Disposed to Landfill and Curbside Compost from Waste Sorts**

Food Category	Urban (n=134)		Rural (n=96)		Total (n=230)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible</b>	32.1%	2.5	31.2%	2.0	31.8%	2.3
Vegetables & Fruits	25.0%	1.9	21.0%	1.3	23.5%	1.7
Prepared Foods & Leftovers	11.4%	0.9	13.1%	0.8	12.0%	0.9
Baked Goods	6.8%	0.5	10.9%	0.7	8.3%	0.6
Meat & Fish	5.6%	0.4	9.1%	0.6	6.9%	0.5
Snacks, Condiments, Sauces	5.3%	0.4	7.0%	0.4	5.9%	0.4
Dry Foods	6.0%	0.5	1.8%	0.1	4.4%	0.3
Unidentifiable	3.5%	0.3	0.5%	<0.1	2.3%	0.2
Liquids, Oils, Grease	2.3%	0.2	2.0%	0.1	2.2%	0.2
Dairy	1.8%	0.1	2.6%	0.2	2.1%	0.2
Eggs	0.1%	<0.1	0.9%	0.1	0.4%	<0.1
<b>Subtotal Edible Food</b>	<b>67.9%</b>	<b>5.2</b>	<b>68.8%</b>	<b>4.4</b>	<b>68.2%</b>	<b>4.9</b>
<b>All Food</b>		<b>7.7</b>		<b>6.4</b>		<b>7.1</b>

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds.

## Diaries

The diary was intended to 1) capture a week's worth of food thrown away in a household 2) compare this amount to a week's worth of food captured in the waste sort, 3) measure how much food is disposed to destinations outside of curbside collections, such as down the drain, to home composting, and to pets, and 4) provide insight into the context and reasons why food was thrown away.

As seen in Table 6, 182 households completed one-week diaries, recording 5,078 entries. The majority of entries ( $n = 3,760$ ) were recorded online. An independent- t-test was performed to determine if there was a

difference between the online and paper diary formats for mean household wasted edible food weight. **No statistically significant differences were found.**

There were 294 entries for food thrown away outside of the home that were analyzed separately.

**All of the following analyses of diary data of food thrown away at home exclude 569 entries (131.7 lb) that:**

- Are not food (e.g., cheese wax, Halloween pumpkins, pet food) (n = 13),
- Disposed away from home (n=294),
- Entries with incomplete or missing information (n=275)
  - Edibility cannot be determined because of a missing food description
  - A participant combined several foods of different types of edibility in one entry such that no one type of edibility was discernable;
  - A food category could not be ascribed to the entry

Any additional reasons for excluding entries from an analyses are noted below the relevant table.

**Table 6: Summary of Diary Data**

	Number of Entries	Number of Households
All Entries	5,078	182
Online Entries	3,760	139
Paper Entries	1,318	43
“No Food Disposed Today” Entries	175	64
“Food Disposed Outside of the Home” Entries	294	90
Entries that are not food	13	10

## Quantity of Wasted Food

In total, 1615 lb of wasted food was recorded in the diaries, with an average household weight of 8.9 lb (see, Table 7) over the seven day reporting period. **Per capita, food thrown away to all destinations was 3.3 lb, of which 2.3 lb was edible.**

**Looking at just landfill/incinerator and curbside compost stream food thrown away in the diaries, 68.6% was edible food** (see, Table A8 in the appendix). **This was similar to the percentage of edible food thrown away in the waste sort where 68.2% of the food sent to the same destinations was edible** (see, Table 5, above).

For per capita calculations, household weights were divided by the number of members in the household as reported in the pre-diary survey. This resulted in a sample of 292 urban residents and 201 rural residents, totaling 493 people. Independent-samples t-tests were conducted to assess differences in the mean weights of wasted food between the urban and rural samples on both the household and per capita levels. No statistically significant differences were found.

**Table 7: Quantity of Wasted Food in Diaries for One Week**

	<b>Urban (n = 110) Weight</b>	<b>Rural (n = 72) Weight</b>	<b>Total (n = 182) Weight</b>
Total Food	985.7	629.4	1615.0
Total Edible Food	696.7	450.1	1146.8
Mean Food Per Household	9.0	8.7	8.9
Mean Edible Food Per Household	6.3	6.3	6.3
Mean Food Per Capita	3.4	3.1	3.3
Mean Edible Food Per Capita	2.4	2.2	2.3

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period. For the per capita figures, urban  $n = 292$  and rural  $n = 201$  for a total of 493 household members. Urban and rural subtotals do not add up to Total, due to rounding.

All entries were coded into the food categories used in the waste sorts. Table 8 displays the mean weights of food (in pounds per week) in each category reported in the diary at the household level. **The average total food weight was 8.9 lb per household, 71% of which was edible food (6.3 lb).** An independent-samples t-test was performed to compare the urban and rural samples' household weights for each category. No statistically significant differences were found.

**Table 8: Wasted Food by Category by Household in Diaries for One Week**

<b>Food Category</b>	<b>Urban (n = 110)</b>		<b>Rural (n = 72)</b>		<b>Total (n = 182)</b>	
	<b>% of Food</b>	<b>Mean Weight</b>	<b>% of Food</b>	<b>Mean Weight</b>	<b>% of Food</b>	<b>Mean Weight</b>
Inedible	29.3%	2.6	28.5%	2.5	29.0%	2.6
Vegetables & Fruit	26.5%	2.4	30.6%	2.7	28.1%	2.5
Prepared Foods & Leftovers	16.7%	1.5	15.4%	1.3	16.2%	1.4
Liquids, Oils, Grease	8.4%	0.8	8.2%	0.7	8.3%	0.7
Dry Foods	6.6%	0.6	3.1%	0.3	5.2%	0.5
Meat & Fish	4.3%	0.4	4.4%	0.4	4.4%	0.4
Baked Goods	4.2%	0.4	3.9%	0.3	4.1%	0.4
Snacks, Condiments, Sauces	2.0%	0.2	3.3%	0.3	2.5%	0.2
Dairy	1.3%	0.1	2.2%	0.2	1.7%	0.1
Eggs	0.5%	<0.1	0.4%	<0.1	0.5%	<0.1
<b>Subtotal Edible</b>	<b>70.7%</b>	<b>6.3</b>	<b>71.5%</b>	<b>6.3</b>	<b>71.0%</b>	<b>6.3</b>
<b>Total Food</b>		<b>9.0</b>		<b>8.7</b>		<b>8.9</b>

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period.

## Food Wasted by Disposal (Discard) Destination

Table 9 displays the household mean weights of food put in each disposal destination, as reported in the diaries: trash (landfill, or incinerator in the case of Woodburn), curbside compost, home or other compost, down the drain (sewer), fed to pets/animals, and other. Oregon considers curbside compost to be a form

of “recovery”, not “disposal” but the term “disposal” is used here for consistency with the Food Loss & Waste Protocol; see, the appendix. This study included discard destinations not often assessed in residential wasted food studies, for example, to home or other compost (14.2%), down the drain (10.8%), or fed to pets (3.6%), reported from a variety of populations across the state of Oregon.

Independent-samples t-tests were conducted to compare the mean household weights of wasted food for each disposal destination in the urban and rural samples. A statistically significant difference between urban and rural samples was found for food discarded to trash ( $t(161) = -2.889, p < 0.01$ ) and curbside compost ( $t(161) = 4.163, p < 0.001$ ). Rural residents disposed more food in the trash than urban residents, who sent more food to compost than their rural counterparts. **Two-thirds of the urban sample had access to curbside composting, whereas neither of the rural sites had regular curbside compost pick-up that includes all types of food.** This could explain the differences in amounts disposed to compost and landfill for urban and rural residents.

**Table 9: Wasted Food by Disposal Destination by Household in Diaries for One Week**

Discard Destination	Urban (n=110)		Rural (n=72)		Total (n=182)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
Trash**	27.3%	2.3	54.2%	4.6	37.6%	3.2
Curbside compost***	46.8%	3.9	11.8%	1.0	33.3%	2.8
Home or other compost	12.2%	1.1	17.3%	1.5	14.2%	1.2
Down the drain	10.7%	1.0	11.0%	1.0	10.8%	1.0
Fed to pets/animals	2.6%	0.2	5.2%	0.5	3.6%	0.3
Other	0.4%	<0.1	0.5%	<0.1	0.4%	<0.1

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period. Excludes entries with destination missing (n = 344).

## Comparison to Waste Sort Data

One goal of the diary task was to see how tracking and self-reporting of wasted food compares to curbside collection and sorting of wasted food in terms of the amount and type of wasted food identified. To calculate a reporting rate for the diaries, the total waste sort food weight was subtracted from the total diary sort food weight. This figure was then divided by the waste sort food weight. Or:

$$\frac{(\text{Diary food weight} - \text{Waste food weight})}{\text{Waste sort food weight}}$$

The analysis was limited to the 164 households that completed both the diary and had landfill bound waste sorted, with the waste sort based compost-only analysis limited to the 51 households who completed the diary *and* had curbside compost sorted. The weights used from the diary were only for entries disposed to landfill or to curbside compost. The compost-only analysis is based on the 63 households (of the 164 total) who had diary entries for curbside compost.

**Table 10: Weights Used for Diary Reporting Rate Calculation**

	Urban		Rural		Total	
	N	Total weight	N	Total weight	N	Total weight
Waste sort: Landfill	98	412.1	66	442.5	164	854.6
Waste sort: Curbside Compost	46	301.5	5	11.4	51	313.0
Diary: Landfill	98	237.3	66	318.1	164	555.5
Diary: Curbside Compost	52	382.9	11	71.0	63	453.9

Weights are in pounds for a seven day period.

As Table 11 shows, **wasted food going to landfill was under-reported in the diary, as compared to the waste sort, at a rate of 35.0% less.** In contrast, the weight of food headed to curbside compost was over-reported; 45.0% higher in the diaries than in the waste sort. Landfill and compost-bound food together was reported at a rate 13.6% lower in the diaries than in the waste sorts.

**Table 11: Diary Reporting Rates Compared to Waste Sort Data**

	Urban		Rural		Total	
	N	Reporting Rate	N	Reporting Rate	N	Reporting Rate
Landfill	98	-42.4%	66	-28.1%	164	-35.0%
Compost	58	27.0%	11	521.4%	69	45.0%
Landfill and Compost	98	-13.1%	66	-14.3%	164	-13.6%

It should be noted that the diaries and waste sorts captured waste from different days (although the season and duration – seven days – were consistent). The over-reporting of compost-bound data and under-reporting of landfill/incinerator bound data may reflect a reporting bias on the part of diary participants.

In order to understand whether certain categories of food were over or under represented in the diaries, the proportion of a given food category of the total wasted food in the diary was compared to the waste sorts. The larger sample of all waste sorted and all diary entries for the same disposal destination could be used for this analysis, unlike in the reporting rate analysis which used a subsample of only those who had both completed the diary and had waste sorted. Looking at landfill-bound waste only, **while 35.0% less food was reported in the diaries, the overall distribution of food across the categories was similar (see, Table 12).** The largest differences in over-reporting in the diaries was prepared food and leftovers, 5.1% more, and vegetables & fruits, 2.6% more of the total food reported in the diaries than it did in the waste sorts. The largest difference in under-reporting in the diaries was snacks, condiments, and sauces which was reported 4.0% less in the diaries than as found in the waste sorts (see, Table 12).

**Table 12: Comparison of Food Disposed to Landfill in Waste Sorts to Food Discarded to Landfill in Diaries**

Category	Waste Sorts (n = 230)		Diaries (n= 182)		Difference (Diaries % Minus Waste Sort %)
	Total Weight	% of Food	Total Weight	% of Food	
Inedible	347.6	26.8%	152.3	25.9%	-0.9%
Vegetables & Fruits	296.0	22.8%	149.5	25.4%	2.6%
Prepared Foods & Leftovers	186.2	14.3%	114.0	19.4%	5.1%
Baked Goods	119.1	9.2%	43.3	7.4%	-1.8%
Meat & Fish	109.5	8.4%	40.6	6.9%	-1.5%
Snacks, Condiments, Sauces	95.9	7.4%	19.8	3.4%	-4.0%
Dry Foods	63.6	4.9%	40.7	6.9%	2.0%
Liquids, Oils, Grease	36.0	2.8%	5.4	0.9%	-1.9%
Dairy	33.4	2.6%	19.3	3.3%	0.7%
Eggs	6.6	0.5%	2.9	0.5%	<0.1%
Unidentifiable	4.7	0.4%	<0.1	<0.1%	-0.4%
<b>Subtotal Edible</b>	<b>950.9</b>	<b>73.2%</b>	<b>435.5</b>	<b>74.1%</b>	<b>0.9%</b>
<b>All Food</b>	<b>1298.4</b>		<b>587.8</b>		

Weights are in pounds for a seven day period.

The same analysis was conducted for curbside compost-bound wasted food with a sample of 58 who had curbside compost sorted and 69 who reported throwing away at least one food item to curbside compost. As seen in Table 13, the largest difference was seen in inedible parts of food which made up 13.3% less of total food in the diary than was found in the waste sort. The largest difference in over-reporting in the diary was in prepared food and leftovers at 8.7% more, followed by fruit and vegetables which made up 6.7% more of total food disposed in the diary than in the waste sort. Edible food considered together constituted 13.3% more of the total food thrown away in the diary than in the waste sort.

**Table 13: Comparison of Food Disposed to Curbside Compost in Waste Sorts to Food Discarded to Curbside Compost in Diary**

Category	Waste Sort (n = 58)		Diaries (n= 69)		Difference (Diaries % Minus Waste Sort %)
	Total Weight	% of Food	Total Weight	% of Food	
Inedible	173.4	50.9%	189.7	37.9%	-13.0%
Vegetables & Fruit	89.4	26.2%	165.0	32.9%	6.7%
Prepared Foods & Leftovers	10.9	3.2%	70.9	14.2%	11.0%
Dry Foods	9.4	2.7%	18.8	3.7%	1.0%
Meat & Fish	3.4	1.0%	17.4	3.5%	2.5%
Baked Goods	17.7	5.2%	15.7	3.1%	-2.1%
Unidentifiable	33.8	9.9%	<0.1	<0.1%	-9.9%
Snacks, Condiments, Sauces	1.5	0.4%	9.8	2.0%	1.6%
Liquids, Oils, Grease	0.0	0.0%	7.3	1.4%	1.4%
Dairy	1.3	0.4%	3.2	0.6%	0.2%
Eggs	0.2	0.1%	3.2	0.6%	0.5%
<b>Subtotal Edible</b>	<b>167.4</b>	<b>49.1%</b>	311.1	62.1%	13.0%
<b>All Food</b>	<b>340.87</b>		<b>500.9</b>		

Weights are in pounds for a seven day period.

## Edibility of Wasted Food

Following a construct created by NRDC, edible food was broken into two categories: typically edible and questionably edible. Typically edible foods are intended for human consumption and widely recognized as such, whether individually or combined with other edible foods e.g. bananas, milk, burritos. Questionably edible foods can be eaten but their edibility varies by culture and preference, e.g., beet greens, apple cores and peels, carrot peels and tops. Identifying the portions of each edibility type in the waste stream can aid in understanding what opportunities exist to reduce these wasted foods. Table 14 displays the mean household weights and percent of total wasted food for each edibility type. Figure 1 uses rounded percentages and shows that for the entire sample, 62% of the wasted food was typically edible and 9% is questionably edible.

Independent-samples t-tests were conducted to assess differences in the mean household weights of wasted food between the urban and rural samples for each type of edibility. No statistically significant differences were found.

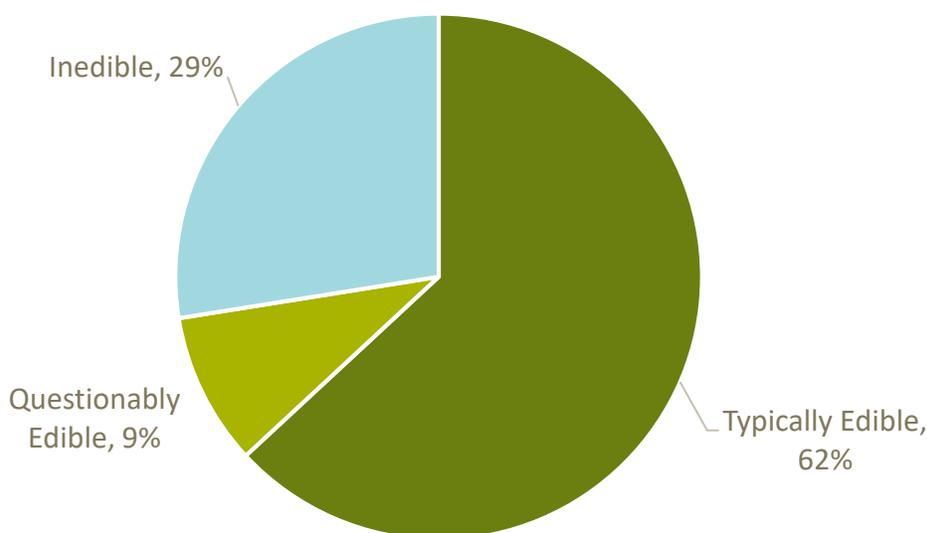
**Table 14: Wasted Food by Edibility in Diaries**

Edibility	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
Typically Edible	61.3%	5.5	62.1%	5.4	61.6%	5.5
Questionably Edible	9.4%	0.8	9.4%	0.8	9.4%	0.8
Inedible	29.3%	2.6	28.5%	2.5	29.0%	2.6

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period.

Figure 1: Edibility of Food Disposed in Diaries



## Top Foods Wasted

Tables 15 – 18 display the top ten wasted foods (by weight) recorded in the diaries. Assessments of the top wasted foods include all foods disposed at home. Food disposed away from home is excluded. All entries were coded according to a list of standard food names (see, the appendix). Entries were labeled “unidentifiable edible” when participants 1) did not give a name of the food but indicated in other responses that it was edible 2) used incomplete descriptions like ‘plate scraps’ or 3) put several edible foods of different categories together in one entry. “Mixed inedibles” was used for entries where several inedible items were mixed together and one did not predominate in terms of weight. “Mixed fruit/vegetable peels/ends” (e.g., carrot and apple peels), “mixed vegetable peels/ends” (e.g., carrot and potato peels) and “mixed fruit and vegetables” (e.g., apple slices and banana pieces) were also used for entries when more than one fruit and/or vegetable was listed.

**Table 15: Top Ten Wasted Foods, All Edibility Types (Typically Edible, Questionably Edible, and Inedible)**

Rank	Urban	Rural	Total
1	coffee grounds	coffee grounds	coffee grounds
2	mixed inedibles	mixed inedibles	mixed inedibles
3	unidentifiable edible	coffee	unidentifiable edible
4	milk	soup	soup
5	soup	unidentifiable edible	coffee
6	beans	red meat dish	milk
7	red meat dish	potatoes	red meat dish
8	coffee	bread	bread
9	bread	banana peels	banana peels
10	banana peels	eggshells	mixed fruit/vegetable peels/ends

**Table 16: Top Ten Edible Wasted Foods (Typically Edible and Questionably Edible)**

Rank	Urban	Rural	Total
1	unidentifiable edible	coffee	unidentifiable edible
2	milk	soup	soup
3	soup	red meat dish	coffee
4	beans	potatoes	milk
5	red meat dish	bread	red meat dish
6	coffee	salad	bread
7	bread	broccoli stalks	mixed fruit/vegetable peels/ends
8	mixed fruit/vegetable peels/ends	poultry dish	non-meat dish
9	non-meat dish	unidentifiable edible	beans
10	mixed fruits & vegetables	non-meat dish	potatoes

**Table 17: Top Ten Questionably Edible Wasted Foods**

Rank	Urban	Rural	Total
1	mixed vegetable peels/ends	broccoli stalks	mixed vegetable peels/ends
2	apple cores/skin	mixed vegetable peels/ends	apple cores/skin
3	mixed fruit/vegetable peels/ends	apple cores/skin	mixed fruit/vegetable peels/ends
4	meat/fish parts (fat/skin)	potato peels	potato peels
5	potato peels	mixed fruit/vegetable peels/ends	meat/fish parts (fat/skin)
6	tomato core/skin	meat/fish parts (fat/skin)	broccoli stalks
7	carrot peels/tops	celery tops/ends	celery tops/ends
8	broccoli stalks	pear core/skin	tomato core/skin
9	greens stems/stalks	asparagus ends	pear core/skin
10	celery tops/ends	kiwi peels	carrot peels/tops

**Table 18: Top Ten Typically Edible Wasted Foods**

Rank	Urban	Rural	Total
1	unidentifiable edibles	coffee	unidentifiable edibles
2	milk	soup	soup
3	soup	red meat dish	coffee
4	beans	potatoes	milk
5	red meat dish	bread	red meat dish
6	coffee	salad	bread
7	bread	poultry dish	non-meat dish
8	non-meat dish	unidentifiable edibles	beans
9	mixed fruits & vegetables	non-meat dish	potatoes
10	rice	pears	mixed fruits & vegetables

## Analysis by Meal Type

Table 19 shows mean household weights of wasted food by meal type. **44.4% of the food discarded was from “other” meals, outside of breakfast, lunch and dinner.** Food from dinner made up the next highest category (28.3%), followed by breakfast (18.9%), and lunch (8.4%). Independent-samples t-tests were conducted to assess differences in the mean household weights of wasted food between the urban and rural samples for each type of meal. No statistically significant differences were found.

**Table 19: Wasted Food by Meal in Diaries**

Meal	Urban (n=110)		Rural (n=72)		Total (n=182)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
Breakfast	17.5%	1.5	21.0%	1.8	18.9%	1.6
Lunch	8.0%	0.7	9.1%	0.8	8.4%	0.7
Dinner	28.4%	2.4	28.1%	2.4	28.3%	2.4
Not part of a meal	46.0%	3.9	41.8%	3.6	44.4%	3.8

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected. Mean weights are in pounds. Excludes entries with type of meal not identified (n=331).

## Loss Reasons

In the diary, participants were asked why an edible food was thrown away. These first set of reasons we labeled immediate loss reasons, as they are most immediate to the time of discard: moldy or spoiled, don't like or tired of eating, not good as leftovers, past date, too little to save, worry about illness, improperly cooked, and other (text could be entered). 247 “other” entries were analyzed and recoded into a set of additional reasons that emerged from the analysis: contaminated, damaged (e.g., stale, soggy, freezer burned), or unrefrigerated too long. Not all ‘other’ entries could be recoded into these new codes and 195 ‘other’ did not have text to code.

Table 20 shows the immediate loss reasons given in the diaries according to its portion of edible wasted food, in descending order of percentage. **“Moldy/spoiled” was the immediate loss reason given for the largest percentage of edible wasted food, 32.1%.** Independent-samples t-tests were conducted to assess differences in the mean household weights of wasted food between the urban and rural samples for each loss reason. The “damaged” reason was found to be significantly different ( $t(77.3) = -2.008, p < 0.05$ ) with this loss reason constituting 2.1% of edible wasted food in the rural sample and .4% in the urban sample. This should be interpreted with caution as the mean weight and number in these cells are very small.

**Table 20: Immediate Loss Reasons for Wasted Edible Food in Diaries**

Immediate Loss Reasons	Urban (n=110)		Rural (n=72)		Total (n=182)	
	% Edible Food	Mean Weight	% Edible Food	Mean Weight	% Edible Food	Mean Weight
Moldy/Spoiled	30.5%	1.7	34.7%	1.8	32.1%	1.7
Don't like/tired of eating	13.4%	0.7	21.3%	1.1	16.4%	0.9
Not good as leftovers	15.5%	0.9	11.9%	0.6	14.1%	0.8
Other	13.0%	0.7	5.8%	0.3	10.2%	0.6
Past date	7.3%	0.4	10.2%	0.5	8.4%	0.5
Too little to save	8.0%	0.4	7.5%	0.4	7.8%	0.4
Worry about illness	9.0%	0.5	4.9%	0.3	7.4%	0.4
Contaminated <sup>1</sup>	1.8%	0.1	0.8%	<0.1	1.4%	0.1
Damaged (stale, soggy, freezer burned) <sup>1*</sup>	0.4%	<0.1	2.1%	0.1	1.1%	0.1
Improperly cooked	1.1%	0.1	0.7%	<0.1	1.0%	0.1
Unrefrigerated too long <sup>1</sup>	<0.1%	<0.1	0.1%	<0.1	<0.1%	<0.1

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds. Table 24 excludes entries with missing immediate loss reason (n = 2860).

<sup>1</sup> Contaminated, Damaged, and Unrefrigerated too long are post-hoc categories, created from analyzing participant submissions for 'Other'. 195 Remaining 'Other' reasons did not have text explaining them and these entries make up the category 'Other' in the table above.

The second set of reasons we have labeled root loss reasons, as they are what led to the immediate loss and farther removed from the time of discard: made too much, bought too much, didn't know how to use, lost track of in fridge or cupboard, too busy and other (text could be entered). 899 “other” entries were analyzed and recoded into a set of additional reasons that emerged from the analysis: schedule problems (combined with ‘too busy’), preventable other (storage issue, left out, source problem), served too much/portion too large, full/not hungry, trying something new, or package too large. Not all ‘other’ entries could be recoded into these new codes and 367 ‘other’ did not have text to code.

Table 21 shows the root loss reasons given in the diaries according to its portion of edible wasted food, in descending order of percentage. **“Made too much” was the root loss reason given for the largest percentage of edible wasted food, 23.8%, followed closely by lost “track in fridge” at 23.6%.** Independent-samples t-tests were conducted to assess differences in the mean household weights of wasted food between the urban and rural samples for each loss reason. No statistically significant differences were found.

**Table 21: Wasted Edible Food by Root Loss Reasons in Diaries**

Root Loss Reasons	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% Edible Food	Mean Weight	% Edible Food	Mean Weight	% Edible Food	Mean Weight
Made too much	22.7%	1.1	25.4%	1.2	23.8%	1.1
Lost track in fridge	22.1%	1.1	25.9%	1.2	23.6%	1.1
Other	21.0%	1.0	11.2%	0.5	17.1%	0.8
Bought too much	12.2%	0.6	9.5%	0.5	11.1%	0.5
Didn't know how to use	7.9%	0.4	5.6%	0.3	7.0%	0.3
Preventable other (storage, left out, source problem) <sup>1</sup>	5.0%	0.2	10.0%	0.5	7.0%	0.3
Schedule problem (too busy, change of plans) <sup>1</sup>	5.0%	0.2	7.9%	0.4	6.1%	0.3
Served too much, portion too large <sup>1</sup>	2.0%	0.1	2.8%	0.1	2.3%	0.1
Full/not hungry <sup>1</sup>	1.3%	0.1	0.7%	<0.1	1.1%	0.1
Trying something new <sup>1</sup>	0.6%	<0.1	1.0%	<0.1	0.7%	<0.1
Package too large <sup>1</sup>	0.3%	<0.1	0.1%	<0.1	0.2%	<0.1

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds. Table 25 excludes entries missing root loss reason (n=3180).

<sup>1</sup> Schedule problems, preventable other, served too much/portion too large, full/not hungry, trying something new, or package too large are post-hoc categories, created from analyzing participant submissions for 'Other'. 367 remaining 'Other' reasons did not have text explaining them and these entries make up the category 'Other' in the table above.

In order to examine the relationship of immediate and root loss reasons to each other, a crosstabs analysis was conducted. As there were 11 reasons in each group, some of reasons were aggregated according to a common theme to create more robust cell sizes. Table A13 in the appendix displays the crosstab analysis of all of the non-aggregated, loss reasons.

For immediate loss reasons the following groups were created:

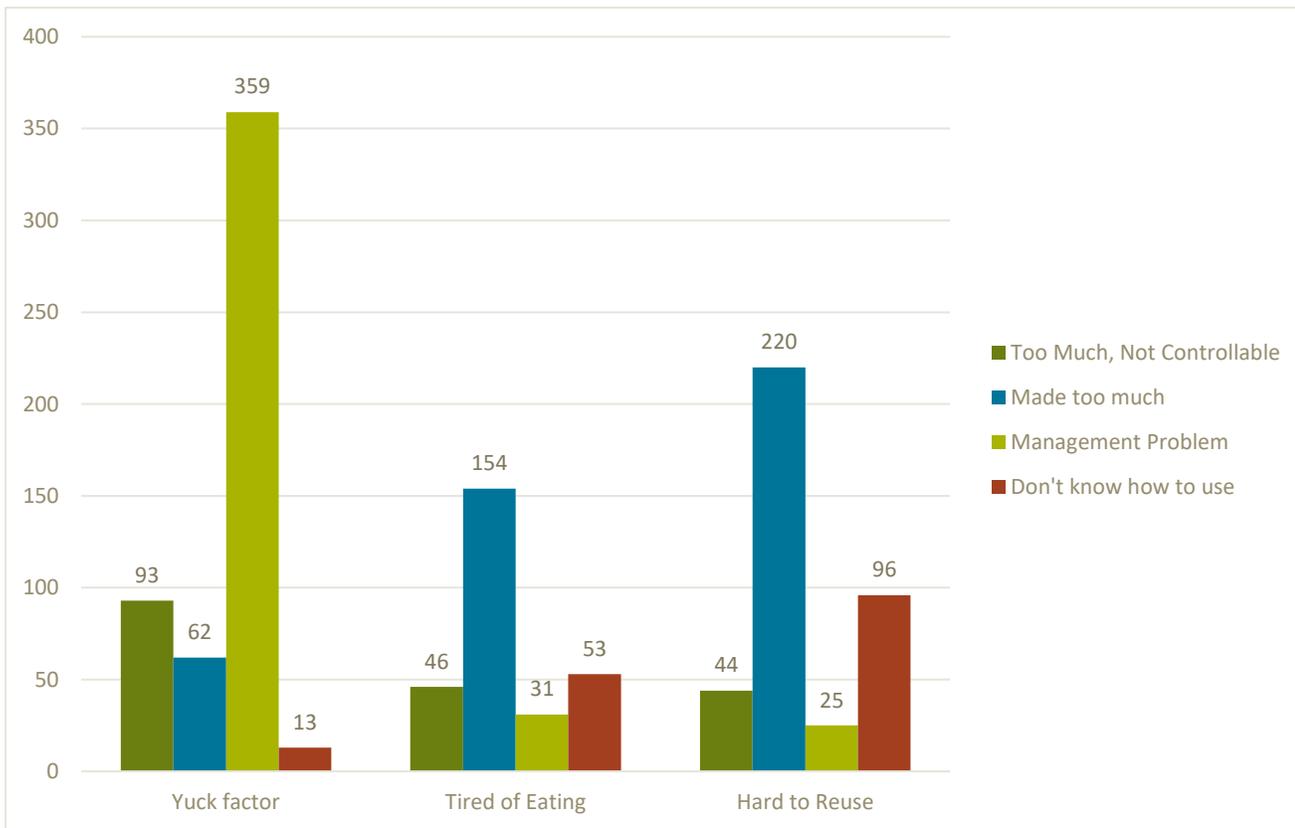
- Yuck factor - Moldy/spoiled, past date, worry about illness, improperly cooked, contaminated, damaged, and unrefrigerated too long
- Don't like/tired of eating was left as its own group
- Hard to reuse - Not good as leftovers and too little to save

For root loss reasons the following groups were created:

- Too much, not controllable - bought too much, package too large, served too much
- Made too much was left as its own group
- Management problem - lost track of, schedule problem
- Don't know how to use was left as its own group

Uncodable "Other" loss reasons were excluded. Figure 2 shows the number of times a root loss reason was given when one of the immediate loss reasons was given. **Management problems were cited the most often (n = 359) for food thrown away due to a 'yuck factor.'** For "don't like/tired of eating" and "hard to reuse", making too much was the most cited root reason (n = 154 and n = 220, respectively).

Figure 2: Relationship of Immediate and Root Loss Reasons To Each Other: Crosstabs Analysis



When participants using the online diary marked “bought too much” or “made too much”, they were presented follow-up questions of “Why was too much bought?” and “Why was too much made?” Tables 22 and 23 show the frequency of responses to these questions. **The most often cited reason for why too much was bought was that the package was too large (n = 36). The most often cited reason for why too much was made was that they thought others would eat it (n = 128).**

**Table 22: Response Frequency - Why was too much bought?**

Reasons	Urban		Rural		Total	
	%	Frequency	%	Frequency	%	Frequency
Package too large	42.4%	25	39.3%	11	41.4%	36
Other	30.5%	18	39.3%	11	33.3%	29
Don't know	18.6%	11	7.1%	2	14.9%	13
On sale or discounted	8.5%	5	14.3%	4	10.3%	9
Total	100.0%	59	100.0%	28	100.0%	87

**Table 23: Response Frequency - Why was too much made?**

Reasons	Urban		Rural		Total	
	%	Frequency	%	Frequency	%	Frequency
Thought others would eat	38.1%	77	38.6%	51	38.3%	128
Made too much by accident	24.8%	50	28.8%	38	26.3%	88
Other	19.8%	40	17.4%	23	18.9%	63
Made a larger batch to eat throughout the week	12.9%	26	6.1%	8	10.2%	34
Don't know	4.5%	9	9.1%	12	6.3%	21
Total	100%	202	100%	132	100%	334

## Household Characteristics and Wasted Edible Food

Previous studies and findings from the earlier phone survey in this [study](#), led us to ask whether the amount of food thrown away may vary by household characteristics, namely household size, the presence of children, income level, and money spent on food in the home and away from the home.

### Household Size

#### Waste sort results

Respondents were divided into 5 groups based on household size reported in the pre-diary survey. 187 participants responded to this survey item and had their waste sorted.

Independent-samples t-tests were conducted to assess differences in the mean household weights and per capita weights of food disposed between the urban and rural samples for each household type. No statistically significant differences were found.

A one-way between subjects analysis of variance was conducted to assess differences between household types for the total sample. There was a statistically significant difference in mean household edible food weights among the five household size categories ( $f = 2.716$ ,  $p < 0.05$ ), where households with five or more members wasted the most edible food. However, **when the same analysis was performed on the per capita weights, there was no significant difference based on household size.**

**Table 24: Mean Weights of Edible Food in Waste Sorts, by Household Size**

Household Size*	Urban (n = 113)		Rural (n = 74)		Total (n = 187)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
1 Member Household	2.7	2.7	2.3	2.3	2.6	2.6
2 Member Household	3.8	1.9	4.0	2.0	3.9	1.9
3 Member Household	6.1	2.0	4.6	1.5	5.7	1.9
4 Member Household	5.7	1.4	5.2	1.3	5.5	1.4
5+ Member Household	7.9	1.4	9.2	1.4	8.6	1.4

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Mean weights are in pounds for a seven day period.

## Diary results

Respondents were divided into 5 groups based on household size reported in the pre-diary survey. As can be seen in Table 25, 182 diary participants responded to this survey item.

Independent-samples t-tests were conducted to assess differences in the mean household weights and per capita weights of food disposed between the urban and rural samples for each household type. No statistically significant differences were found.

A one-way between subjects analysis of variance was conducted to assess differences between household types for the total sample. There was a statistically significant difference in mean edible food household weights among the five household size categories ( $f = 6.950, p < 0.001$ ), where households with three members wasted the most edible food. However, **when the same analysis was performed on per capita weights, there was no significant difference based on household size.**

**Table 25: Mean Weights of Edible Food in Diaries, by Household Size**

Household Size***	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
1 Member Household	2.9	2.9	4.6	4.6	3.5	3.5
2 Member Household	3.8	1.9	5.1	2.5	4.3	2.2
3 Member Household	9.8	3.3	7.5	2.5	9.1	3.0
4 Member Household	8.8	2.2	8.9	2.2	8.9	2.2
5+ Member Household	9.8	1.9	7.5	1.2	8.7	1.5

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Weights are in pounds for a seven day period.

## Household Composition

### Waste sort results

Participants who had waste sorted were divided into three groups based on the composition of their household, as reported in the pre-diary survey: 1 Adult, 2+ Adults Without Children Under 18, and 1+ Adult(s) With Children Under 18. One hundred eighty-six participants responded to this survey item and had their waste sorted. Independent-samples t-tests were conducted to assess differences in the mean household weights of food disposed between the urban and rural samples for each household type. No statistically significant differences were found.

A one-way between subjects analysis of variance was conducted to assess differences between household types for the total sample. As displayed in Table 26, there was a statistically significant difference in mean edible food weights among the three household types ( $f = 4.321, p < 0.05$ ) where single adult households wasted the least edible food and households with one or more adult with children wasted the most edible food. However, **when assessed at the per capita level, there is not a significant difference based on household type.** These findings should be interpreted with caution as the number of children in the households with children varied. There is also a question of whether the age of the children affects the generation of waste but given the small sample sizes (69 households with children of all ages) analysis could not be conducted on the effect of children's age.

**Table 26: Mean Weights of Edible Food in Waste Sorts, by Household Composition**

Household Type***	Urban (n = 112)		Rural (n = 74)		Total (n = 186)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
1 Adult	2.7	2.7	2.3	2.3	2.6	2.6
2+ Adults WITHOUT Children Under 18	4.0	1.8	4.1	1.7	4.0	1.8
1+ Adults WITH Children Under 18	7.1	1.8	7.0	1.6	7.1	1.7

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Weights are in pounds for a seven day period.

## Diary results

Respondents were divided into 3 household types based on composition (e.g. 1 or 2+ adults with and without children under 18. As can be seen in Table 27, 180 diary participants reported household types in the pre-survey.

Independent-samples t-tests were conducted to assess differences in the mean household weights and per capita weights of food disposed between the urban and rural samples for each household type. No statistically significant differences were found.

A one-way between subjects analysis of variance was conducted to assess differences between household types for the total sample. There was a statistically significant difference in mean edible food household weights among the three household size categories ( $f = 5.467$ ,  $p < 0.05$ ), where households composed of 1+ adults with children under 18 wasted the most amount of edible food. However, when assessed **at the per capita level, there is not a significant difference based on household type.**

**Table 27: Mean Weights of Edible Food in Diaries, by Household Composition**

Household Size***	Urban (n = 109)		Rural (n = 71 )		Total (n = 180)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
1 Adult	2.9	2.9	4.6	4.6	3.5	3.5
2+ Adults WITHOUT Children Under 18	6.4	2.7	5.9	2.7	6.2	2.7
1+ Adults WITH Children Under 18	7.9	2.1	7.6	1.7	7.8	1.9

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Weights are in pounds for a seven day period.

## Income

In the pre-diary survey, participants answered a question about their household income, placing them in one of eight income groups. Due to small sample size for the “Under \$10,000,” “\$150,000 – \$199,000” and

“\$200,000 or more” categories, these categories were collapsed with the next closest income group, creating the five groups below in Tables 28 and 29.

## Waste sort results

Table 28 presents mean weights of edible food in waste sorts by income group. Independent-samples t-tests were conducted to assess differences in the mean household and per capita weights of food disposed between the urban and rural samples for each household type. No statistically significant differences were found. A one-way between subjects analysis of variance was conducted to assess differences between income groups for the total sample at the household and per capita levels. No statistically significant differences were found.

**Table 28: Mean Weights of Edible Food in Waste Sorts, by Income Group**

Income Group	Urban (n = 109)		Rural (n = 69)		Total (n = 178)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
Less than \$24,999	6.3	3.8	7.0	2.2	6.7	2.7
\$25,000 to \$49,999	6.0	2.2	3.5	1.4	4.9	1.9
\$50,000 to \$74,999	3.8	1.6	4.2	1.5	4.0	1.5
\$75,000 to \$99,999	2.6	0.8	4.9	1.4	3.5	1.0
\$100,000 or more	5.8	1.7	5.9	1.6	5.8	1.7

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Weights are in pounds for a seven day period.

## Diary results

Table 29 presents mean weights of edible food reported in diaries by income group. Independent-samples t-tests were conducted to assess differences in the household level and per capita weights of food disposed between the urban and rural samples for each income group. No statistically significant differences were found.

A one-way between subjects analysis of variance was conducted to assess differences between income groups for the total sample, at both the household and per capita levels. No statistically significant differences were found.

**Table 29: Mean Weights of Edible Food in Diaries, by Income Group**

Income Group	Urban (n = 106)		Rural (n = 66)		Total (n = 172)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
Less than \$24,999	3.1	1.8	6.4	2.6	4.7	2.3
\$25,000 to \$49,999	9.0	3.2	5.4	2.1	7.5	2.7
\$50,000 to \$74,999	4.7	1.9	7.6	2.8	5.9	2.3
\$75,000 to \$99,999	4.8	1.7	7.4	2.3	5.9	2.0
\$100,000 or more	8.1	2.6	6.2	1.6	7.8	2.5

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.  
Weights are in pounds for a seven day period.

## Food Disposed Away from Home

In many other diary studies, tracking is limited to food discarded at home. In an effort to see how much data could be captured regarding food thrown away outside of the home, participants were asked to record this food but they were not expected to weigh these items. There are no weights to report for these entries. These entries represented only 5.8% of all entries. Frequencies of entries in terms of edibility and food categories is detailed in Table 30. The majority of food thrown away outside of the home was edible (74.1%). The top three categories of wasted food disposed outside of the home were vegetables and fruits, cooked or prepared items, and inedible parts of food.

**Table 30: Frequencies Diary Entries for Wasted Food Disposed Away From Home**

Edibility	Urban (n=110)		Rural (n=72)		Total (n=182)	
	% of Entries	N	% of Entries	N	% of Entries	N
Typically Edible	64.1%	100	85.5%	118	74.1%	218
Questionably Edible	15.4%	24	1.4%	2	8.8%	26
Inedible	19.2%	30	10.9%	15	15.3%	45
Missing	1.3%	2	2.2%	3	1.7%	5
<b>Food Category</b>						
Vegetables & Fruits	35.90%	56	14.50%	20	25.90%	76
Cooked, Prepared Items, Leftovers	15.40%	24	26.10%	36	20.40%	60
Inedible	19.20%	30	10.90%	15	15.30%	45
Baked Goods	7.70%	12	13.80%	19	10.50%	31
Liquids, Oils, Grease	6.40%	10	8.00%	11	7.10%	21
Meat & Fish	5.10%	8	8.00%	11	6.50%	19
Dry Foods	3.80%	6	5.80%	8	4.80%	14
Snacks, Condiment, Sauces	3.20%	5	4.30%	6	3.70%	11
Dairy	0.60%	1	3.60%	5	2.00%	6
Missing	1.30%	2	2.90%	4	2.00%	6
Eggs	1.30%	2	2.20%	3	1.70%	5
<b>Total</b>		<b>156</b>		<b>138</b>		<b>294</b>

Loss reasons for food thrown out away from home are presented in Figures 3 and 4. The reasons presented to participants making outside of the home entries were the same as in home with the addition of “unable to store”. The top three immediate loss reasons are: don’t like/tired of eating, not good as leftovers, and too little to save. The top three root loss reasons are: bought too much, other, and served too much.

Figure 3: Immediate Loss Reasons, Food Thrown Out Away From Home

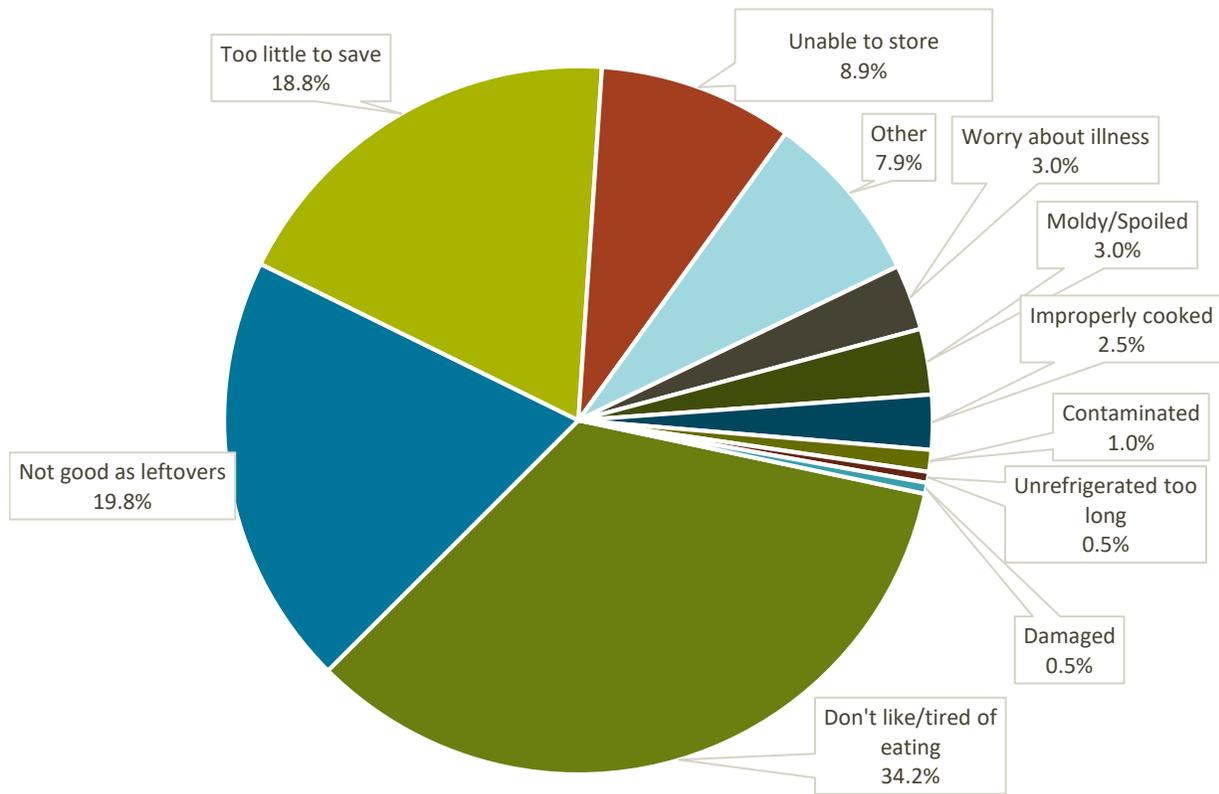
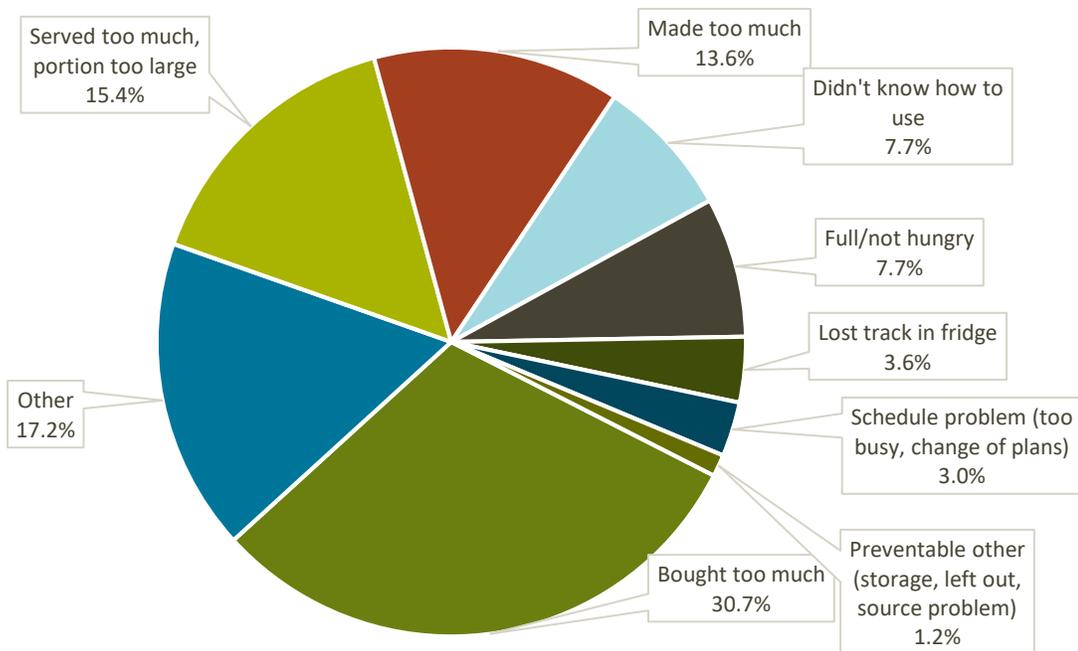


Figure 4: Root Loss Reasons, Food Thrown Out Away From Home



## Relationship to Composting

One research question this study aimed to address is whether there is a difference in generation of wasted food related to composting, either access to and use of curbside compost service or at home or community composting. Table 31 shows the number of participants who reported access to curbside compost service in the pre-diary survey, who made at least one diary entry for curbside compost, and/or made at least one diary entry for home or other compost.

**Table 31: Whether and How Household Currently Composts, Survey and Diary Data**

	Urban Households	Rural Households	Total Households
Has curbside compost service (reported in survey)	104	42	146
Has at least 1 kitchen diary entry headed for curbside compost	59	11	70
Has at least 1 kitchen diary entry headed for home compost	40	19	59

Fifty-seven households whose waste was sorted and reported in the survey that they did not have curbside compost service were compared to 134 households whose waste was sorted and reported in the survey they had curbside compost service. Fifty-eight households had compost sorted. There were three households that reported they did not have compost service but who had compost collected and sorted. These three households were included in the ‘composts’ sample. This could indicate a misunderstanding of the survey item, which asked “As part of your household’s garbage and recycling service, do you have a separate container for food and yard waste?” This may have been interpreted as having a separate bin within the home not as a bin set out for collection or may have simply been answered incorrectly. As seen in Table 32, **no significant differences were found in the total food or total edible food thrown away between the composting and not composting groups, on a household basis.** However, over 70% of survey respondents reported feeling less guilty about throwing food out that is composted (see, Table 46).

**Table 32: Total Comparison Per Household (Trash and Compost)**

	Does Not Compost			Composts								
	Trash			Compost			Trash			Trash & Compost		
	Food Per House hold	Edible Food Per House hold	% Edible	Food Per House hold	Edible Food Per House hold	% Edible	Food Per House hold	Edible Food Per House hold	% Edible	Food Per House hold	Edible Food Per House hold	% Edible
Mean	8.9	6.6	61.3%	5.9	2.3	33.7%	3.9	2.9	63.5%	6.5	3.9	55.2%
SD	11.4	10.0	29.3%	8.2	5.4	31.5%	4.6	3.8	34.7%	7.5	5.6	30.7%
N	57	57	57	58	58	58	134	134	134	134	134	134
T-Test Score	0.148	0.060	0.204									

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period.

As seen in Table 33, **no significant differences were found in the total food or total edible food thrown away between the composting and not composting groups, on a per capita basis.** Note, 43 participants who had their waste sorted did not complete the pre-diary survey, so their household size is unknown. These participants were assigned 2.86 members to their household, the average household size of the total 187 participants whose waste were sorted.

**Table 33: Total Comparison Per Capita (Trash and Compost)**

	Does Not Compost			Composts								
	Trash			Compost			Trash			Trash & Compost		
	Food Per Capita	Edible Food Per Capita	% Edible	Food Per Capita	Edible Food Per Capita	% Edible	Food Per Capita	Edible Food Per Capita	% Edible	Food Per Capita	Edible Food Per Capita	% Edible
Mean	3.7	2.7	61.4%	2.5	1.0	35.6%	1.4	1.1	63.5%	2.5	1.5	55.2%
SD	5.9	4.5	29.3%	3.2	2.0	31.4%	1.7	1.4	34.7%	2.8	2.0	30.7%
N	57	57	57	58	58	58	134	134	134	134	134	134
T-Test Score	0.147	0.057	0.197									

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds for a seven day period.

# Pre- and Post-Diary Surveys

For the presentation of findings from the pre- and post-diary surveys, the items have been grouped into the following topics:

- Procurement
- Planning
- Disposal
- Leftovers
- Food preparation, use and management

For many of the survey items, respondents were asked to speak on behalf of their entire household. At the beginning of the survey, they were told that household means “anyone living in your home that you usually buy or cook food with or for.” Respondents who lived alone were told to consider themselves the household.

Comparisons between urban and rural Oregon households were conducted for each of the items. For this survey, urban included households in Gresham, Portland, and Salem, and rural included households in Redmond and Woodburn.

## Survey Respondent Characteristics

Table 34 presents a summary of the demographic characteristics of the 216 respondents who completed the pre-diary survey and the 184 respondents who also completed the post-diary survey. The survey question about paid employment hours was only asked in the post-diary survey, so those data are not available for all of the pre-diary respondents. Although the counts decreased from pre- to post-diary, the distribution of respondent demographics in each survey were quite similar.

**Table 34: Respondent Demographics**

	Pre-diary Survey (N=216)		Post-survey Diary (N=184)	
	Count	Percent	Count	Percent
<b>Gender [in descending order]</b>				
Female	159	73.6%	136	73.9%
Male	52	24.1%	44	23.9%
Prefer not to answer	2	0.9%	2	1.1%
Other	1	0.5%	0	0.0%
Missing	2	0.9%	2	1.1%
<b>Age Group</b>				
18-34 Years Old	46	21.3%	35	19.0%
35-64 Years Old	123	56.9%	107	58.2%
65 Years of Age or Older	46	21.3%	41	22.3%
Missing	1	0.5%	1	0.5%

**Table 34: Respondent Demographics**

	Pre-diary Survey (N=216)		Post-survey Diary (N=184)	
	Count	Percent	Count	Percent
<b>Highest Level of Education</b>				
Elementary or some high school (no diploma or GED)	4	1.9%	4	2.2%
High school diploma or GED	20	9.3%	17	9.2%
Some college, but no degree	50	23.1%	41	22.3%
Associate's degree (2-year degree, AA, AS, etc.)	23	10.6%	16	8.7%
Bachelor's degree (4-year degree, BA, BS, etc.)	71	32.9%	62	33.7%
Master's degree or higher	44	20.4%	40	21.7%
Missing	4	1.9%	4	2.2%
<b>Total Household Income for 2016</b>				
	Count	Percent	Count	Percent
Under \$10,000	8	3.7%	6	3.3%
\$10,000 to \$24,999	22	10.2%	17	9.2%
\$25,000 to \$49,999	54	25.0%	47	25.5%
\$50,000 to \$74,999	47	21.8%	42	22.8%
\$75,000 to \$99,999	39	18.1%	30	16.3%
\$100,000 to \$149,999	27	12.5%	25	13.6%
\$150,000 to \$199,999	7	3.2%	6	3.3%
\$200,000 or More	2	0.9%	1	0.5%
Missing	10	4.6%	10	5.4%
<b>Race or Ethnicity</b> <i>[in descending order]</i> <i>[select all that apply; percentages sum to &gt;100%]</i>				
	Count	Percent	Count	Percent
White	196	90.7%	167	90.8%
Hispanic or Latino	18	8.3%	14	7.6%
American Indian or Alaska Native	10	4.6%	7	3.8%
Asian	7	3.2%	5	2.7%
Black or African American	5	2.3%	3	1.6%
Native Hawaiian or Other Pacific Islander	5	2.3%	4	2.2%
Other	2	0.9%	1	0.5%
Missing	2	0.9%	2	1.1%
<b>Hours of Paid Employment Each Week</b>				
	Count	Percent	Count	Percent
Less than 10 hours	--	--	11	6.0%
10 to 20 hours	--	--	7	3.8%
20 to 30 hours	--	--	11	6.0%
30 to 40 hours	--	--	45	24.5%
More than 40 hours	--	--	40	21.7%
Do not work in paid employment	--	--	68	37.0%
Missing	--	--	2	1.1%

**Table 34: Respondent Demographics**

	<b>Pre-diary Survey (N=216)</b>		<b>Post-survey Diary (N=184)</b>	
<b>Number of People Living in Household</b>	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
1 person	38	17.6%	32	17.4%
2 people	78	36.1%	67	36.4%
3 people	38	17.6%	34	18.5%
4 people	34	15.7%	31	16.8%
5 people	14	6.5%	11	6.0%
6 people	8	3.7%	5	2.7%
7 people	1	0.5%	0	0.0%
8 people	1	0.5%	1	0.5%
9 people or more	3	1.4%	2	1.1%
Missing	1	0.5%	1	0.5%
<b>Number of Other Household Members 0 to 5 Years</b>	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
None	149	69.0%	126	68.5%
1	29	13.4%	23	12.5%
2	13	6.0%	11	6.0%
3	4	1.9%	4	2.2%
Missing	21	9.7%	20	10.9%
<b>Number of Other Household Members 6 to 12 Years</b>	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
None	155	71.8%	131	71.2%
1	22	10.2%	21	11.4%
2	13	6.0%	10	5.4%
3	6	2.8%	3	1.6%
Missing	20	9.3%	19	10.3%
<b>Number of Other Household Members 13 to 17 Years</b>	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
None	173	80.1%	145	78.8%
1	16	7.4%	15	8.2%
2	5	2.3%	3	1.6%
Missing	22	10.2%	21	11.4%
<b>Number of Other Household Members 18 to 64 Years</b>	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
None	57	26.4%	46	25.0%
1	117	54.2%	102	55.4%
2	25	11.6%	21	11.4%
3	6	2.8%	5	2.7%

**Table 34: Respondent Demographics**

	Pre-diary Survey (N=216)		Post-survey Diary (N=184)	
5	1	0.5%	1	0.5%
6	1	0.5%	0	0.0%
Missing	9	4.2%	9	4.9%
<b>Number of Other Household Members 65 Years of Age or Older</b>				
	Count	Percent	Count	Percent
None	168	77.8%	142	77.2%
1	28	13.0%	24	13.0%
2	1	0.5%	0	0.0%
3	1	0.5%	1	0.5%
Missing	18	8.3%	17	9.2%
<b>Household Type [in descending order]</b>				
	Count	Percent	Count	Percent
Two or more adults without children	98	45.4%	84	45.7%
One or more adults with children	78	36.1%	66	35.9%
Adult living alone	38	17.6%	32	17.4%
Missing	2	0.9%	2	1.1%
<b>Geographic Area [in descending order]</b>				
	Count	Percent	Count	Percent
Urban	132	61.1%	110	59.8%
<i>Gresham</i>	37	17.1%	26	14.1%
<i>Portland</i>	49	22.7%	44	23.9%
<i>Salem</i>	46	21.3%	40	21.7%
Rural	84	38.9%	74	40.2%
<i>Redmond</i>	45	20.8%	42	22.8%
<i>Woodburn</i>	39	18.1%	32	17.4%

## Procurement

All of the items in this Procurement section were only asked in the pre-diary survey.

Respondents were asked to indicate whether or not they purchase or get food to eat at home across nine potential places. Respondents often reported shopping at multiple places; therefore, the percentages in Table 35 add up to more than 100%. The most common response was Grocery Stores (99.5%), followed by Superstores (60.2%), their Backyard Garden or Local Garden (52.3%), and Farmers Market (50.5%).

**Table 35: Pre-Diary: Places Households Purchase or Get Food to Eat at Home**

*[sorted in descending order of count]*

	Count	Percent
Grocery stores	215	99.5%
Superstores, like Costco	130	60.2%
Your backyard garden or local garden	113	52.3%
Farmers market	109	50.5%
Corner stores or mini-marts	34	15.7%
Online meal delivery (e.g., GrubHub, Blue Apron, restaurants)	23	10.6%
Other	23	10.6%
Online grocery delivery (e.g., Amazon.com, Safeway.com)	22	10.2%
Food pantries	16	7.4%
CSA (Community-supported agriculture)	11	5.1%

Q1: Below is a list of possible places where your household may purchase or get food to eat at home. Please select all that apply.  
N=216

Chi-square tests were conducted to determine if differences in purchasing food at each of those locations were statistically significant for urban and rural households. Table 36 shows that two of the purchasing locations were significantly different across urban and rural areas. Rural households were more likely to purchase food to eat at home from Superstores ( $X^2=7.251, p<.01$ ), but urban households were more likely to purchase food from Farmers Markets ( $X^2=11.961, p<.01$ ).

**Table 36: Pre-Diary: Shopping Locations across Urban and Rural Households**

Places Households Purchase or Get Food to Eat at Home	Geographic Area	
	Urban	Rural
Grocery stores	99.2%	100.0%
Superstores, like Costco**	53.0%	71.4%
Farmers markets**	59.8%	35.7%
Your backyard garden or local garden	53.0%	51.2%
Corner stores or mini-marts	16.7%	14.3%
CSA (community-supported agriculture)	6.8%	2.4%
Food pantries	6.1%	9.5%
Online meal delivery (e.g., GrubHub, Blue Apron, restaurants)	12.1%	8.3%
Online grocery delivery (e.g., Amazon.com, Safeway.com)	10.6%	9.5%

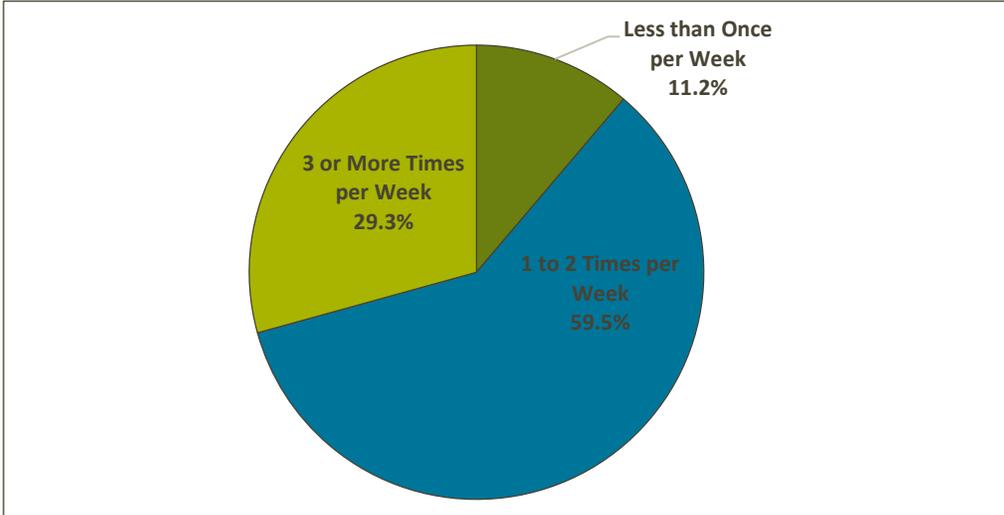
\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

Q1: Below is a list of possible places where your household may purchase or get food to eat at home. Please select all that apply.  
N=216

Respondents who reported purchasing food at a grocery store or farmers market were asked a follow-up question regarding the frequency with which they shop at each of those locations. As can be seen in Figure 5, over half of the respondents who reported shopping at grocery stores do so 1 to 2 Times per Week (59.5%), and over one-quarter shop there 3 or More Times per Week (29.3%). Figure 6 shows that the

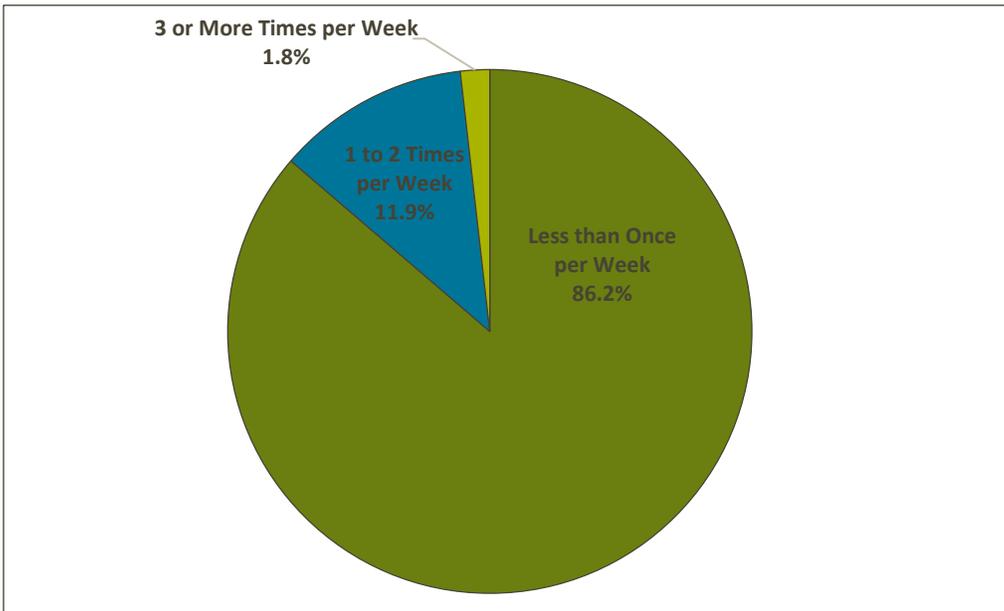
majority of respondents who reported shopping at farmers markets do so Less than Once per Week (86.2%).

Figure 5: Pre-Diary: Frequency of Shopping at Grocery Stores



Q1A: On average, how often does your household purchase or get food from a grocery store? Please consider your purchasing habits over the past year.  
n = 215

Figure 6: Pre-Diary: Frequency of Shopping at Farmers Markets

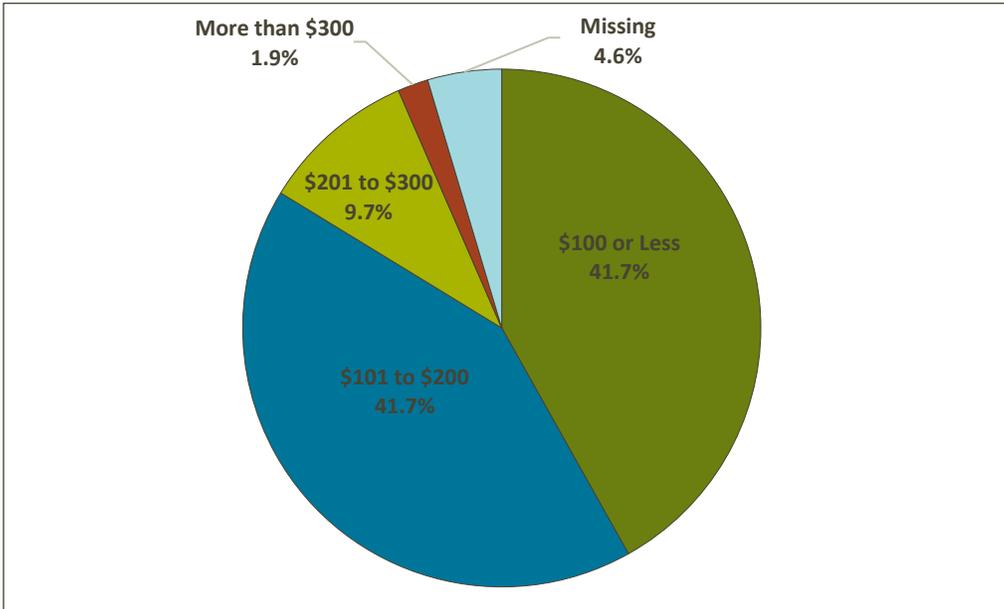


Q1B: On average, how often does your household purchase or get food from a farmers market? Please consider your purchasing habits over the past year.  
n = 109

The frequency of shopping at either grocery stores or farmers markets did not differ significantly across urban and rural households.

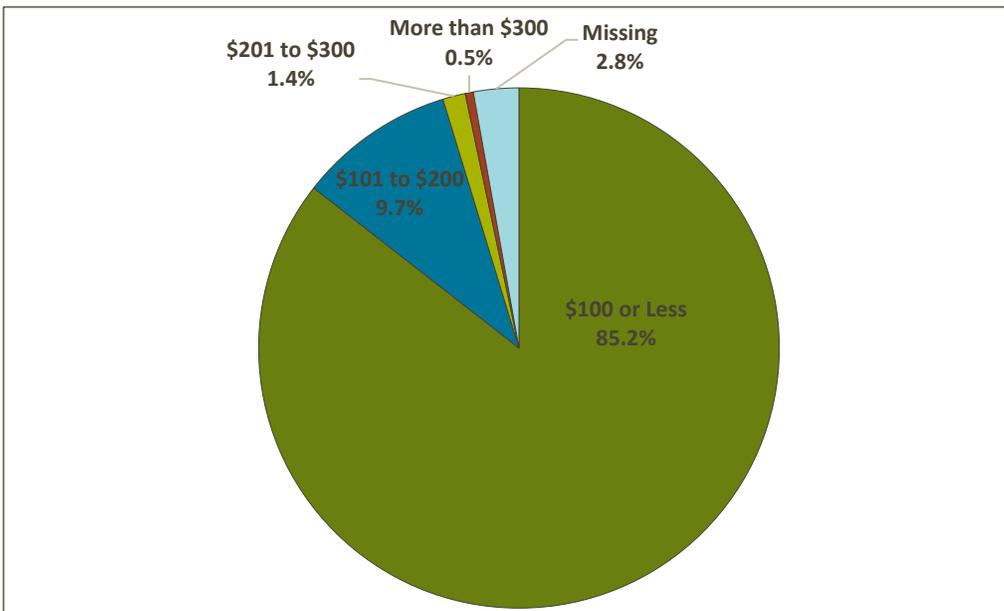
All respondents were asked how much money they spend on food and beverages eaten at home and eaten away from home each week. Figures 7 and 8 show that the distribution of spending differs across food and beverages at home compared to away from home. The majority of respondents spend either \$101 to \$200 (41.7%) or \$100 or Less (41.7%) on food and beverages eaten *at home* each week; whereas, the vast majority of households spend \$100 or Less (85.2%) each week on food and beverages eaten *away from home*.

Figure 7: Pre-Diary: Money Spent on Food & Beverages Eaten at Home Each Week



D1A: Approximately how much money does your household spend on food and beverages EATEN AT HOME each week?  
N=216

Figure 8: Pre-Diary: Money Spent on Food & Beverages Eaten Away from Home Each Week



D1B: Approximately how much money does your household spend on food and beverages EATEN AWAY FROM HOME each week?  
N=216

Chi-square tests were conducted to determine if differences in money spent on purchasing food and beverages each week were statistically significant for urban and rural households. Table 37 shows that urban households were more likely to spend \$101 to \$200 each week on food and beverages eaten at home and rural households are slightly more likely to spend \$201 to \$300 ( $X^2=11.773, p<.01$ ). Table 37 also shows that rural households are more likely to spend \$100 or Less each week on food and beverages eaten away from home and urban households are slightly more likely to spend \$101 to \$200 ( $X^2=8.045, p<.05$ ). It is important to note that some of the respondent counts are quite small, so these findings should be interpreted cautiously (see sample sizes listed for each column).

**Table 37: Pre-Diary: Money Spent on Food Each Week across Urban and Rural Households**

<b>Money Spent Each Week on Food Eaten at Home</b>				
<b>Geographic Area**</b>	\$100 or Less (n=90)	\$101-\$200 (n=90)	\$201-\$300 (n=21)	More than \$300 (n=4)
Urban (n=127)	41.7%	51.2%	6.3%	0.8%
Rural (n=78)	47.4%	32.1%	16.7%	3.8%

<b>Money Spent Each Week on Food Eaten away from Home</b>				
<b>Geographic Area*</b>	\$100 or Less (n=184)	\$101-\$200 (n=21)	\$201-\$300 (n=3)	More than \$300 (n=1)
Urban (n=129)	85.3%	14.0%	0.8%	0.0%
Rural (n=80)	92.5%	3.8%	2.5%	1.3%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

D1A: Approximately how much money does your household spend on food and beverages EATEN AT HOME each week?  
n=205

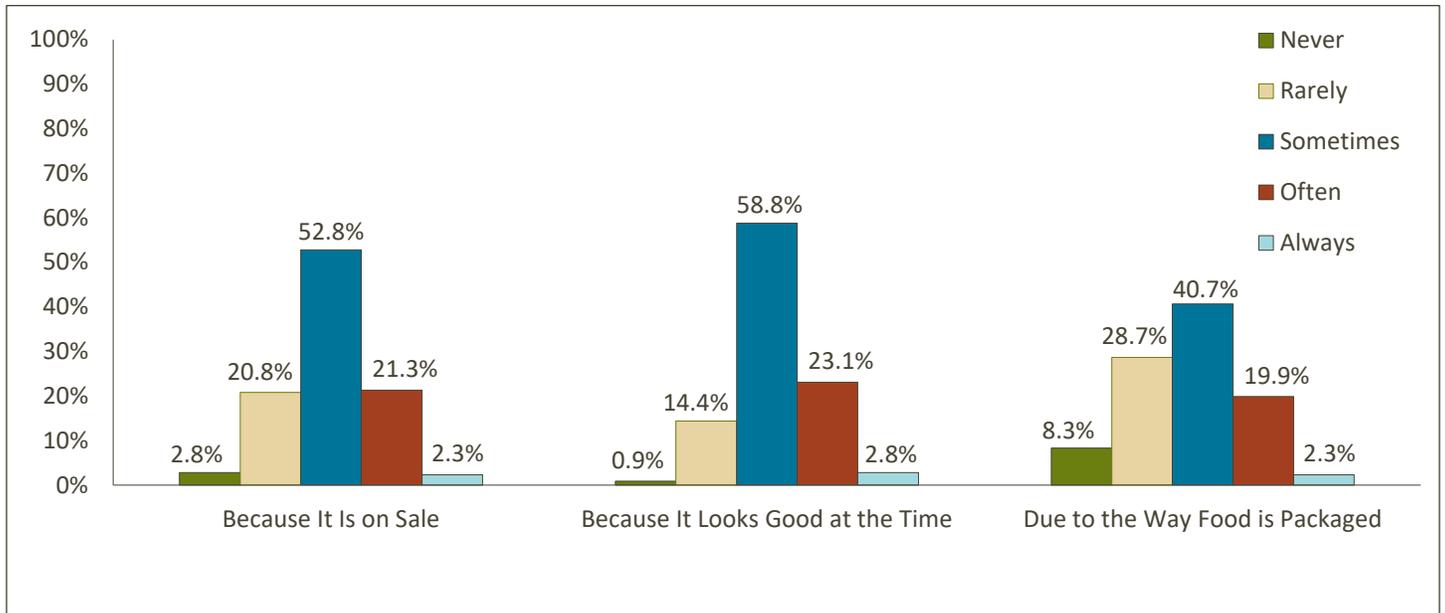
D1B: Approximately how much money does your household spend on food and beverages EATEN AWAY FROM HOME each week?  
n=209

All respondents were asked to rate how often their household does three things related to shopping:

- Buy more of a product than you were planning to because it is on sale.
- Buy something unplanned because it looks good at the time.
- Buy food in larger quantities than desired, due to the way food is packaged.

Each behavior was rated on a 5-point scale Never to Always. As can be seen in Figure 9, the most common response across all three items was Sometimes (40.7% to 58.8%). Looking at the proportion of respondents who reported Often or Always for each item, only 25.9% of respondents do so Because it Looks Good at the Time. 23.6% of respondents do so Because it is On Sale, and 22.2% do so Due to the Way Food is Packaged.

Figure 9: Pre-Diary: Frequency Ratings of Shopping Behaviors



When shopping for food, how often does your household do the following:

Q4A: Buy more of a product than you were planning to because it is on sale.

Q4B: Buy something unplanned because it looks good at the time.

Q4C: Buy food in larger quantities than desired due to the way food is packaged.

N=216

None of these items showed statistically significant differences across urban and rural households.

Chi-square tests were conducted to see if these shopping behaviors differed across households based on the amount they spend each week on food and beverages both at home and away from home. The only significant differences occurred for Buying Food in Larger Quantities Due to Packaging. Table 38 shows that, in general, respondents who spend less on food and beverage eaten at home are less likely to buy food in larger quantities due to the way it is packaged ( $X^2=27.258, p<.01$ ). The pattern is a little less consistent, but it generally follows the same trend ( $X^2=21.182, p<.05$ ) for respondents who spend less on food eaten away from home. It is important to note that some of the respondent counts are quite small, so these findings should be interpreted cautiously (see sample sizes listed for each column and row).

**Table 38: Pre-Diary: Shopping Behaviors by Money Spent on Food and Beverages Eaten at Home Each Week**

Money Spent Each Week on Food Eaten AT HOME**	Buy Food in Larger Quantities Due to Packaging				
	Never (n=18)	Rarely (n=58)	Sometimes (n=82)	Often (n=42)	Always (n=5)
\$100 or Less (n=90)	15.6%	32.2%	32.2%	16.7%	3.3%
\$101-\$200 (n=90)	3.3%	22.2%	52.2%	21.1%	1.1%
\$201-\$300 (n=21)	4.8%	42.9%	23.8%	23.8%	4.8%
More than \$300 (n=4)	0.0%	0.0%	25.0%	75.0%	0.0%

Money Spent Each Week on Food Eaten AWAY FROM HOME*	Buy Food in Larger Quantities Due to Packaging				
	Never (n=18)	Rarely (n=59)	Sometimes (n=85)	Often (n=42)	Always (n=5)
\$100 or Less (n=184)	8.7%	29.3%	40.8%	19.0%	2.2%
\$101-\$200 (n=21)	0.0%	23.8%	47.6%	23.8%	4.8%
\$201-\$300 (n=3)	66.7%	0.0%	0.0%	33.3%	0.0%
More than \$300 (n=1)	0.0%	0.0%	0.0%	100.0%	0.0%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

When shopping for food, how often does your household do the following:

Q4C: Buy food in larger quantities than desired due to the way food is packaged.

D1A: Approximately how much money does your household spend on food and beverages EATEN AT HOME each week?

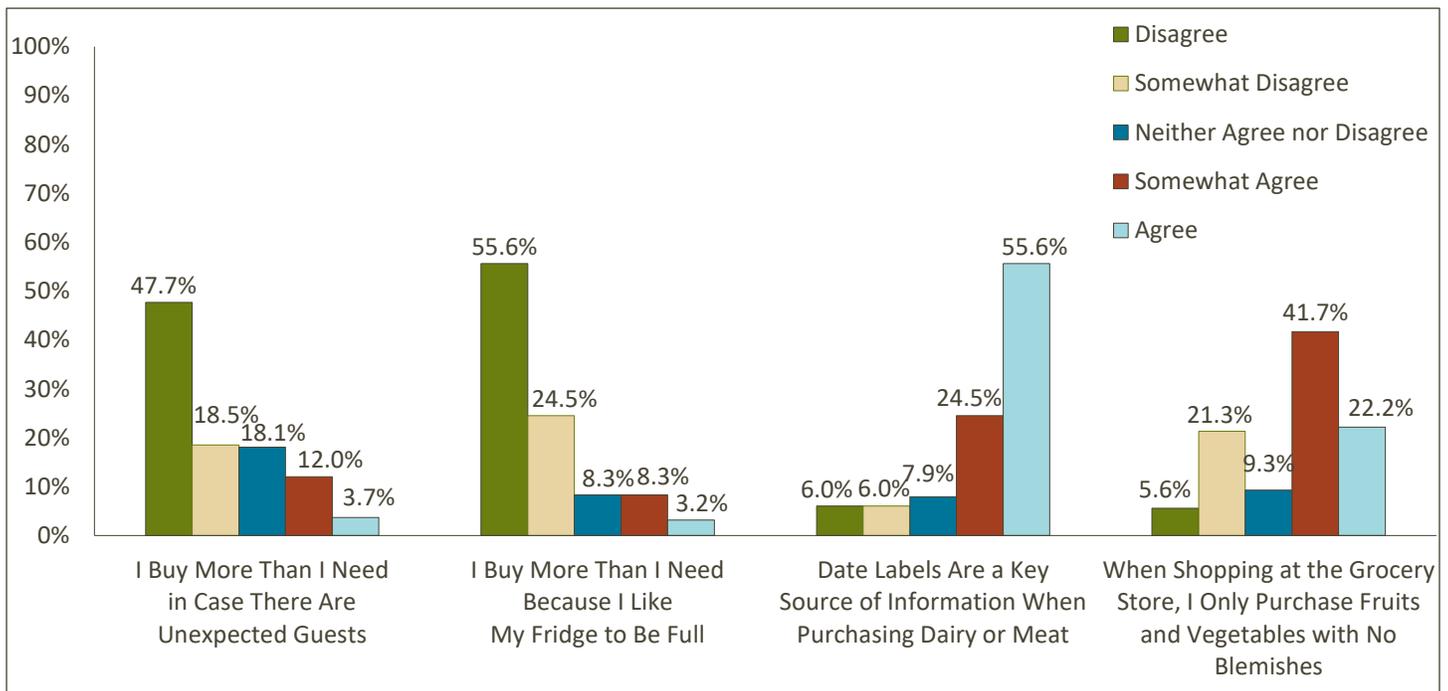
n=205

D1B: Approximately how much money does your household spend on food and beverages EATEN AWAY FROM HOME each week?

n=209

Respondents were asked to rate how strongly they agreed or disagreed with four statements about purchasing food. Each statement was rated on a 5-point scale from Disagree to Agree, the distributions of which are presented in Figure 10. Only 15.7% of households are Buying More Than They Need in Case There Are Unexpected Guests (3.7% Agree or 12.0% Somewhat Agree) and 11.5% are Buying More Than They Need Because They Like Their Fridge to Be Full (3.2% Agree or 8.3% Somewhat Agree). Alternatively, the majority of households reported using Date Labels as a Key Source of Information When Purchasing Dairy or Meat (80.1% Agree or Somewhat Agree) and Only Purchase Fruits and Vegetables with No Blemishes (63.9% Agree or Somewhat Agree).

Figure 10: Pre-Diary: Ratings of Food Purchasing Behaviors



How strongly do you agree or disagree with the following statements?  
 Q15I: I buy more than I need in case there are unexpected guests.  
 Q15J: I buy more than I need because I like my fridge to be full.  
 Q15K: Date labels are a key source of information I use when purchasing dairy and meat.  
 N15A: When shopping at the grocery store, I only purchase fruits and vegetables with no blemishes.  
 N=216

Chi-square tests revealed that only one purchasing behavior was significantly different across urban and rural areas (see, Table 39), with rural households more likely to buy more than what they need in case of unexpected guests ( $X^2=10.121, p<.05$ ).

**Table 39: Pre-Diary: Ratings for Food Purchasing Behavior across Urban and Rural Households**

**I buy more than I need in case there are unexpected guests.**

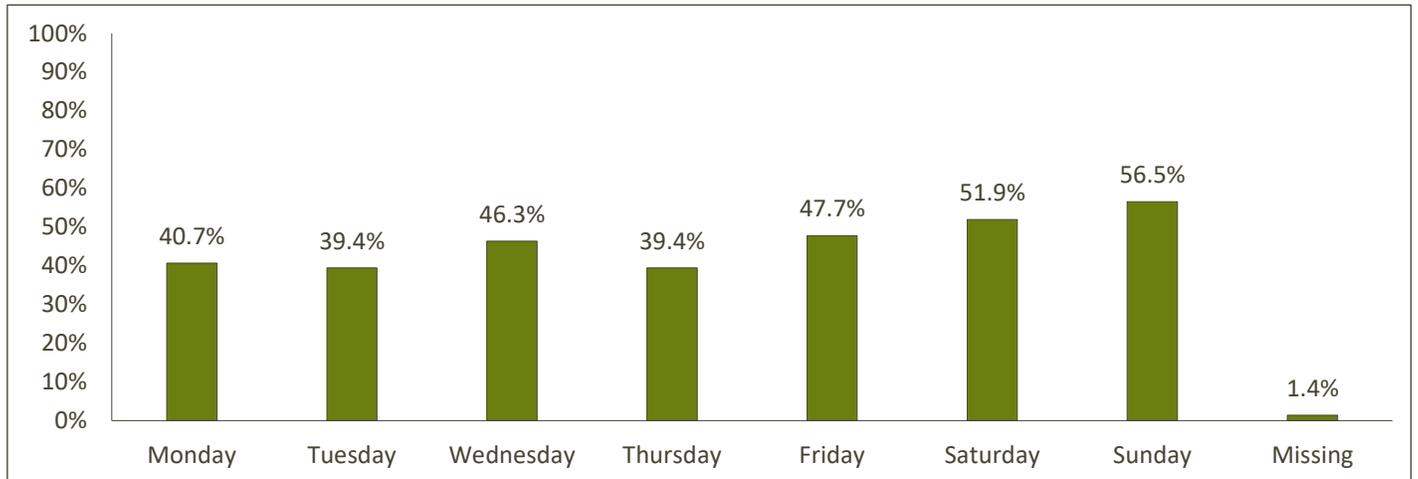
Geographic Area*	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
Urban	51.5%	22.0%	15.9%	7.6%	3.0%
Rural	41.7%	13.1%	21.4%	19.0%	4.8%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

How strongly do you agree or disagree with the following statements?  
 Q15I: I buy more than I need in case there are unexpected guests.  
 N=216

Respondents were asked to indicate which days of the week their household usually shops for food. Each day that applied could be selected, so the percentages in Figure 11 add up to more than 100%. Interestingly, there is not a wide variation across the days of the week, ranging from a low of 39.4% shopping on Tuesdays and Thursdays to the two highest shopping days being on the weekend, with 51.9% on Saturdays and 56.5% shopping on Sundays. The frequency of shopping days did not differ significantly across urban and rural households.

Figure 11: Pre-Diary: Days of the Week Households Usually Shop for Food

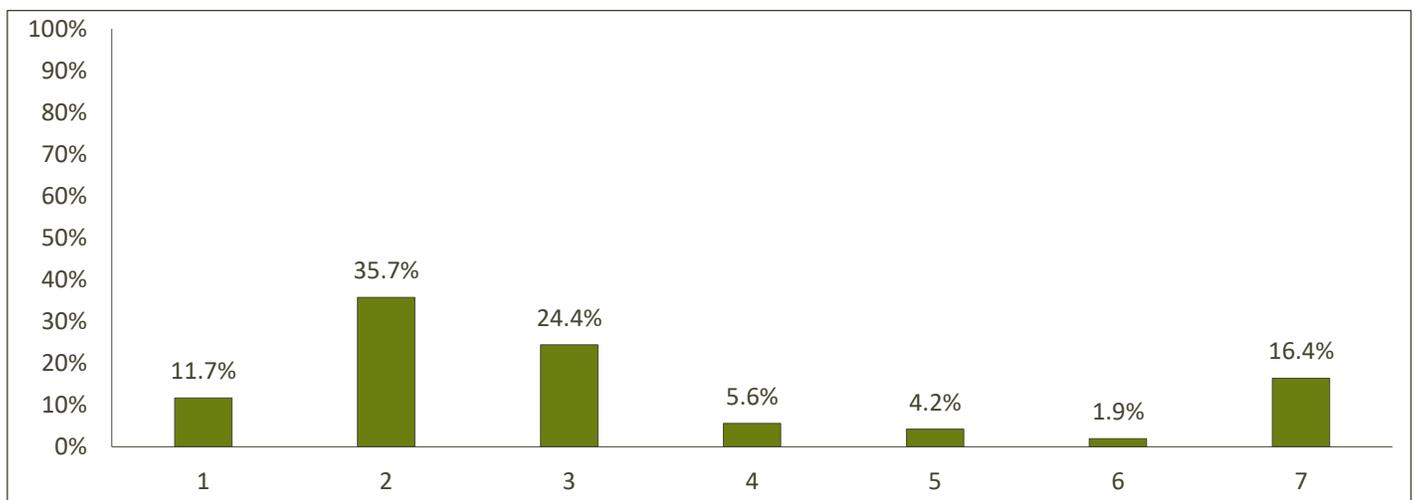


Q5: On which days of the week does your household usually shop for food?

N=216

Another way to look at these data is to identify the number of days each week households usually shop for food. Excluding people who did not know which days of the week they shopped, Figure 8 shows that more households shop two (35.7%) or three (24.4%) days per week, with nearly one-sixth of households (16.4%) shopping all seven days of the week. On average, households shop 3.3 days per week.

Figure 12: Pre-Diary: Estimated Number of Days Each Week Households Usually Shop for Food



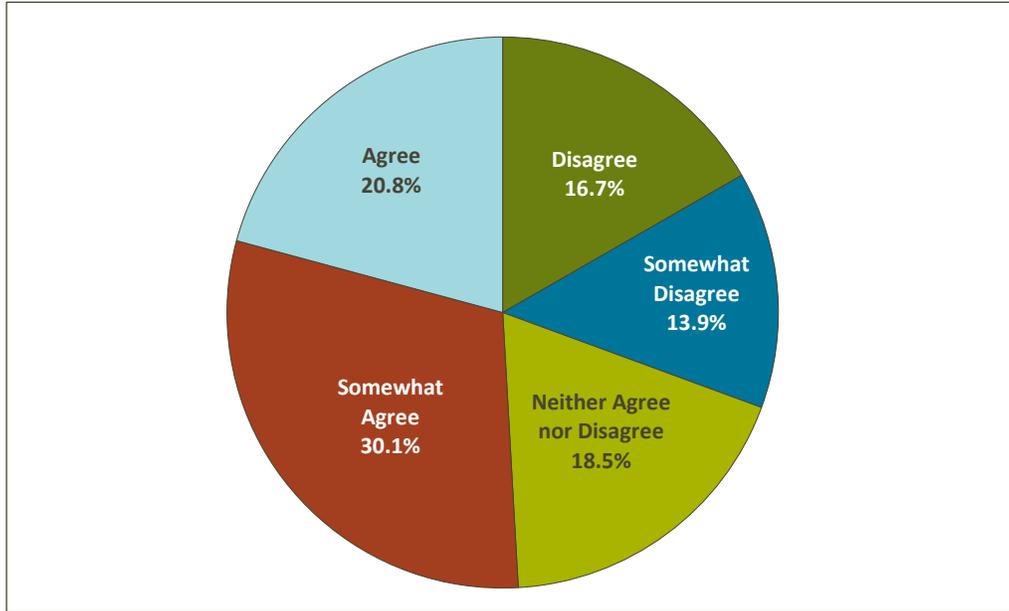
Q5: On which days of the week does your household usually shop for food? Recalculated into **number of days** each week households usually shop, assuming that shopping usually occurs on each of the days mentioned. This may overestimate the number of days that people actually shop.

n=213

The number of days people usually shop each week did not differ significantly across urban and rural households.

Respondents were asked to rate how strongly they agreed or disagreed with a statement about grocery shopping being a hassle. Figure 13 presents the distribution of ratings, suggesting that approximately half of the respondents find grocery shopping to be a hassle (20.8% Agree, 30.1% Somewhat Agree) and slightly less than a third do not find grocery shopping to be a hassle (16.7% Disagree, 13.9% Somewhat Disagree). The comparison of urban and rural households did not reveal a significant difference.

Figure 13: Pre-Diary: Grocery Shopping Is a Hassle



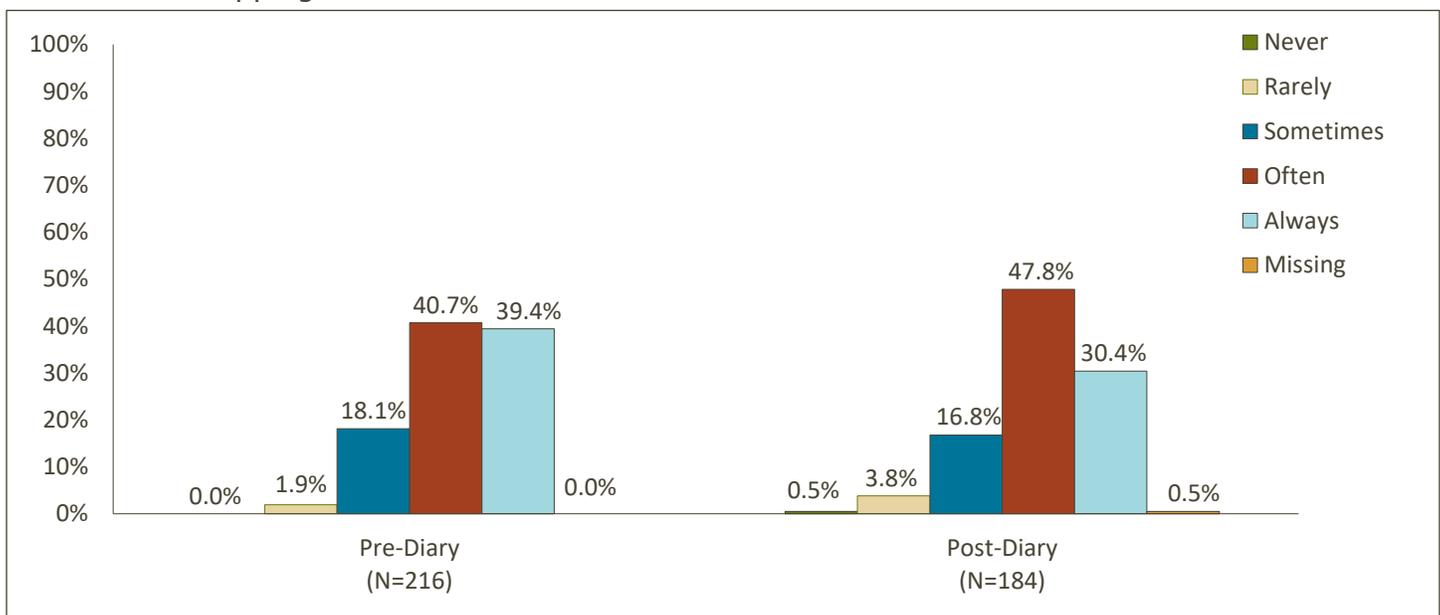
How strongly do you agree or disagree with the following statements?  
Q15G: I find grocery shopping to be a hassle. n=216

## Planning

All of the items in this section were asked in both the pre- and post-diary surveys. Both frequency distributions will be presented. Chi square tests were performed to determine if there was a significant difference between pre- and post-diary responses. If the difference is significant, the  $X^2$  statistic was included in this report; however, for completeness, the notation “ns” will be included to indicate if the difference was not significant.

To understand the degree to which households plan before shopping for food, respondents were asked how often they check to see what they already have. Figure 14 shows that the majority of households pre-diary either Always or Often (80.1%) check their supply of food before they go shopping. A similar proportion of households (78.4%) reported doing so post-diary, but a slightly larger proportion reported that they do it Often (47.8%) than Always (30.4%) (ns).

Figure 14: Pre- and Post-Diary: Frequency of Checking to See What Food Already Have Before Shopping



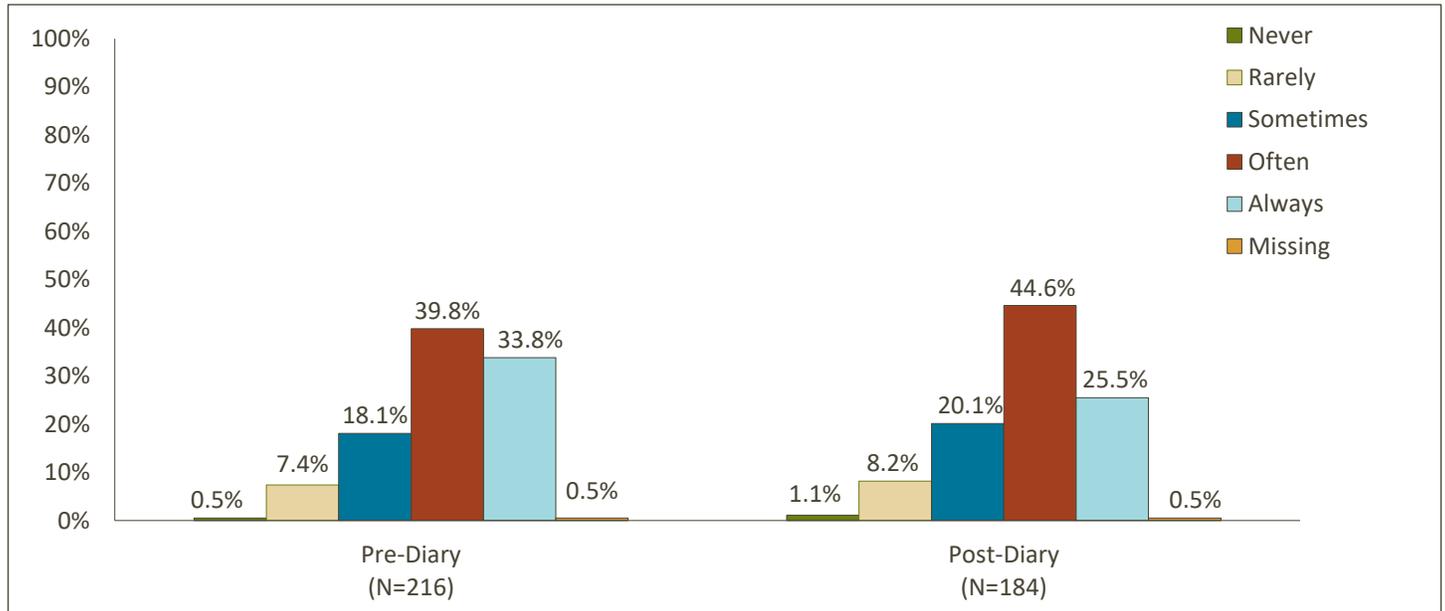
Q2: Before shopping for food, how often does your household check to see what you already have?

This shopping behavior did not differ significantly across urban and rural households.

The respondents who reported Rarely or Sometimes checking on the food they have before going shopping were asked if they would like to do that more often. The vast majority of those 43 respondents (pre-diary) and 39 respondents (post-diary) said they *would like* to check on the food they have before going shopping more often (81.4% and 87.2%, respectively; ns). This did not differ significantly across urban and rural households.

Respondents were also asked if they estimate how much they need to buy of each item, and similar results were found. Figure 15 shows that the majority of households either Always or Often estimate item quantity before shopping both pre-diary (73.6%) and post-diary (70.1%). Although the overall proportions were similar, slightly more households reported that they did this Always pre-diary relative to post-diary (33.8% and 25.5%, respectively; ns). This did not differ significantly across urban and rural households.

Figure 15: Pre- and Post-Diary: Frequency of Estimating How Much of Each Item Need to Buy Before Shopping

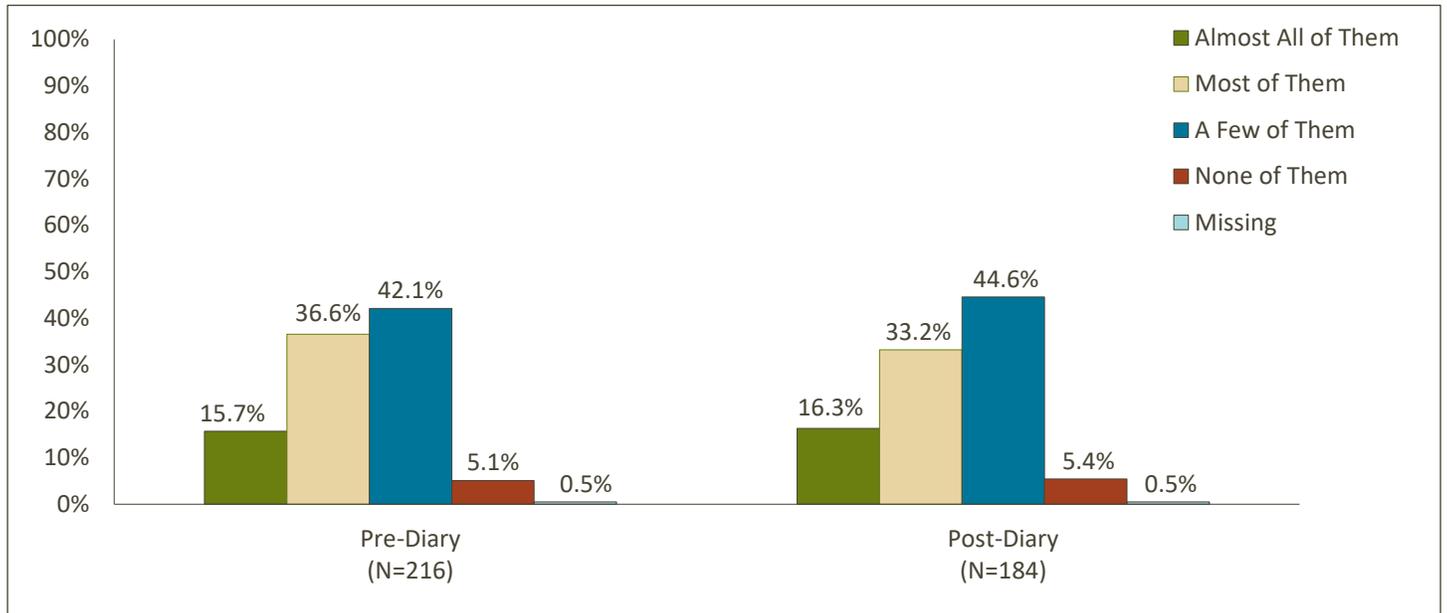


Q3: Before shopping for food, how often does our household estimate how much of each item you need to buy?

The respondents who reported Never, Rarely or Sometimes estimating how much they need to buy before going shopping were asked if they would like to do that more often. Of those 56 respondents pre-diary, nearly two-thirds (66.1%) reported that they *would want* to estimate how much they need to buy before going shopping more often. **Post-diary, a significantly larger proportion (81.5%) reported that they would like to do that more often** ( $X^2=4.284, p<.05$ ). Urban and rural households did not differ significantly on this rating.

Respondents were asked how many of their main meals they plan ahead of time on a weekly basis. Figure 16 shows that the responses were quite similar both pre- and post-diary (ns), with the majority of households either planning A Few of Them (42.1% pre-diary, 44.6% post-diary) or Most of Them (36.6% pre-diary, 33.2% post-diary) ahead of time each week. This did not differ significantly across urban and rural households.

Figure 16: Pre- and Post-Diary: Proportion of Main Meals Planned Ahead of Time Each Week



Q6: On a weekly basis, how many of your main meals do you plan ahead of time? Main meals would be breakfast, lunch, or dinner.

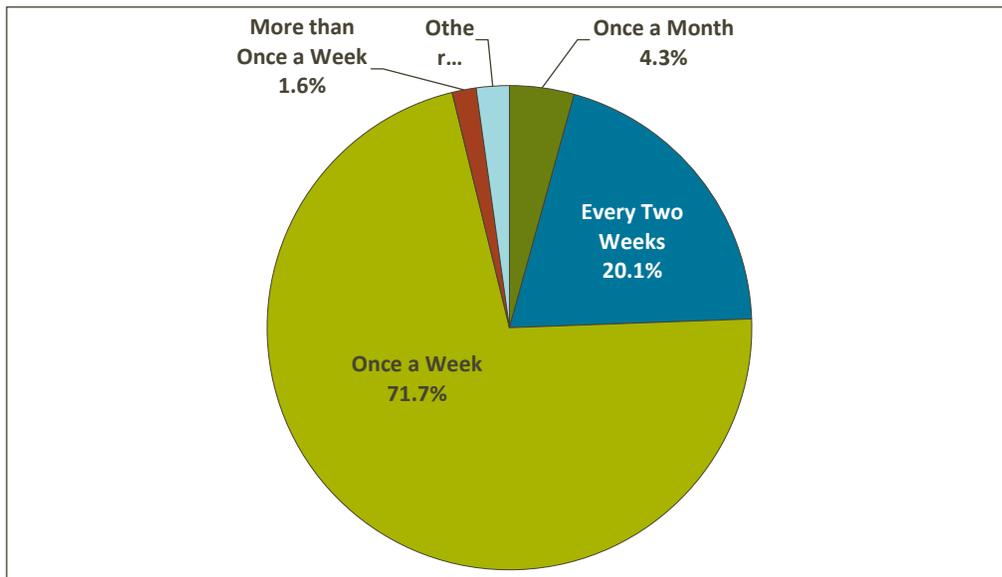
Any respondents who did not report planning almost all of their main meals ahead of time were asked if they would like to do that more often. Of those 181 pre-diary respondents, slightly less than three-quarters (70.7%) reported that they *would want* to plan their main meals head of time more often. The proportion was quite similar (74.5%, ns) for the 114 post-diary respondents. Urban and rural households did not differ significantly.

# Disposal

Respondents were asked a series of questions that address household food disposal. The majority (67.6%) of respondents reported that their household has a separate container for food and yard waste as part of their garbage and recycling service. Urban households (78.8%) were significantly more likely to have a separate food and yard waste container for curbside pickup than rural households (50.0%;  $X^2=19.421$ ,  $p<.001$ ). This is expected because in this sample, curbside composting was available to two of the three urban sites and available in very limited circumstances in the two rural sites.

In the post-diary survey, respondents were asked how often their garbage (landfill-bound trash, no separated recyclables) is picked up. Figure 17 shows that the vast majority of households (71.7%) have their garbage picked up Once a Week.

Figure 17: Post-Diary: Frequency of Garbage Pick-up



P8: How often is your garbage (landfill-bound trash, not separated recyclables) picked up?  
N=184

A chi-square test was conducted to determine whether garbage pick-up differed across urban and rural households. Table 40 shows that urban households are more likely to have their garbage picked up Every Two Weeks and rural households are more likely to have their garbage picked up Once a Week ( $X^2=28.511$ ,  $p<.001$ ). This is not surprising, since the urban sample included households in Portland, where every-other-week collection of garbage is the norm.

**Table 40: Post-Diary: Frequency of Garbage Pick-up by Geographic Area**

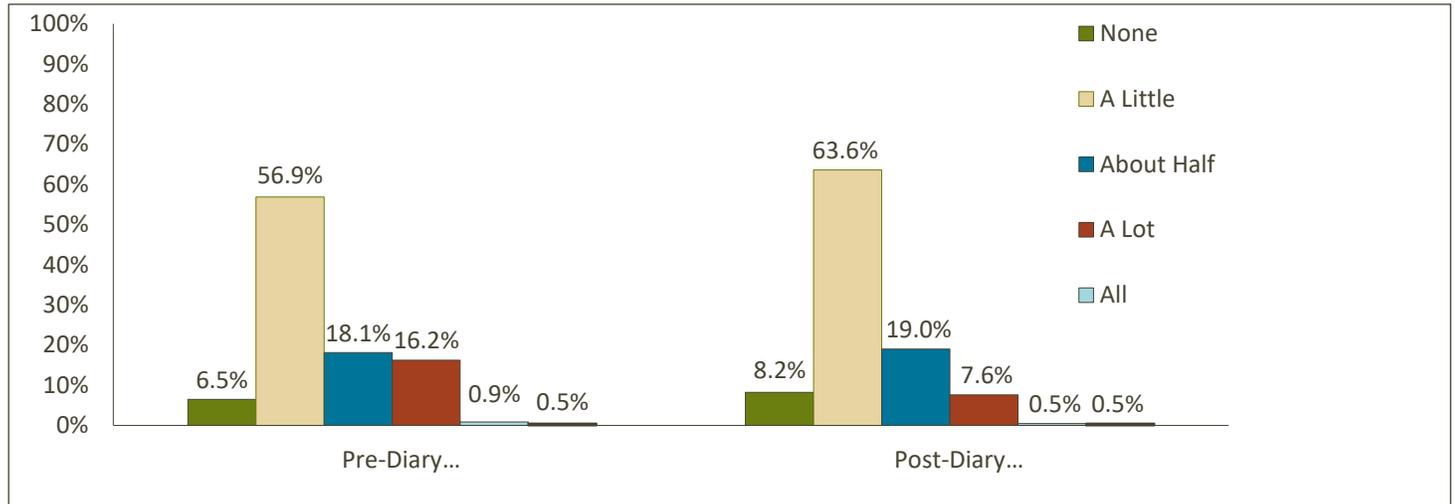
Geographic Area***	Frequency of Garbage Pick-up				
	Once a Month	Every Two Weeks	Once a Week	More than Once a Week	Other
Urban	5.5%	31.8%	60.9%	0.0%	1.8%
Rural	2.7%	2.7%	87.8%	4.1%	2.7%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

P8: How often is your garbage (landfill-bound trash, not separated recyclables) picked up?  
N=184

Considering how much food their household throws away or composts in the average week, respondents were asked how much of that they think could be avoided. Figure 18 shows that pre-diary, a little over half think they could avoid A Little of the food their household throws out or composts (56.9%), and another 18.1% think they could avoid About Half. Only 16.2% reported they could avoid A Lot of the food they throw out or compost. Proportions were somewhat comparable post-diary, but a slightly larger proportion thought they could avoid A Little (63.6%) and a smaller proportion thought they could avoid A Lot (7.6%) (ns). This did not differ significantly across urban and rural households.

Figure 18: Pre- and Post-Diary: Proportion of Food Thrown Away or Composted that Could Be Avoided



Q9: Considering the food your household throws away or composts in the average week, how much of that do you think could be avoided?

Chi-square tests were conducted to determine whether the avoidable amount of wasted food differed across household type. As seen in Table 41, before completing the kitchen diary, adults living alone were more likely to report that they could avoid None or A Little food thrown away or composted, while households with children were more likely to state that they could avoid About Half or A Lot ( $X^2=20.436$ ,  $p<.01$ ). Similar trends occurred post-diary, with the exception that households with more than one adult without children were also more likely to report that they could avoid About Half or A Lot of their wasted food ( $X^2=19.006$ ,  $p<.05$ ).

**Table 41: Pre- and Post-Diary: Amount of Wasted Food That Could Be Avoided by Household Type**

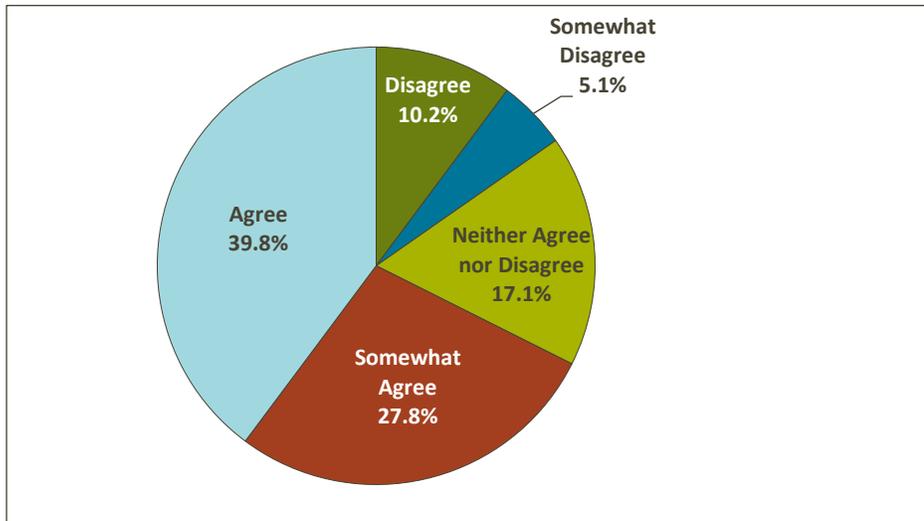
Household Type**	Pre-Diary (n=214)				
	None	A Little	About Half	A Lot	All
Adult living alone	10.8%	73.0%	13.5%	2.7%	0.0%
2+ Adults WITHOUT Children	8.2%	61.9%	13.4%	15.5%	1.0%
1+ Adults WITH Children	2.6%	44.2%	27.3%	24.7%	1.3%
Household Type*	Post-Diary (n=180)				
	None	A Little	About Half	A Lot	All
Adult living alone	6.5%	87.1%	6.5%	0.0%	0.0%
2+ Adults WITHOUT Children	14.5%	55.4%	21.7%	8.4%	0.0%
1+ Adults WITH Children	1.5%	65.2%	21.2%	10.6%	1.5%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

Q9: Considering the food your household throws away or composts in the average week, how much of that do you think could be avoided?

Two items asked respondents to rate how strongly they agree or disagree with statements related to food disposal. Figure 19 shows the distribution of ratings regarding feeling less guilty about throwing out food that has been in the refrigerator for a long time. This item was only included in the pre-diary survey. Nearly two-thirds of the respondents (67.6%) Agreed or Somewhat Agreed that they felt less guilty. Urban and rural respondents did not differ significantly.

Figure 19: Pre-Diary: Feel Less Guilty about Throwing Away Food Left in the Fridge a Long Time



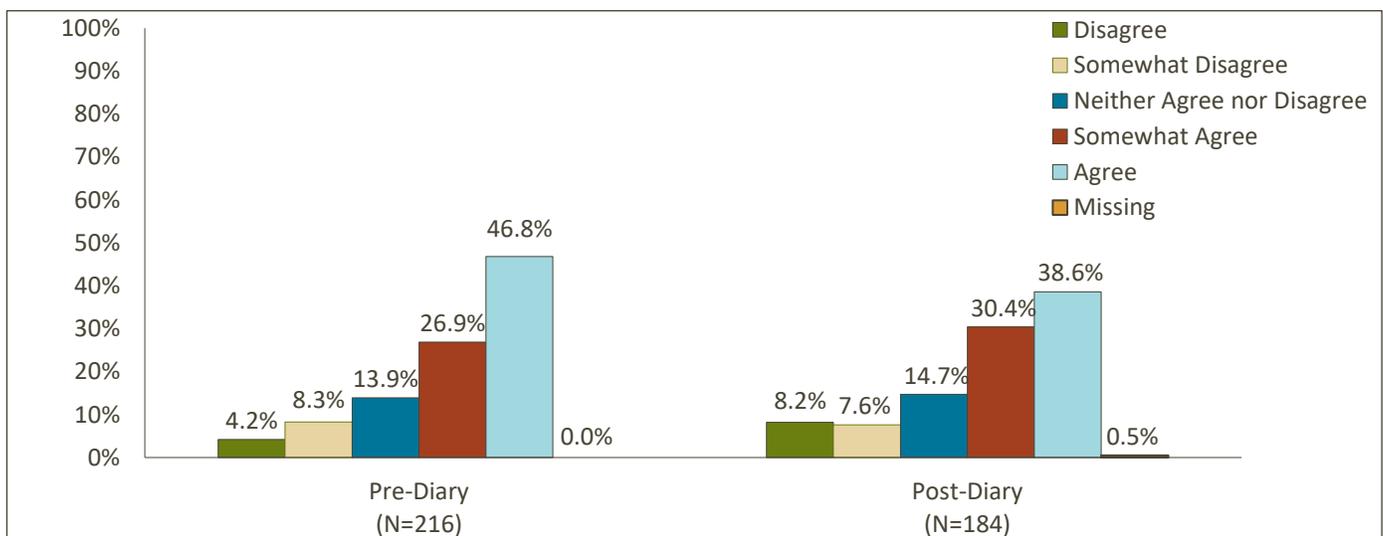
How strongly do you agree or disagree with the following statements?

Q15A: I feel less guilty about throwing out food that has been in the refrigerator for a long time, compared to food that has been in the refrigerator for a short time.

N=216

Figure 20 shows the distribution of ratings related to believing that their household should reduce the amount of food they throw away asked both pre- and post-diary. Nearly three-quarters of respondents (73.7%) selected Agree or Somewhat Agree that their household should reduce the amount of food they throw away. Although the proportions were somewhat comparable post-diary, a slightly smaller proportion of respondents Agreed or Somewhat Agreed (69.0%) that their household should reduce wasted food (ns). There was not a significant difference between urban and rural households on this rating.

Figure 20: Pre- and Post-Diary: Household Should Reduce Amount of Food Thrown Away



How strongly do you agree or disagree with the following statements?

Q15B: I believe my household should reduce the amount of food we throw away.

The characteristics of the 158 respondents who reported that they either Agree or Somewhat Agree that their household should reduce the amount of food they throw away are presented in Table 42. The percentages represent the proportion of each demographic subgroup who reported that their households should reduce the amount of food they throw away (e.g., 75.4% of females and 69.2% of males reported food thrown away should be reduced). The percentages of each demographic for the full sample of 216 respondents are included for comparison. Those percentages do not add up to 100% because the respondents who did not provide a response to those demographic items are not included in the table.

**Table 42: Pre-Diary: Respondent Demographics for Households That Should Reduce the Amount of Food They Throw Away**

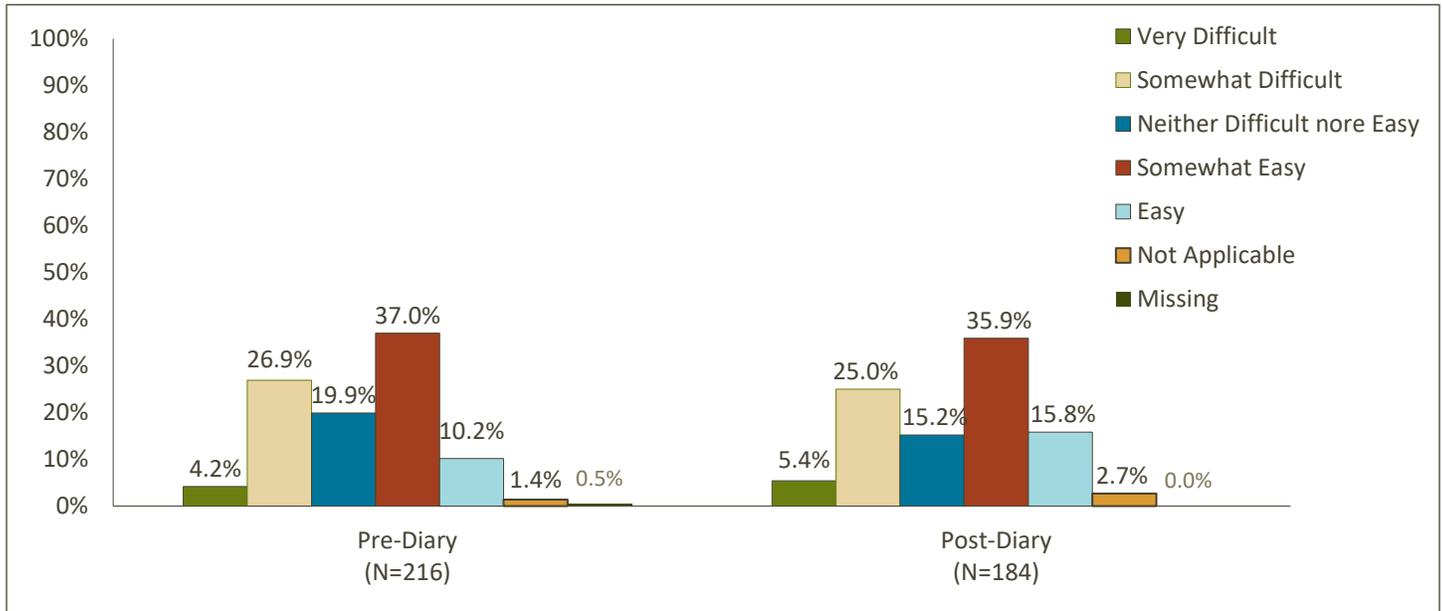
	Household Should Reduce Food Thrown Away (n=158)	Full Sample (n=216)
<b>Respondent Gender [in descending order]</b>		
Female	75.4%	73.6%
Male	69.2%	24.1%
Other	100.0%	0.5%
Prefer not to answer	50.0%	0.9%
<b>Age Group</b>		
18-34 Years Old	82.6%	21.3%
35-64 Years Old	75.6%	56.9%
65 Years of Age or Older	58.7%	21.3%
<b>Total Household Income for 2016</b>		
Under \$10,000	75.0%	3.7%
\$10,000 to \$24,999	72.8%	10.2%
\$25,000 to \$49,999	74.0%	25.0%
\$50,000 to \$74,999	70.2%	21.8%
\$75,000 to \$99,999	79.5%	18.1%
\$100,000 to \$149,999	81.4%	12.5%
\$150,000 to \$199,999	71.4%	3.2%
\$200,000 or More	50.0%	0.9%
<b>Household Type</b>		
Two or more adults without children	68.4%	45.4%
One or more adults with children	88.5%	36.1%
Adult living alone	55.3%	17.6%
<b>Money Spent on Food Eaten at Home Each Week</b>		
\$100 or Less	74.4%	41.7%
\$101-\$200	73.4%	41.7%
\$201-\$300	71.4%	9.7%
More than \$300	75.0%	1.9%

How strongly do you agree or disagree with the following statements?

Q15B: I believe my household should reduce the amount of food we throw away. [Agree or Somewhat Agree]

Respondents were asked to rate how easy or difficult it would be for them to reduce the amount of food that goes to waste in their household. Figure 21 shows that a slightly larger proportion of respondents believe it would be Very Easy or Somewhat Easy (47.2% pre-diary, 51.7% post-diary) to reduce wasted food than believe it would be Very Difficult or Somewhat Difficult (31.1% pre-diary, 30.4% post-diary) (ns). Significant differences on this rating were not found across urban and rural households, or across household type.

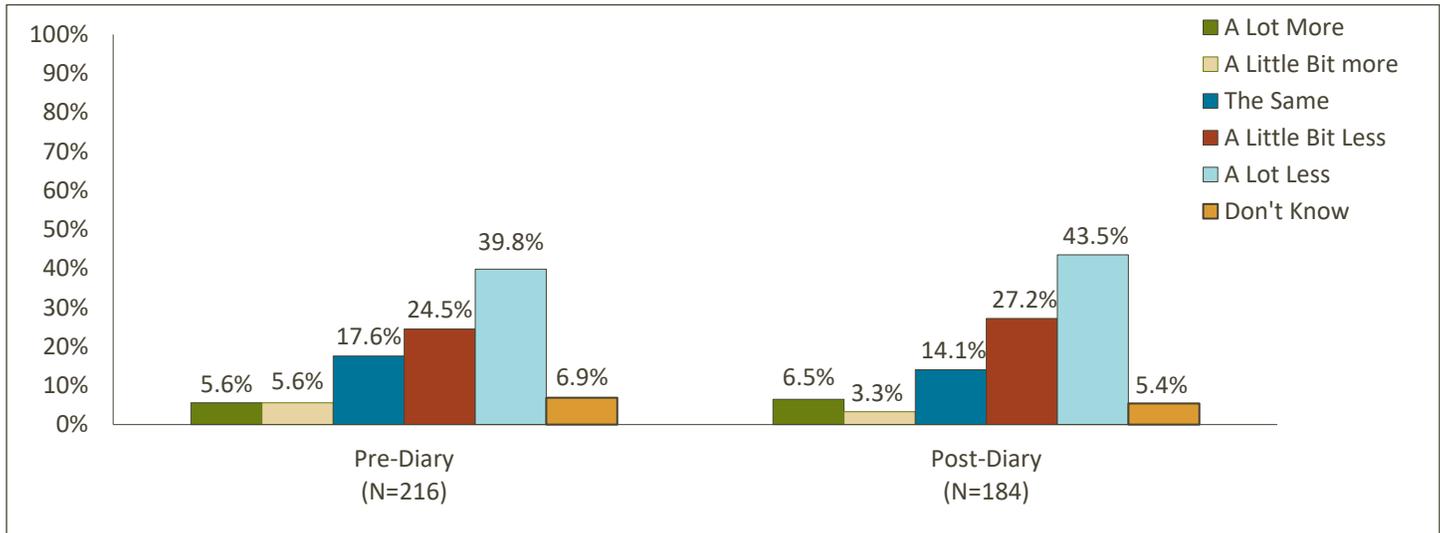
Figure 21: Pre- and Post-Diary: Ease of Reducing the Amount of Food That Goes to Waste



Q14: How easy or difficult do you think it would be for you, personally, to reduce the amount of food that goes to waste in your household?

Respondents were also asked to estimate how much food they throw away or compost relative to the average American. As can be seen in Figure 22, the majority of respondents pre-diary believed they throw out or compost A Lot Less (39.8%) or A Little Bit Less (24.5%) than the average American. Although the difference was not statistically significant, a slightly larger proportion of households post-diary believed they throw out or compost A Lot Less (43.5%) or A Little Bit Less (27.2%). These ratings did not differ significantly across urban and rural households.

Figure 22: Pre- and Post-Diary: Food Thrown Away or Composted Relative to the Average American



Q13: Thinking of the average American, do you think the amount of food you throw out or compost is a lot more, a little bit more, the same, a little bit less, or a lot less?

Chi-square tests were conducted to determine whether the amount of food believed to be thrown out or composted relative to the average American differed across household type. Table 43 shows that pre-diary, adults living alone or two or more adults living without children were more likely to believe they throw out or compost A Lot Less food than the average American, and households with children were more likely to say they throw out or compost A Little Bit Less or The Same amount food ( $X^2=28.912$ ,  $p<.001$ ). The differences were not significant post-diary.

**Table 43: Pre-Diary: Food Thrown Out or Composted Relative to the Average American by Household Type**

Household Type***	Pre-Diary (n=214)				
	A Lot Less	A Little Bit Less	The Same	A Little Bit More	A Lot More
Adult living alone	66.7%	16.7%	8.3%	5.6%	2.8%
2+ Adults WITHOUT Children	52.2%	21.1%	16.7%	4.4%	5.6%
1+ Adults WITH Children	19.2%	37.0%	27.4%	8.2%	8.2%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

Q13: Thinking of the average American, do you think the amount of food you throw out or compost is a lot more, a little bit more, the same, a little bit less, or a lot less?

Food is often marked with a “use by,” “sell by” or “best by” date. Respondents were asked what they generally do with different foods after the date has passed. Table 44 presents the percentages for each of the different approaches taken across five food types. Responses that occurred most frequently have been color coded for ease of comparison, with the most frequent in **burgundy**, the second most frequent in **green**, and the third most frequent in **orange**.

For every food type *except* Canned Foods, the most common option was to Smell or Look at It to Determine if It’s Still Good. This option was the third most common for Canned Goods, while the most common option was the respondents Don’t Pay Attention to the Dates. Throw It Away or Compost It was the second most common option for all of the food types *except* Fresh Meat or Fish. This was the third most common option for Fresh Meat or Fish, whereas the second most common option was Not Applicable Because Everything Is Eaten or Frozen before the Package Date. Don’t Pay Attention to the Dates was the third most common option for Fresh Fruits and Vegetables and Condiments. Not Applicable Because Everything Is Eaten or Frozen before the Package Date was the third most common option for Eggs or Dairy.

**Table 44: Pre-Diary: Approach to Foods That Have Passed the “Use by,” “Sell by,” or “Best by” Date has Passed**

<b>Approach to Foods</b> <i>[sorted in descending order by Fresh Meat or Fish]</i>	Fresh Meat or Fish	Eggs or Dairy	Fresh Fruits and Vegetables	Canned Foods	Condiments
Smell or look at it to determine if it's still good	<b>40.3%</b>	<b>58.8%</b>	<b>64.4%</b>	<b>19.9%</b>	<b>47.2%</b>
Not Applicable, everything is eaten or frozen before the package date	<b>30.6%</b>	<b>10.2%</b>	6.5%	11.6%	8.3%
Throw it away or compost it	<b>16.2%</b>	<b>19.4%</b>	<b>13.4%</b>	<b>28.7%</b>	<b>28.7%</b>
Not applicable, vegetarian or vegan	8.3%	1.9%	--	--	--
Don't buy or eat this type of food	1.9%	2.3%	0.9%	5.6%	1.4%
Missing	1.4%	2.3%	1.9%	--	0.5%
None of the above	0.9%	1.4%	1.9%	5.1%	1.4%
Don't pay attention to dates	0.5%	3.7%	<b>11.1%</b>	<b>29.2%</b>	<b>12.5%</b>

Food is often marked with a “use by,” “sell by,” or “best by” date. What do you generally do with the following foods after that date has passed?

Q10A: Fresh meat or fish

Q10B: Eggs or dairy

Q10C: Fresh fruits and vegetables

Q10D: Canned foods

Q10E: Condiments, for example, mayonnaise, mustard, or salad dressings

N=216

Chi-square tests showed no significant difference across urban and rural households for any of the food types.

The characteristics of the respondents who reported that they *throw away or compost* foods that have passed the “use by,” “sell by” or “best by” date are presented in Table 45. The percentages represent the proportion of each demographic subgroup who reported that they throw away or compost each of the food types. The percentages of each demographic for the full sample are included at the far right for comparison (excluding Missing, see Table 34). Due to small sample sizes and the resulting very small cell

sizes (i.e., number of respondents in a given demographic subgroup), these findings should be interpreted with caution.

**Table 45: Respondent Demographics for Households that Throw Away or Compost Foods that have Passed the “Use by,” “Sell by,” or “Best by” Date**

<b>Households that Throw Away or Compost</b>						
	Fresh Meat or Fish (n=35)	Eggs or Dairy (n=42)	Fresh Fruits and Vegetables (n=29)	Canned Foods (n=62)	Condiments (n=62)	Full Sample (N=216)
<b>Gender</b>						
Female	18.9%	20.8%	13.2%	31.4%	30.2%	73.6%
Male	7.7%	15.4%	15.4%	21.2%	21.2%	24.1%
Other	0.0%	0.0%	0.0%	0.0%	100.0%	0.5%
Prefer not to answer	50.0%	50.0%	0.0%	0.0%	50.0%	0.9%
<b>Age Group</b>						
18-34 Years Old	15.2%	23.9%	13.0%	34.8%	32.6%	21.3%
35-64 Years Old	18.7%	22.0%	10.6%	32.5%	32.5%	56.9%
65 Years of Age or Older	10.9%	8.7%	21.7%	13.0%	15.2%	21.3%
<b>Total Household Income for 2016</b>						
Under \$10,000	0.0%	25.0%	0.0%	25.0%	25.0%	3.7%
\$10,000 to \$24,999	4.5%	27.3%	22.7%	45.5%	50.0%	10.2%
\$25,000 to \$49,999	20.4%	16.7%	22.2%	24.1%	27.8%	25.0%
\$50,000 to \$74,999	19.1%	19.1%	8.5%	25.5%	27.7%	21.8%
\$75,000 to \$99,999	15.4%	17.9%	7.7%	33.3%	30.8%	18.1%
\$100,000 to \$149,999	14.8%	18.5%	11.1%	37.0%	25.9%	12.5%
\$150,000 to \$199,999	28.6%	28.6%	14.3%	0.0%	14.3%	3.2%
\$200,000 or more	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
<b>Household Type</b>						
Two or more adults without children	15.3%	16.3%	12.2%	28.6%	29.6%	45.4%
One or more adults with children	20.5%	28.2%	11.5%	30.8%	26.9%	36.1%
Adult living alone	10.5%	10.5%	21.1%	26.3%	28.9%	17.6%
<b>Money Spent on Food Eaten at Home Each Week</b>						
\$100 or Less	6.7%	10.0%	15.6%	25.6%	25.6%	41.7%
\$101-\$200	24.4%	23.3%	10.0%	30.0%	32.2%	41.7%
\$201-\$300	28.6%	33.3%	9.5%	38.1%	23.8%	9.7%
More than \$300	0.0%	50.0%	25.0%	0.0%	50.0%	1.9%

Food is often marked with a “use by,” “sell by,” or “best by” date. What do you generally do with the following foods after the date has passed?

Q10A: Fresh meat or fish; n = 35

Q10B: Eggs or dairy; n = 42

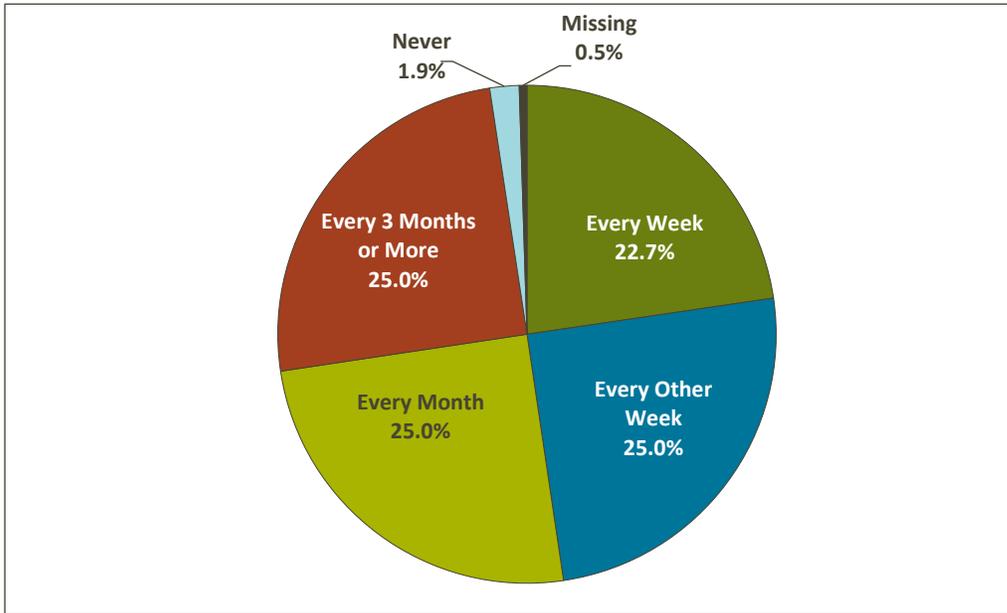
Q10C: Fresh fruit or vegetables; n = 29

Q10D: Canned foods; n = 62

Q10E: Condiments, for example, mayonnaise, mustard, or salad dressings; n = 62

Respondents were asked how often they clean out their fridge. Figure 23 shows that respondents were almost evenly split across four of the response options, with Every 3 Months or More, Every Month, and Every Other Week were each selected by one-quarter of respondents (25.0%), and Every Week selected by nearly one-quarter of respondents (22.7%). A chi-square test revealed no significant difference in frequency of cleaning out their fridge across urban and rural households.

Figure 23: Pre-Diary: Frequency of Fridge Cleaning

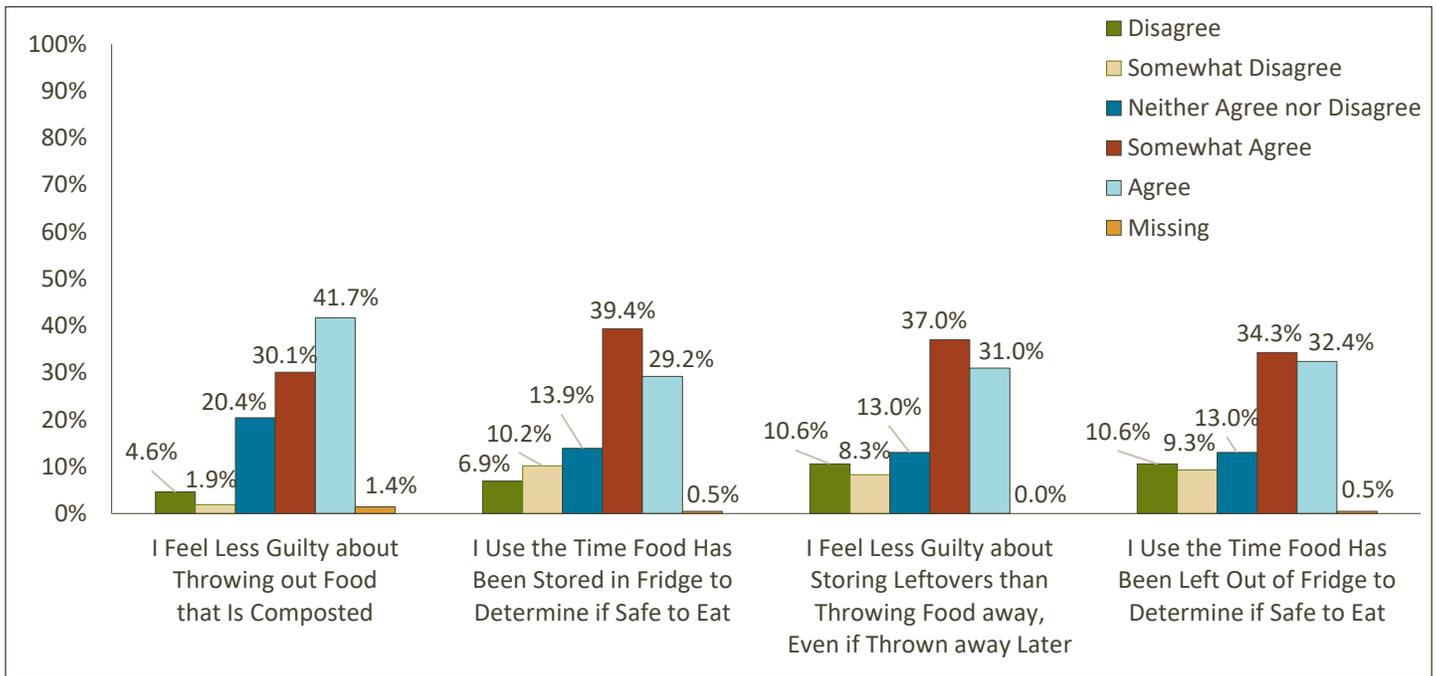


Q11: How often do you clean out your fridge?  
N=216

Respondents were asked how strongly they agree or disagree with four statements about food storage and disposal. Each statement was rated on a 5-point scale from Disagree to Agree. Figure 24 shows that approximately two-thirds of households responded that they either Somewhat Agree or Agree that they (in descending order of percentage):

- Feel less guilty about throwing out food that is composted (71.8%)
- Use the time food has been stored in the fridge to determine if it is safe to eat (68.7%)
- Feel less guilty about storing leftovers than throwing food away, even if thrown away later (68.0%)
- Use the time food has been left out of the fridge to determine if it's safe to eat (66.7%)

Figure 24: Pre-Diary: Thoughts and Feelings about Food Storage and Disposal



How strongly do you agree or disagree with the following statements?

N15\_D: I feel less guilty about throwing out food that is composted.

N1\_B: I use the time food has been stored in the fridge to determine whether food is safe to eat.

N15\_E: I feel less guilty about storing leftovers rather than throwing food away, even if they are thrown away later.

N1\_A: I use the time food has been left out of the fridge to determine whether food is safe to eat.

N=216

Chi-square tests revealed that only one of those food storage and disposal ratings was statistically significant for urban versus rural households. Table 46 shows that urban households were more likely to feel less guilty about throwing food out that is composted than rural households ( $X^2=12.039, p<.05$ ). This is predictable in that in this sample, curbside composting was available to 2 of the 3 urban sites and available in very limited circumstances in the 2 rural sites.

**Table 46: Ratings for Feeling less guilty about throwing out food that is composted across Urban and Rural Households**

**I feel less guilty about throwing out food that is composted.**

Geographic Area*	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
Urban	5.3%	2.3%	13.6%	30.3%	48.5%
Rural	3.7%	1.2%	32.1%	30.9%	32.1%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$ , no notation: statistically significant difference not detected.

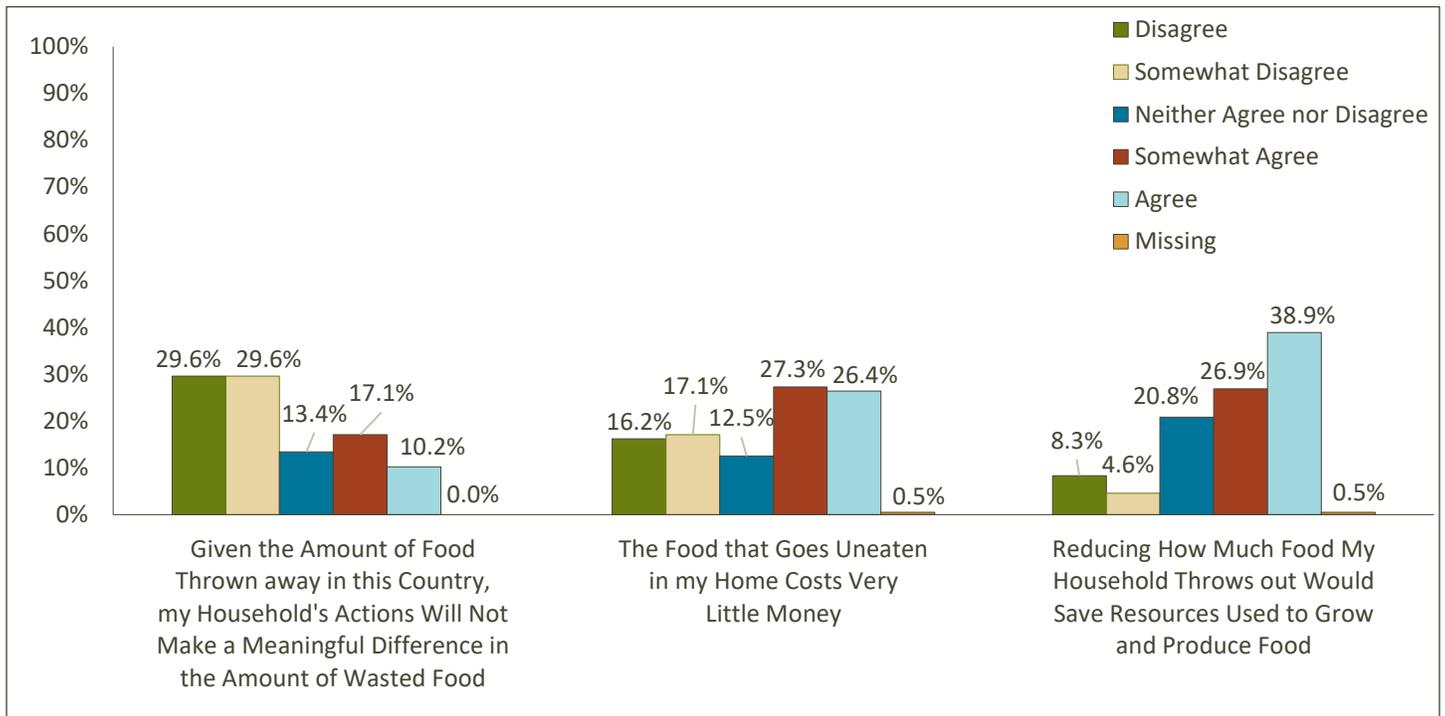
How strongly do you agree or disagree with the following statements?

N15D: I feel less guilty about throwing out food that is composted.

n=215

Figure 25 presents the ratings of three items that address opinions about wasted food. Over half of respondents (59.2%) reported that they Disagree or Somewhat Disagree that their household’s actions would not make a meaningful difference in the amount of food thrown away in this country (i.e., their actions would make a difference). Just over half of respondents (53.7%) reported that they Agree or Somewhat Agree that the uneaten food in their household costs them very little money. Finally, nearly two-thirds (65.8%) reported that they Agree or Somewhat Agree that reducing the food they throw out will save resources used to grow and produce food. None of these ratings showed significant differences between urban and rural households.

Figure 25: Pre-Diary: Opinions about Wasted Food



How strongly do you agree or disagree with the following statements?

N15\_F: Given the amount of food that is thrown away in this country, the actions of my household will not make a meaningful difference in the amount of food being wasted.

N15\_G: The quantity of food that goes uneaten in my home costs my household very little money.

N15\_H: Reducing how much food my household throws out would save resources used to grow and produce the food we eat.

N=216

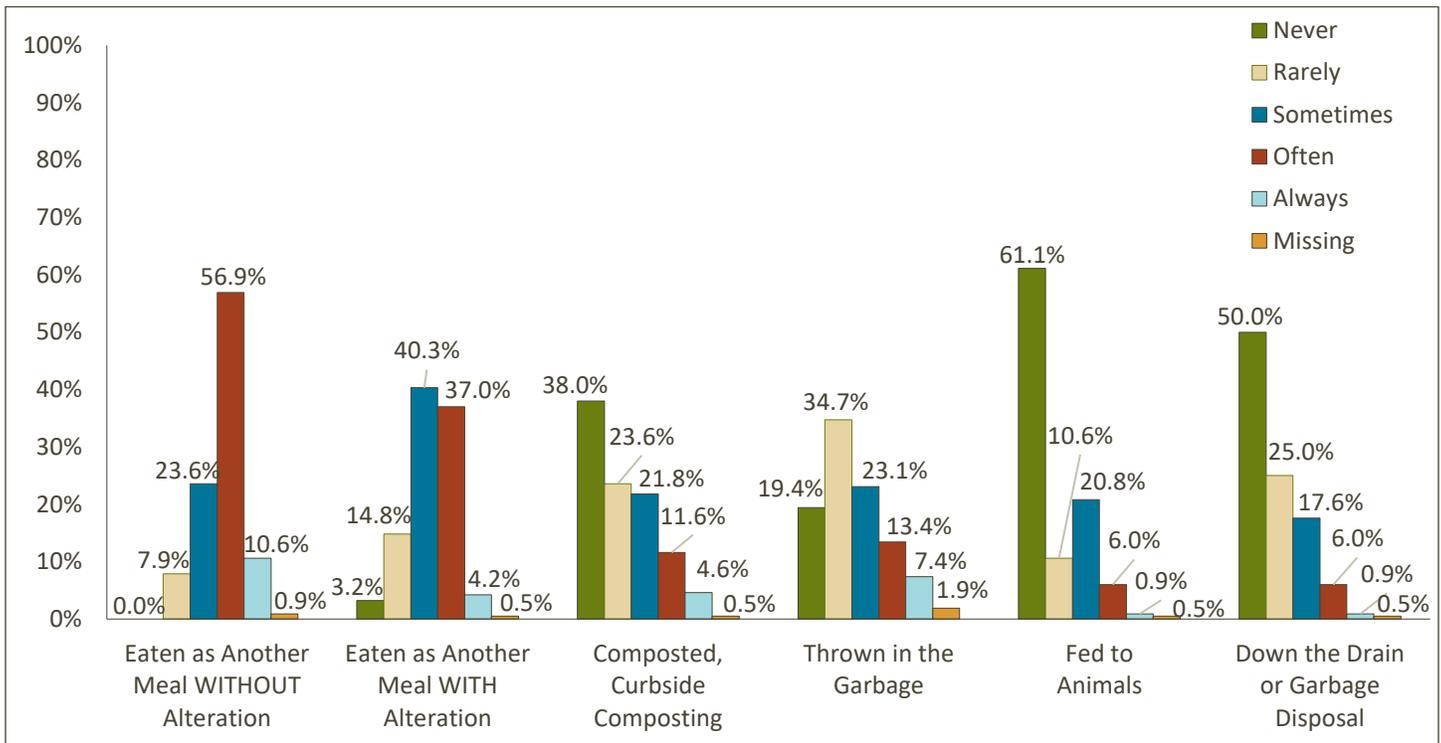
# Leftovers

A series of survey items focused on how households handle leftovers. Respondents were asked to rate how often leftovers are:

- Eaten as another meal, without alteration or other food added
- Used as part of another meal, with other food added
- Composted or put in curbside composting
- Put down the drain or garbage disposal
- Fed to animals
- Thrown in the garbage

Figure 26 presents the distribution of frequency ratings across the six approaches to handling leftovers. The most common approach to handling leftovers is to Eat Them as Another Meal, Without Alteration (67.5% Always or Often). The least common ways of handling leftovers are to Put Them Down the Drain or Garbage Disposal (75%) or Feed Them to Animals (71.7% Never or Rarely).

Figure 26: Pre-Diary: Frequency for Ways in Which Leftovers Are Handled



Sometimes households have leftovers. How often are leftovers:  
 Q8A: Eaten as another meal, without alteration or other food added?  
 Q8B: Used as part of another meal, with other food added?  
 Q8C: Composted or put in curbside composting?  
 Q8D: Put down the drain or garbage disposal?  
 Q8E: Fed to animals?  
 Q8F: Thrown in the garbage?

N=216

Chi-square analyses were done to determine whether the manner in which leftovers are handled differs across urban and rural households. Table 47 presents the two ratings that were significantly different across geographic area. Rural households are more likely to Never compost leftovers ( $X^2=16.791, p<.01$ ), while urban households are more likely to Sometimes compost leftovers. Urban households are more likely to Never or Rarely throw leftovers in the garbage, while rural households are more likely to Sometimes or Often, or Always do that ( $X^2=29.257, p<.001$ ). This is expected because in this sample, curbside composting was available to two of the three urban sites and available in very limited circumstances in the two rural sites.

**Table 47: Pre-Diary: Ways in Which Leftovers are Handled across Urban and Rural Households**

Geographic Area**	Composted or Put in Curbside Composting				
	Never	Rarely	Sometimes	Often	Always
Urban	28.2%	25.2%	28.2%	12.2%	6.1%
Rural	53.6%	21.4%	11.9%	10.7%	2.4%

Geographic Area***	Thrown in the Garbage				
	Never	Rarely	Sometimes	Often	Always
Urban	26.7%	42.0%	19.1%	6.9%	5.3%
Rural	8.6%	24.7%	30.9%	24.7%	11.1%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$  no notation: difference across groups was not statistically significant

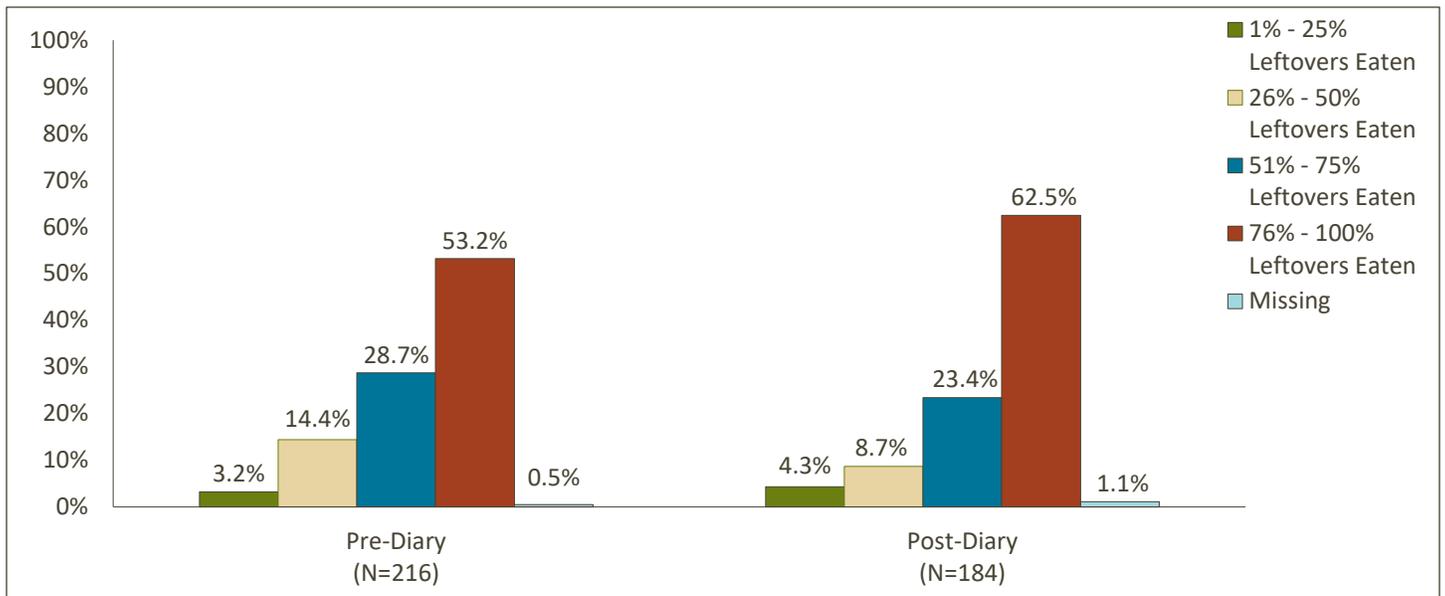
Sometimes households have leftovers. How often are leftovers:

Q8C: Composted or put in curbside composting? n = 215

Q8F: Thrown in the garbage? n = 212

Respondents were asked what proportion of their household leftovers were eaten using a sliding scale from 0% to 100%. **The average percentage of leftovers eaten pre-diary was lower (73.4%) than post-diary (77.0%), which was statistically significant ( $t=2.160, p<.05$ ).** For ease of displaying the results, responses were grouped into four percentage groupings. Figure 27 shows that pre-diary, over half of the respondents (53.2%) reported they ate 76% to 100% of their leftovers, and over one-quarter (28.7%) reported they ate 51% to 75% of their leftovers. The proportion of households reporting that they ate 76% to 100% of their leftovers post-diary was slightly higher (62.5%). A t-test showed no significant difference between urban and rural households.

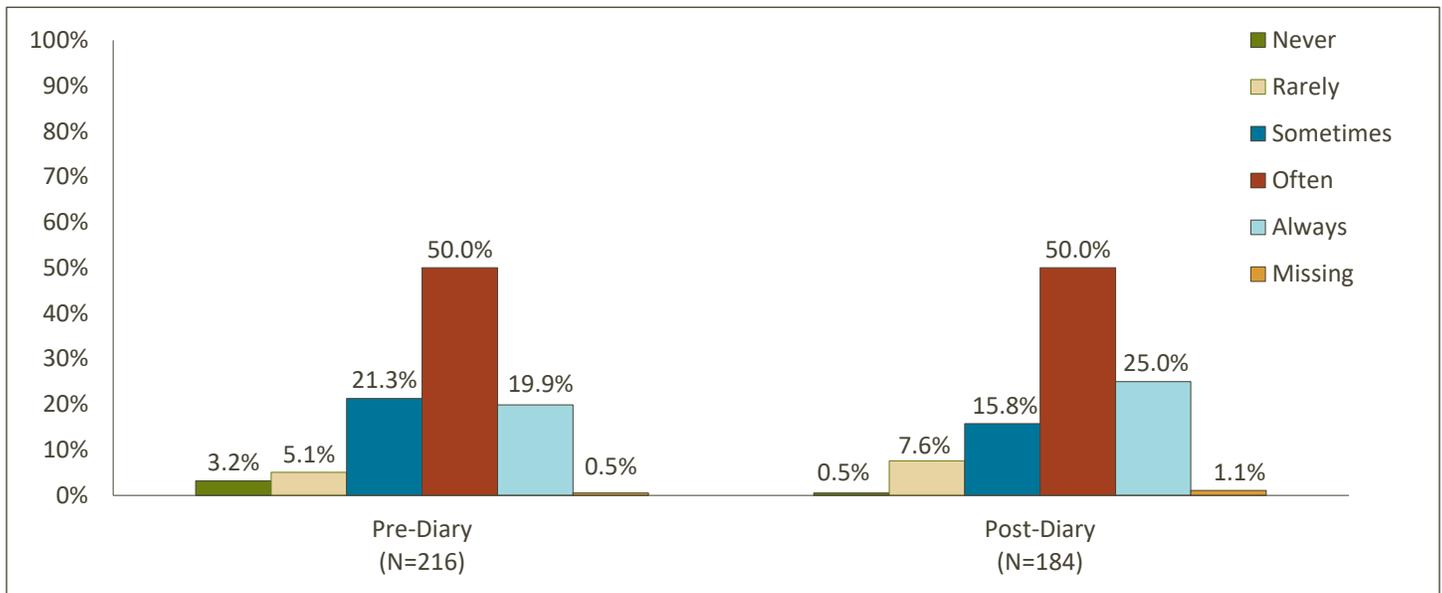
Figure 27: Pre- and Post-Diary: Proportion of Leftovers Eaten



N2\_1: In general, what proportion of your household leftovers are eaten?

Respondents were asked two more questions about how their household manages leftovers. Figure 28 shows that the majority of households either Often (50% pre- and post-diary), Sometimes (21.3% pre-diary, 15.8% post-diary), or Always (19.9% pre-diary, 25.0% post-diary) Prioritize Eating Leftovers (ns). Urban and rural households did not differ significantly.

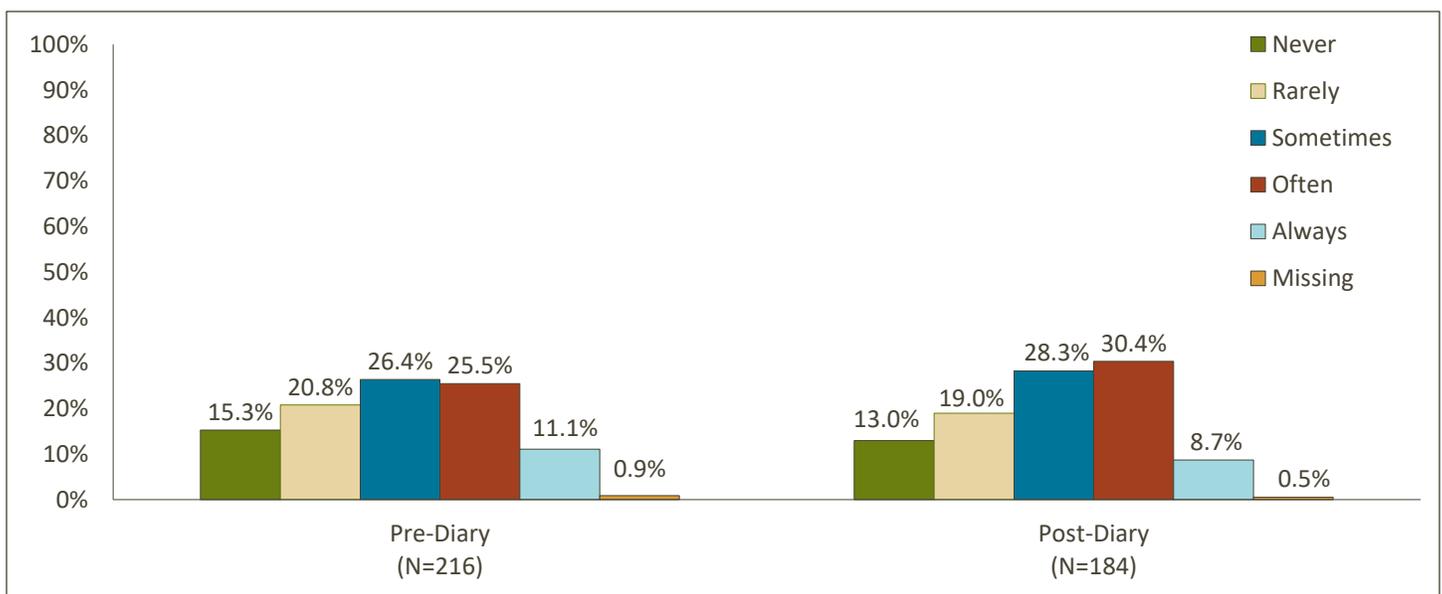
Figure 28: Pre- and Post-Diary: Frequency of Prioritizing Leftovers



Generally, how often do you or other household members take the following actions:  
Q12A: Prioritize eating leftovers?

Figure 29 shows that the spread of responses across the rating scale for Freezing Leftovers That Will Not Be Eaten in Time is fairly flat, particularly pre-diary, suggesting that households vary quite a bit on that behavior. Although the proportion of households reporting that they Often (30.4%) or Sometimes (28.3%) freeze leftovers was slightly higher post-diary, the difference was not statistically significant. Urban and rural households did not differ significantly in prioritizing eating or freezing leftovers.

Figure 29: Pre- and Post-Diary: Frequency of Freezing Leftovers

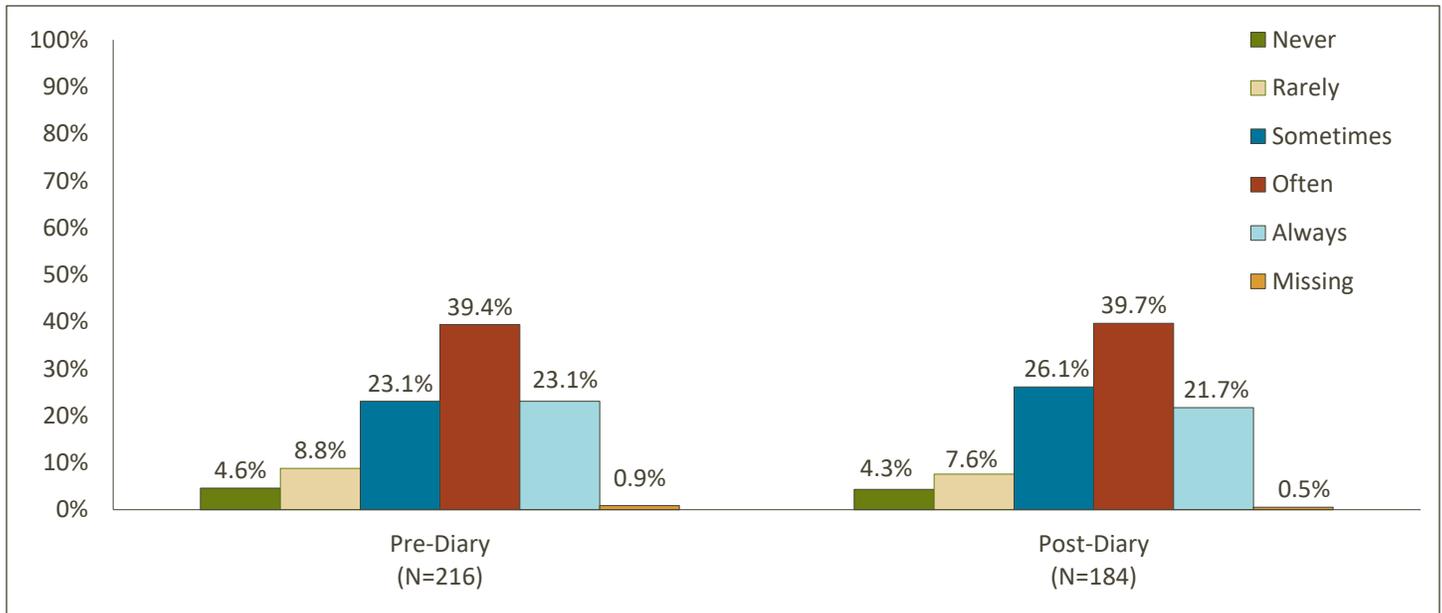


Generally, how often do you or other household members take the following actions:  
Q12B: Freeze leftovers if you think you will not be able to eat them in time?

# Food Preparation, Use and Management

Respondents were asked four questions about their household’s preparation, use, and management of food. Figure 30 shows that households commonly remove the bad parts of fruits and vegetables Always or Often both pre-diary (62.5%) and post-diary (61.4%, ns).

Figure 30: Pre- and Post- Diary: Frequency of Removing Bruised Parts of Fruits and Vegetables



Generally, how often do you or other household members take the following actions:  
 Q12C: When fruits or vegetables are bruised, you remove the bad part and eat the rest?

As seen in Table 48, urban and rural households differed significantly on this item both pre-diary ( $X^2=26.067, p<.001$ ) and post-diary ( $X^2=9.713, p<.05$ ). Urban households were more likely to Often remove the bruised portion of produce and eat the remainder, and rural households were more likely to Never or Rarely treat produce in this manner. Post-diary there was also a slightly larger difference for Sometimes, with urban households being more likely to select that response than rural households.

**Table 48: Pre- and Post-Diary: Frequency of Removing Bruised Parts of Fruits and Vegetables across Urban and Rural Households**

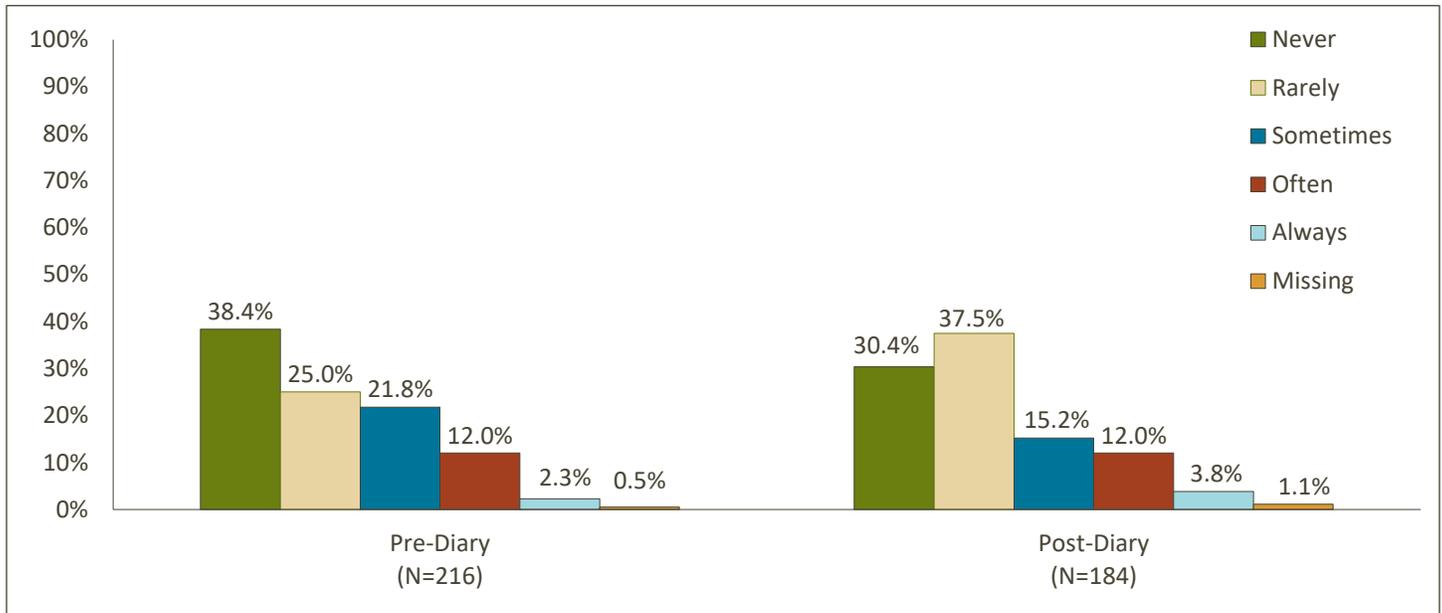
Geographic Area***	Pre-Diary (n=214)				
	Never	Rarely	Sometimes	Often	Always
Urban	1.5%	3.8%	24.2%	49.2%	21.2%
Rural	9.8%	17.1%	22.0%	24.4%	26.8%
Geographic Area*	Post-Diary (n=183)				
	Never	Rarely	Sometimes	Often	Always
Urban	2.8%	3.7%	29.4%	44.0%	20.2%
Rural	6.8%	13.5%	21.6%	33.8%	24.3%

\* $p<.05$  \*\* $p<.01$  \*\*\* $p<.001$  no notation: difference across groups was not statistically significant

Generally, how often do you or other household members take the following actions:  
 Q12C: When fruits or vegetables are bruised, you remove the bad part and eat the rest?

Figure 31 shows that households do not commonly use vegetable peels and stalks in cooking with Never or Rarely selected by 63.4% of respondents pre-diary and 67.9% post-diary (ns). Urban and rural households did not differ significantly on this item.

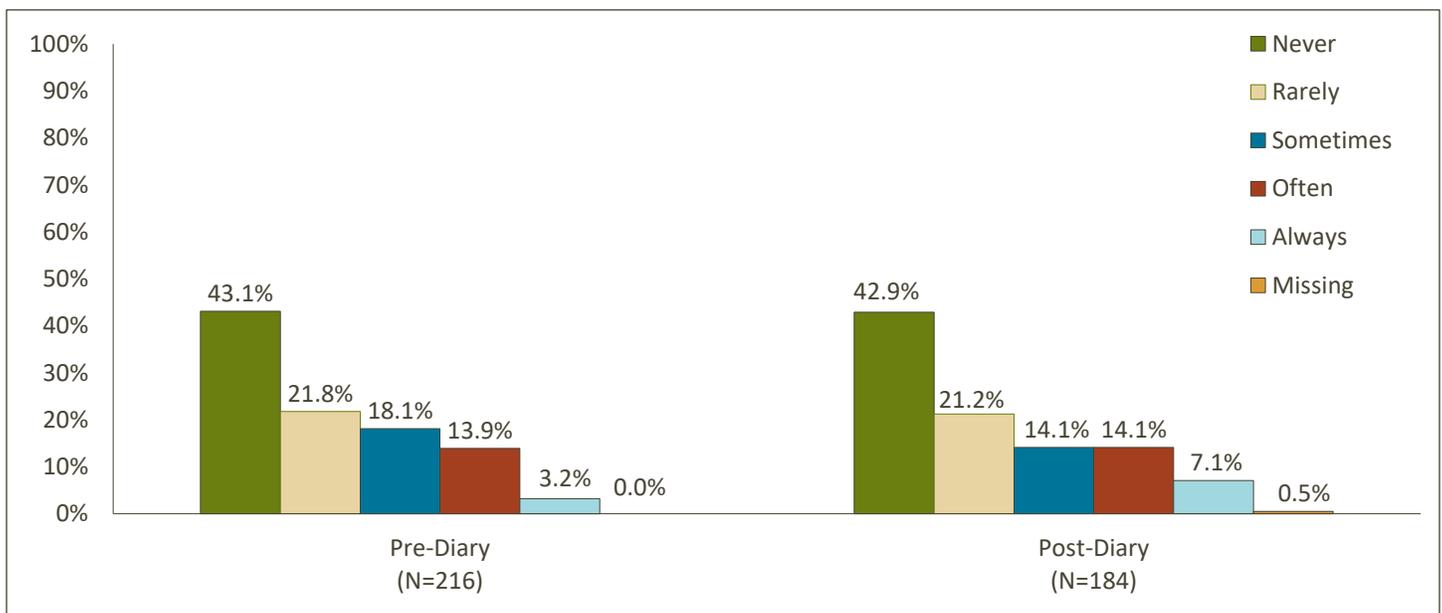
Figure 31: Pre- and Post-Diary: Frequency of Using Vegetable Peels and Stalks in Cooking



Generally, how often do you or other household members take the following actions:  
Q12D: Use vegetable peels and stalks in cooking (for example, soups)?

Figure 32 shows that households are also not likely to use bones for cooking, with nearly two-thirds of households selecting Never or Rarely pre-diary (64.9%) and post-diary (64.1%) (ns). This was also not significantly different for urban and rural households.

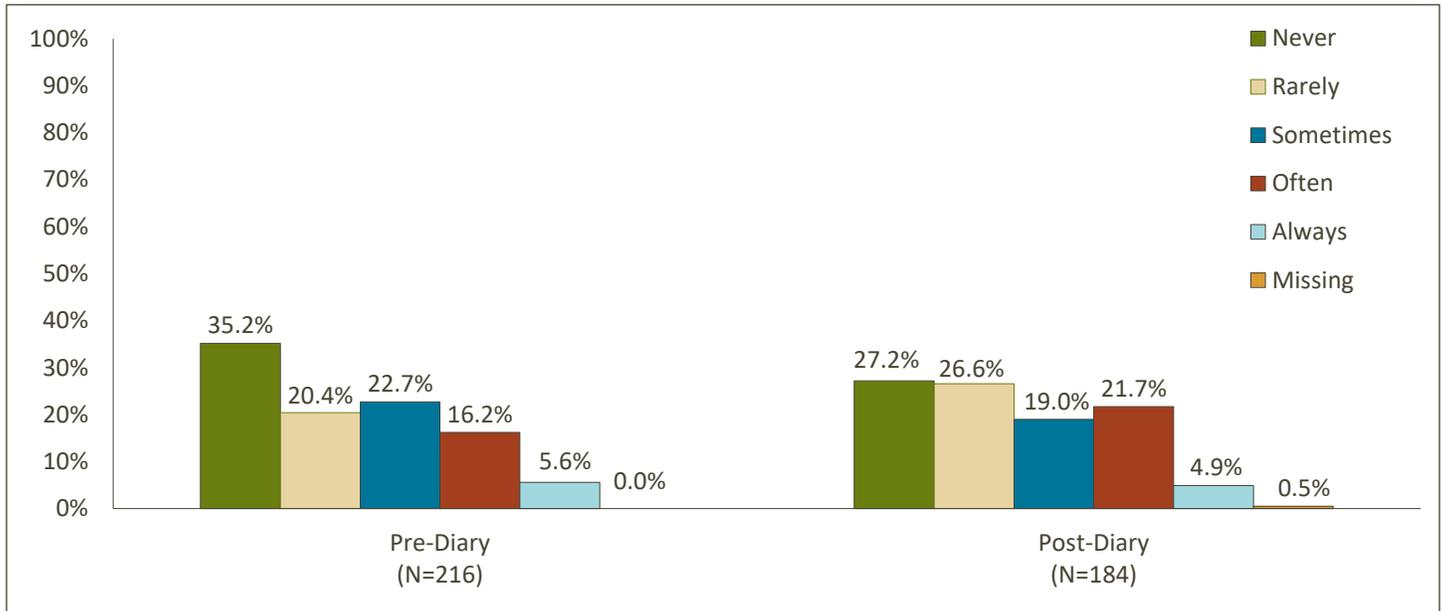
Figure 32: Pre- and Post-Diary: Frequency of Using Bones for Cooking



Generally, how often do you or other household members take the following actions:  
Q12E: Use bones for cooking (for example, soups)?

Figure 33 presents the distribution for the [fourth and final](#) item in this series. Households were more likely to Never or Rarely (55.6% pre-diary, 53.8% post-diary) manage food in the refrigerator by storing items that need to be eaten the soonest in a designated area than Always or Often (21.8% pre-diary, 26.6% post-diary) (ns). Urban and rural households did not differ significantly on this behavior.

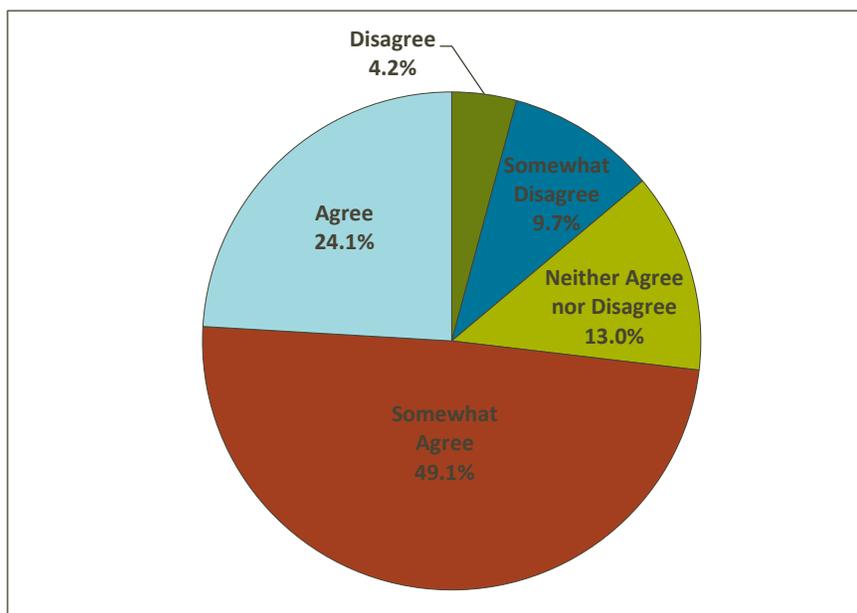
Figure 33: Pre- and Post-Diary: Frequency of Storing Items that Need to Be Eaten Soonest in Designated Fridge Area



Generally, how often do you or other household members take the following actions:  
 Q12F: Manage food in the refrigerator by storing items that need to be eaten the soonest in a designated area?

Respondents were asked to rate how strongly they agree or disagree with a statement about eating similar meals each week. Figure 34 shows that 73.2% of the households either Agree or Somewhat Agree that they eat similar meals each week. This did not differ significantly across urban and rural households.

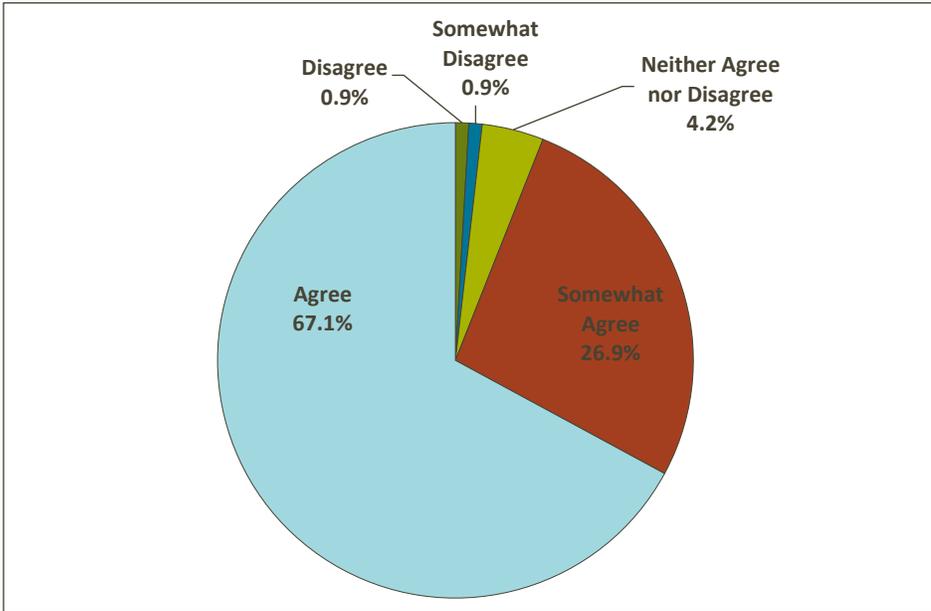
Figure 34: Pre-Diary: Household Eats Similar Meals Each Week



How strongly do you agree or disagree with the following statements?  
 Q15C: My household eats similar meals each week. N=216

Respondents were also asked to rate how strongly they agree or disagree that they are able to prepare meals based on what is on hand. Figure 35 shows that the majority of households are preparing meals using what is available at the time (67.1%), which did not differ significantly across urban and rural households.

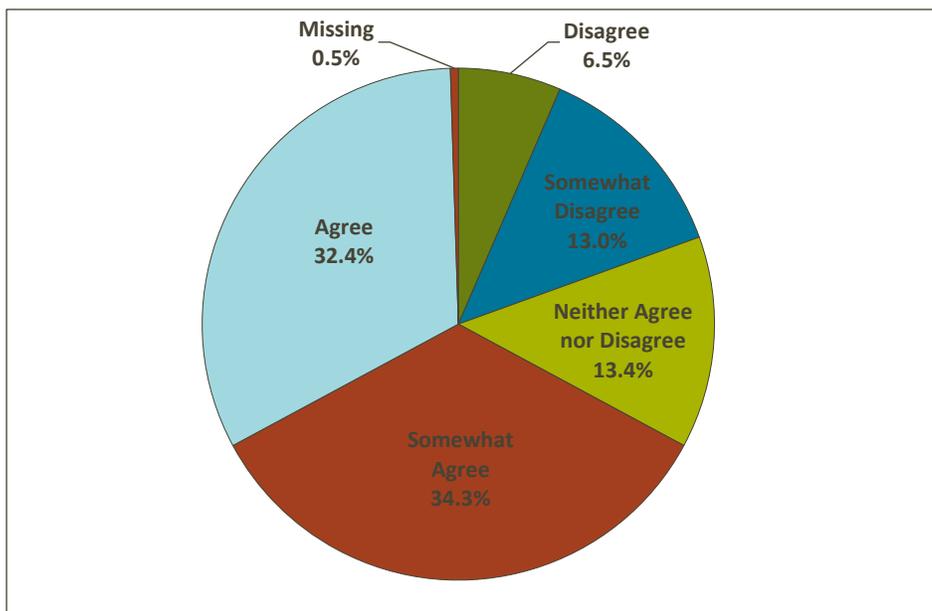
Figure 35: Pre-Diary: Create Meals Based on What is on Hand



How strongly do you agree or disagree with the following statements?  
 Q15D: The person in my household who most often prepares meals is able to create meals based on what is on hand. N=216

Figure 36 shows the distribution of ratings on the same agreement scale related to wanting to eat more healthily. One-third of the respondents (66.7%) would like to eat in a more healthy manner, including eating more servings of fresh fruits and vegetables. Almost one-fifth (19.5%) of respondents disagreed with wanting to eat more healthily. These results did not differ significantly across urban and rural households.

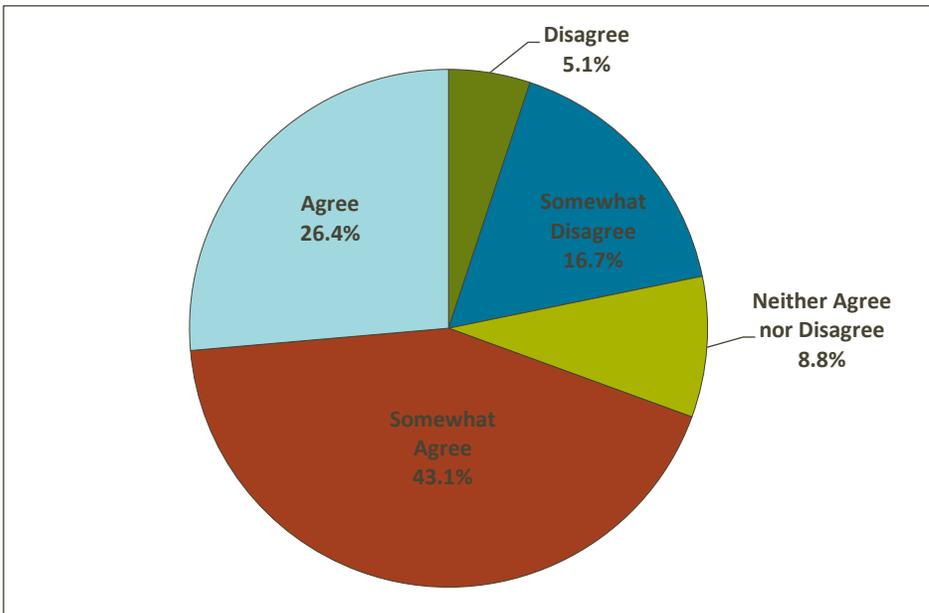
Figure 36: Pre-Diary: Desire to Eat More Healthily



How strongly do you agree or disagree with the following statements?  
 Q15E: I wish I ate more healthily, for example eating more servings of fresh fruits and vegetables. N=216

Respondents were also asked if they always eat the food stored in their freezer. As can be seen in Figure 37, the majority of households are eating the foods they freeze (69.5% Agree or Somewhat Agree). Differences were not statistically significant across urban and rural households.

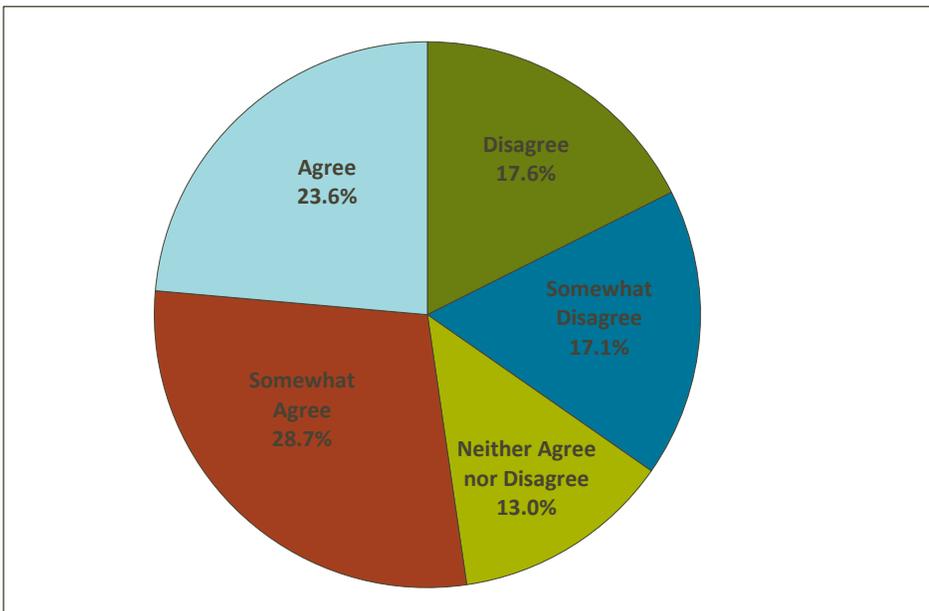
Figure 37: Pre-Diary: Always Eat Food Stored in the Freezer



How strongly do you agree or disagree with the following statements?  
Q15H: I always eat food that I have stored in the freezer. N=216

Figure 38 shows that slightly over one-half of the respondents either Agree (23.6%) or Somewhat Agree (28.7%) that work and social life can lead to food going uneaten due to management issues. Urban and rural households did not differ significantly on this item.

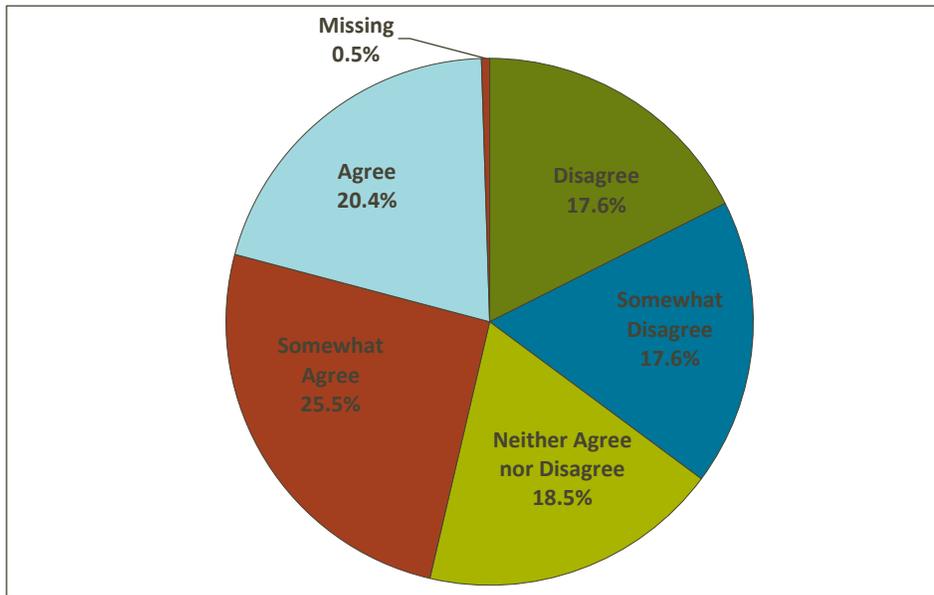
Figure 38: Pre-Diary: Work and Social Life Make Managing Food Difficult



How strongly do you agree or disagree with the following statements?  
Q15F: Work and social life can make managing food at home difficult, leading to food going uneaten. N=216

Respondents were asked whether or not they believe it is important to finish all the food on their plates at a meal. Figure 39 shows that the responses were quite evenly distributed for this item, with 17.6% to 25.5% endorsing each response across the scale. This suggests that respondents are quite varied in how important they think it is to finish all the food on their plates at a meal. Urban and rural households did not differ significantly.

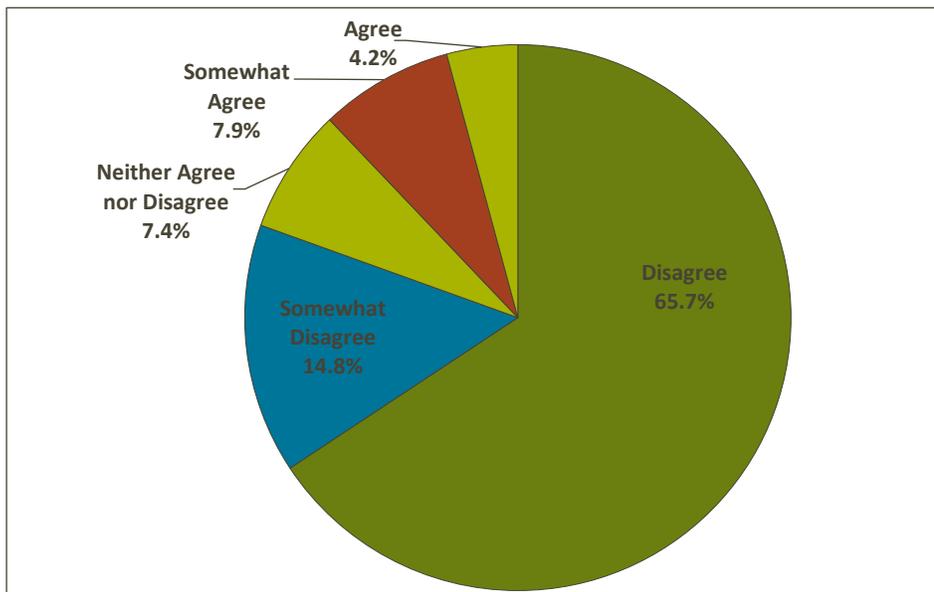
Figure 39: Pre-Diary: Important to Eat All Food for a Meal



How strongly do you agree or disagree with the following statements?  
 N15\_B: It is important to finish all food that is on our plates for a meal. N=216

The final (pre-diary) survey item related to food management addresses the issue of food insecurity. Respondents were asked whether or not they worry if they will have enough food in an average week. Figure 40 shows that nearly two-thirds of respondents (65.7%) Disagree that they worry about having enough food. This did not differ significantly across urban and rural households.

Figure 40: Pre-Diary: Worry about Having Enough Food in an Average Week



How strongly do you agree or disagree with the following statements?  
 N15\_C: I worry about whether I will have enough food in an average week. N=216

# Kitchen Diary Feedback

A series of post-diary survey items focused on feedback from households about the diary task and the impact it may have had on their behavior.

Respondents were first asked to respond to an open-ended item about what could have made completing the kitchen diary or participating in the study easier for them. The text responses were reviewed and coded into topical themes. Table 49 presents the themes that emerged from the responses and the proportion of respondents who mentioned them. Respondents could include more than one response, so the percentages in the table add up to more than 100%. The most common response (48.4%) was that the diary was easy to complete or they did not know what could have made participating in the study easier. Improving the structure of the diary or the tasks associated with the study was the second most common response (25.5%) regarding things that would have made it easier to participate.

**Table 49: Post-Diary: Things that Could Have Made Completing the Kitchen Diary or Participating in the Study Easier**

<i>[sorted in descending order]</i>	Percent
Nothing, don't know	48.4%
Improve diary structure/tasks (e.g., ability to view/edit previous entries, larger spaces on paper diary, difficulty weighing food, diary by day rather than meal, tedious web structure with a lot of clicks)	25.0%
Better instructions, more details about what to include	9.8%
Technological changes or challenges (e.g., create an app, finding email to click on link, lost entries, internet connection issues)	4.3%
Needed reminders or notification (e.g., daily email, notification when completed successfully)	4.3%
Timing issues (e.g., late emails, late paper survey, more time to track, more timely notification to have garbage out)	3.8%
More household member cooperation or support	2.7%
Remembering (e.g., remembering to record, weigh, put garbage out)	1.6%
Other	6.5%
Missing	5.4%

P1: What (if anything) would have made it easier to complete the kitchen diary or participate in this study in general?  
N=184

Respondents were also asked what they learned from the diary study. The text responses were reviewed and coded into topical themes. Table 50 presents the themes that emerged from the responses and the proportion of respondents who mentioned them. Respondents could include more than one response, so the percentages in the table add up to more than 100%. The most common things that respondents learned from participating in the study were that they wasted more food than they realized (44.6%), wasted very little food (32.6%), the behaviors that lead to more/less wasted food (25.0%), a cluster of responses related to composting ~~reduces wasted food~~ (17.9%), and general increased awareness of wasted food (15.8%).

**Table 50: Post-Diary: Things Learned from Participating in the Study**

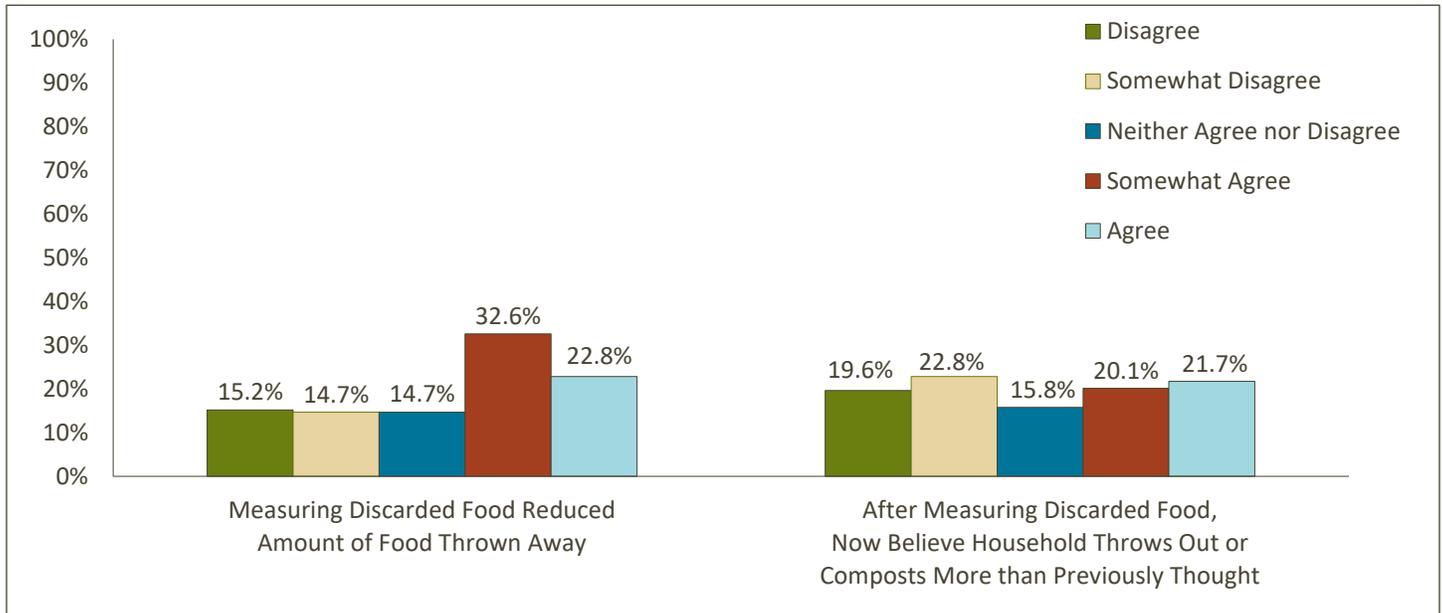
<i>[sorted in descending order]</i>	Percent
Waste more food than realized, identified the foods most wasted	44.6%
Waste very little food, good at managing the amount of wasted food	32.6%
Identified behaviors that lead to more/less wasted food, changed behavior due to monitoring waste	25.0%
Identified wasted food that could be composted, good job at composting, composting reduces wasted food	17.9%
Increased awareness of wasted food, need to pay more attention to wasting food, bothered by wasted food	15.8%
Pets take care of food that would otherwise be wasted	2.2%
Amount of packaging that could be avoided	1.6%
Other	6.5%
Nothing, don't know	3.3%

P2: What did you learn (if anything) from participating in this study?

N=184

Respondents rated how strongly they agreed or disagreed with two statements related to the impact of measuring the food that was discarded in their household. Figure 41 presents the distribution of those two survey items. Slightly over half (55.4%) of the respondents Agreed or Somewhat Agreed that the amount of food thrown away was reduced due to measuring discarded food during the study. In contrast, 29.9% Disagreed or Somewhat Disagreed with the statement. The responses were more evenly distributed (15.8% to 22.8%) for the item asking whether measuring the discarded food made them think they throw out or compost more food than they previously thought. Also, chi square analyses revealed no significant differences for either household type or household size related to believing that they throw out more than they previously thought.

Figure 41: Post-Diary: Impact of Measuring Discarded Food



How strongly to you agree or disagree with the following statements?

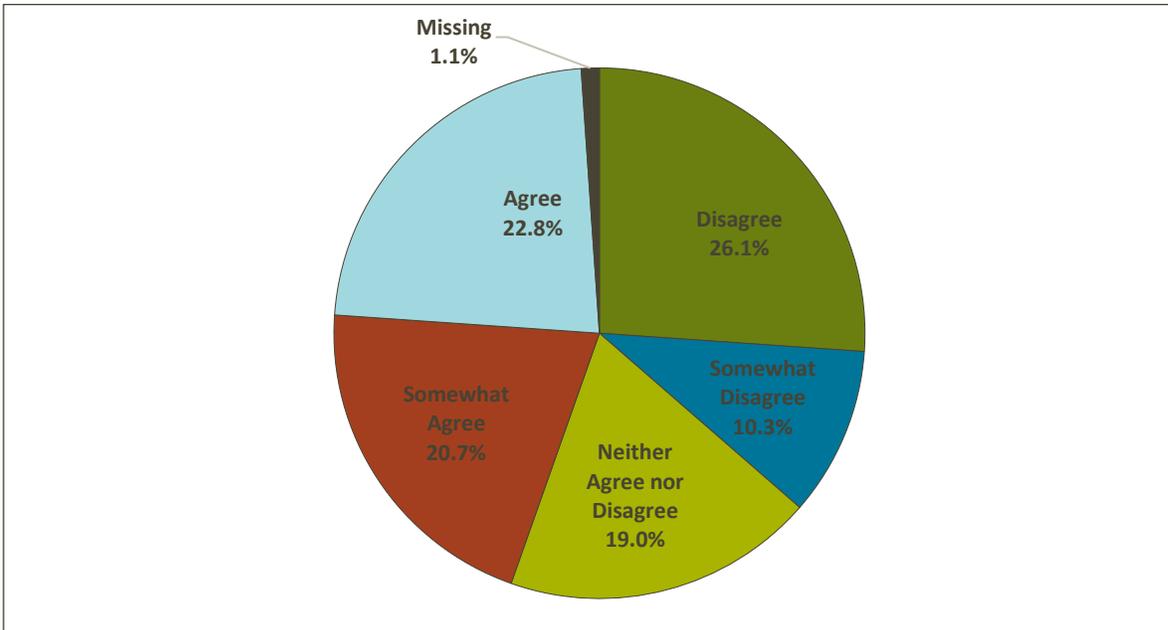
P3: Measuring the food that was discarded in our household reduced how much food we throw away.

P4: After measuring the food that was discarded in our household, I now believe that our household throws out or composts more food than I previously thought.

N=184

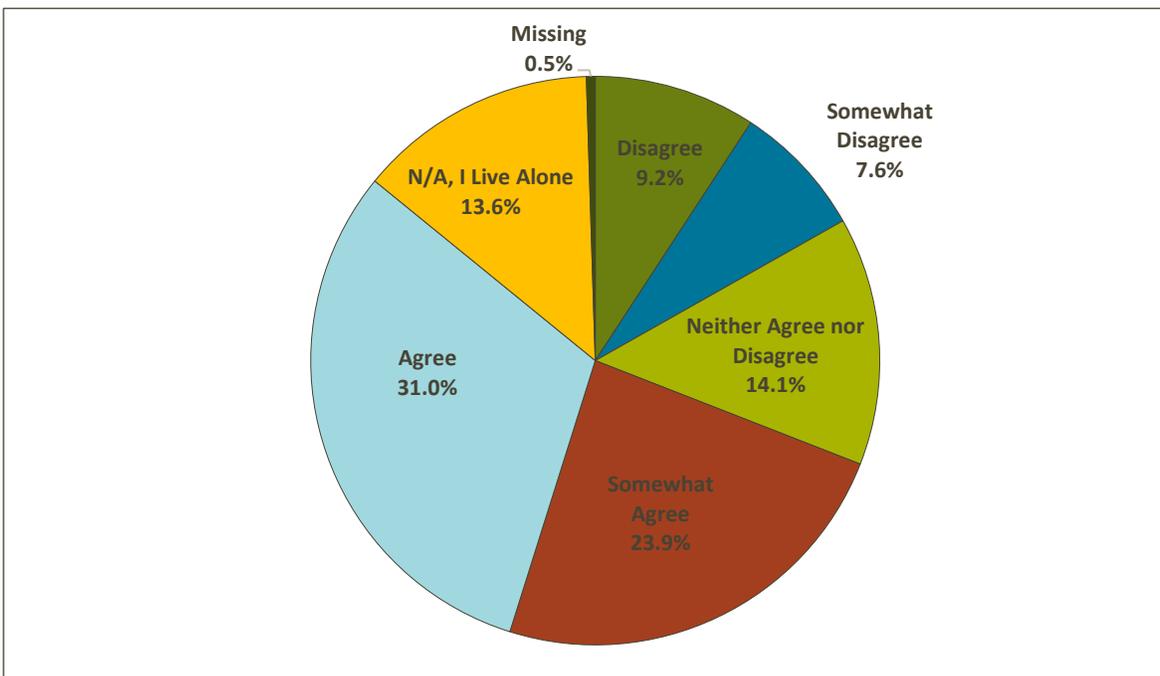
Figure 42 shows that slightly over half (54.9%) of the respondents Agreed or Somewhat Agreed that participating in the study increased how often they talk to household members about the issue of food being wasted, while only 16.8% Disagreed or Somewhat Disagreed. Figure 43 suggests that participation in the study had a smaller impact on talking to people outside of the household about wasted food, with 43.5% who Agreed or Somewhat Agreed and 36.4% who Disagreed or Somewhat Disagreed.

Figure 42: Study Increased Talking to Household Members about Wasted Food



P5: How strongly to you agree or disagree that being in this study increased how often you talked with *members of your household* about the issue of food being wasted (other than talking about using the diary)?

N=184



P6: How strongly to you agree or disagree that being in this study increased how often you talked with *someone outside your household* about the issue of food being wasted (other than talking about using the diary)?

N=184

One final survey item asked participants to imagine they could make all the decisions for the state of Oregon about how to waste less food. They were then asked to identify what they think Oregon could do to help residents waste less food. The text responses were reviewed and coded into topical themes. Table 51 presents the themes that emerged from the responses and the proportion of respondents who mentioned them. The most common things that respondents thought Oregon could do to reduce wasted food were to provide education and resources (44.0%), improve food management skills (without mentioning how that would be accomplished; 22.8%), increase composting (19.6%), generally increase awareness of wasted food (without mentioning how that would be accomplished; 13.6%), address issues within industry (10.9%), and specifically mentioning advertising or an ad campaign (10.3%). Some of the actions mentioned in a general way could be accomplished through either education or advertising; however, responses were only coded as those two themes if they were specifically mentioned.

**Table 51: Things Oregon Could Do to Help Residents Waste Less Food**

*[sorted in descending order]*

	Percent
Education and resources (e.g., classes or programs in the community, instruction in schools, provide resources like a recipe database or recipe/shopping list app)	44.0%
Improve food management skills (without mention of how) (e.g., buy less, buy or prepare smaller portions, buy what you need, make what you need, freeze leftovers)	22.8%
Increase composting, provide curbside composting throughout the state	19.6%
Generally increase awareness (without mention of how)	13.6%
Address issues within industry (e.g., packaging smaller portions, don't incentivize buying larger quantities than needed through pricing, extent/remove dates on products, reduce fast food/commercial waste)	10.9%
Advertise, ad campaign	10.3%
Incentives for reducing wasted food, increase garbage prices	4.9%
Donate excess food to families or food banks (i.e., households, restaurants, grocery stores)	4.3%
Encourage home/community gardens, purchasing of local fresh food, use of farmers markets	4.3%
Reduce waste at schools, serve kids better food, provide smaller meals/snacks	2.7%
Other	3.8%
Nothing, don't know	12.0%

P7: Imagine you could make all the decisions for the state of Oregon about how to waste less food. What do you think Oregon can do to help residents waste less food?

# Analysis

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The four parts of this study – waste sort, kitchen diary, and pre and post-diary survey – revealed several findings along a few themes. First, in terms of how much and the kinds of food thrown away, the level of wasted food, both edible and inedible, is comparable to other studies (NRDC 2017; UK WRAP 2015), indicating that the structures that promote the wasting of food and the behaviors of Oregonians are not dissimilar to others in the US and UK. **Edible food made up 68.2% of food disposed to the landfill and curbside compost streams** (4.9 lb per household per week or 1.9 lb per person) in the waste sort (see, Table A6 in the appendix for per capita results). In the diary tracking method, the percent of edible food thrown away was similar, making up 71% (6.3 lb per household or 2.3 lb per capita) of all food thrown out to *all destinations* and 68% (4.1 lb per household or 1.5 lb per capita) of food disposed to landfill/incinerator and curbside compost. The difference in weight represents a tendency for underreporting in the diary method, as seen in previous studies (e.g., NRDC 2017; UK WRAP 2015). In this study, the under-reporting rate for food disposed to landfill/incinerator in the diary was 35%. Curbside compost stream alone was over-reported in the diary, also similar to NRDC findings. This over-reporting that is in stark contrast to under-reporting for landfill/incinerator that has been found across multiple studies, combined with the smaller sample sizes of curbside compost in the waste sort (also an issue with the NRDC study), suggests that more auditing of compost streams is needed to identify a reliable reporting rate.

Based on waste sorts, inedible parts of food were the largest single category of food type thrown away to landfill and curbside compost stream in the waste sort, constituting 31.8% of the food thrown away. Fruits and vegetables were the next largest type, and the largest amount of edible wasted food at 23.5%. Prepared foods and leftovers were the second largest edible category, at 12%. In terms of weight, these two categories of edible food represent the largest opportunity for preventing waste; however, other categories present significant opportunity in terms of the full lifecycle of impact of preventing their waste.

Tracking wasted food at home with the diary, it was possible to dig in deeper into types and edibility of food thrown out. It was found that (62%) of the wasted food was typically edible and only 9% is questionably edible (see, Table 14). This points to the large opportunity to reduce the wasting of foods already perceived as edible, compared to foods less often perceived as edible such as peels and ends of vegetables. Types of food disposed of *away* from home was similar to food disposed of at home, with fruit and vegetables being the top reported edible category in both settings. However, inedible parts of food were the top contributor to in-home waste, and out of the home, it was third. This highlights a need for more research into the quantities of and reasons for food thrown away outside of the home, particularly since much of it is likely to be edible and preventable waste.

Looking at beliefs and emotions related to wasted food, almost three-quarters (73.7% pre-diary) of respondents agreed that they *should* reduce the amount of food they throw away, yet almost two-thirds (64.3%) believe they throw out less than the average American (see, Figures 20 and 22). This indicates a mixed picture of perceptions of subjunctive (i.e., what one should do) and descriptive norms (i.e., what ‘everyone’ does) around throwing edible food away where most people believe they should throw out less but that they already throw out less than average.

Levels of perceived behavioral control (i.e., how much a person thinks they can make an effect on a situation) are also mixed; 1) less than a quarter (16.2% pre-diary) thought they *could* throw out a lot less, 2) the sample was split on how easy or difficult it would be, 3) a little more than half (59.2%) disagreed that

their household's actions would *not* make a meaningful difference in food thrown out in the country (see, Figure 18). 65.8% reported that reducing the food they throw out would save natural resources. Respondents were also split on whether wasted food affected their household financially.

Guilt is a predominant emotion in people's experiences of waste and this study found that some practices seem to help alleviate the guilt associated with wasting food. Two-thirds (68%) of respondents felt less guilty about storing leftovers than simply throwing them away, even if they are thrown out later, or throwing out food that had been in the fridge for a long time (67.6%). Nearly three-quarters (71.8%) feel less guilty about throwing out food that is composted (see, Figure 24).

This study did not find significant differences in per capita levels of wasted food generated based on the demographics assessed (i.e., household size or type, income, and money spent on food at home and away from home). Adults living alone and households of two or more adults without children believe they throw out less than the average American (see, Table 43) though there were not significant differences in wasted food generated by household composition and our results suggest that Oregonians' levels of wasted food is similar to other Americans.

### Shopping for food

The majority of households shop for food 2-3 times per week at all types of retailers and nearly every household shops at grocery stores (see, Figure 5). Shopping behaviors was one of the only areas with a significant difference between urban and rural respondents. Urban households are more likely to shop at farmers' markets and spend more money eating out. Rural households shop more often at superstores and spend more on food eaten at home (see, Table 36). These findings likely point to contextual and structural differences in urban and rural settings: more farmers' markets are held in urban areas and there are more restaurants, while in rural areas distances to food stores are greater and stocking up at a superstore, where available, can reduce shopping trips, though determining this would require further study.

There were several findings that can help retailers understand how packaging, labeling and appearance can contribute to wasted food. A majority of households said they use date labels when shopping to determine their choices for meat and dairy. When buying fruits and vegetables, the majority of households opt for produce without blemishes (see, Figure 10). When food was thrown out because too much was bought, the most often cited reason for why too much was bought was that the package was too large. People who spend less on food are less likely to buy it in larger quantities. This could point to several opportunities for retailers to work with customers to reduce waste by 1) focusing efforts to clarify date labels on meats and dairy products, 2) promoting imperfect produce, and 3) offering smaller package options or unpackaged, bulk products so customers can choose the amount they need.

### Planning

A majority of respondents do check their supply of food to estimate quantity needed before shopping. Of those who don't, a majority would like to do this more. The proportion of those who did not estimate quantities but would like to plan more increased significantly, from 66.1% to 81.5%, after tracking wasted food with the diary (see, Figure 15). Very few participants planned almost all of their meals, yet most households eat similar meals each week. Of those who do not plan meals, almost three quarters indicated they'd like to do that more (see, Figure 16).

### Leftovers

The most common approach to handling leftovers is to eat them as is, for another meal. The average proportion of leftovers reported to be eaten was quite high at 73.4%. After using the waste tracking diary, this rate rose slightly, but significantly, to 77% (see, Figure 27). However, in the waste sorts, prepared

foods and leftovers were the second largest category of edible food thrown out, making up 13.3% of food disposed in landfill/incinerator and composts stream (see, Table A4 in the appendix). In the diary, prepared foods and leftovers were a slightly larger portion of the food disposed to all destinations at 16.2% (see, Table A9 in the appendix). These high rates of disposing leftovers calls the self-reported rates of leftover consumption into question however more research is needed to determine more precisely how many leftovers are actually eaten versus thrown away. Alternatively, it may be that households are eating most of their leftovers and yet the remainder (uneaten and discarded) are still significant in quantity simply because so many leftovers are being produced in the first place.

### Food preparation

A majority of households remove the bad parts of fruit and vegetables before eating them (see, Figure 30). However, urban households reported doing this significantly more often than rural households (see, Table 48). A majority of households rarely or never use peels and bones when cooking (see, Figures 31 and 32) and a majority agree or somewhat agree that they prepare meals using what's on hand (see, Figure 35).

### Food management

Focusing on food management behaviors, most households (55.6%) never or rarely use a designated area in the refrigerator to store items that need to be eaten sooner (see, Figure 33).

Most households (68.7%) use the time food has been in the fridge and (66.7%) the time food is left out of the refrigerator, to determine whether it is safe to eat (see, Figure 24). After the “use by” or “sell by” date has passed, smelling or looking at food was the most common option to determine if food was still good for all foods except canned foods, where the most common options are to either not pay attention to expiration or use by dates, or to discard the food (see, Table 44).

The diary data gives insight into how mismanagement was tied to specific instances of food loss. The most common immediate loss reason for discarding edible food was due to it being moldy or spoiled (32.1%). Reasons were combined into factors according to themes and food being moldy or spoiled was the predominant reason in the ‘yuck’ factor. Mismanagement (such as losing track of the food, or scheduling problems) was cited most often as the root reason why food landed in the ‘yuck’ category (see, Figure 2).

The most common root reason for food loss was that too much was made (23.8%) followed by lost track of it in the fridge (23.6%). Thinking others would eat a food but didn't was the most cited reason for making too much, pointing to an issue with either mis-estimation of portions, problems with cooking skills, or mismatch in expectations and the food itself (see, Table 21). This mismatch could also be related to issues such as ‘aspirational eating’. For example, two-thirds of respondents stated they'd like to eat in healthier manner, including eating more fruits and vegetables. While a direct relationship can't be tested here, this aspiration is notable as fruits and vegetables are the largest category of wasted edible food.

Structural issues, such as time constraints, work schedules, and social activities, can also lead to mismanagement of food. In this study, just over half of respondents stated that work and social life can lead to food going uneaten (see, Figure 38).

### Effect of diary

As cities and states consider using kitchen diaries as one tool to help their citizens identify and track the wasting of food, it is notable that the diary tool has a split effect. 45% of participants (post-diary) realized they waste more food than they realized and 33% of participants (post-diary) realized the exact opposite, that they waste very little food and are good at managing food (see Table 50). As noted earlier, the diary does appear to motivate people wanting to plan more meals and reporting that they eat more of their

leftovers, though more research is needed to understand whether this increased motivation actually translates into changed behaviors, and whether these behaviors, in what contexts, would reduce wasted food.

# Appendix

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## Measurement tools

### Diary Script

Q146 Welcome to the Oregon food diary! If you have any questions, please check out the [USER GUIDE](#).

Q161 Did you dispose of any food today?

Yes (1)

No (2)

Q145 What is the date?

Date entry

If answered “No” in Q161

Q143 Comments:

Text entry \_\_\_\_\_

End of survey

If answered “Yes” in Q161,

Q147 Where was the food disposed of?

At home (1)

Outside of the home (2)

Q148 Was the food from breakfast, lunch, dinner, or not part of a meal?

Breakfast (1)

Lunch (2)

Dinner (3)

Not part of a meal (4)

Q149 Would you like to add a photo?

Choose file button, browse to choose photo file

Q150 Please provide a detailed description of the food.

Text entry \_\_\_\_\_

Q151 How much did it weigh?

(0 to any whole integer)

pounds (lb) \_\_\_\_\_

ounces (oz) \_\_\_\_\_

If answered “Outside of the home” in Q147

Q152 Where did it come from?

- Restaurant or Cafeteria (1)
- Grocery store or market (2)
- Brought from home (3)
- Other (4) \_\_\_\_\_

If answered “Other” in Q152,

Type text explaining where it came from, text entry

Q153 Was it?

- Unprepared food (1)
- Cooked or prepared food (2)
- Inedible parts (3)
- Liquids (coffee, milk, etc.) (6)
- Other (5) \_\_\_\_\_

If answered “Other” in Q153,

Type text answering the nature of the food, if answer is not listed in the response list from Q153, text entry

Q154 Reason? (select the primary one)

- Past date on label (1)
- Moldy or spoiled (2)
- Didn't like or tired of eating (3)
- Worry that it might cause illness (4)
- Too little to save (6)
- Not good as leftovers (7)
- Unable to store or save (10)
- Other (9) \_\_\_\_\_

If answered “Other” in Q154,

Type text explaining primary reason for disposing of food, if answer is not included in the response list for Q154, text entry

Q155 What happened?

- Bought too much (1)
- Made too much (2)
- Lost track of in the fridge or cupboard (3)
- Too busy (4)
- Didn't know what to do with or how to use (6)
- Other (5) \_\_\_\_\_

If answered "Other" in Q155,

Type text explaining what happened, if answer is not included in the response list from Q155, text entry

Q156 Why was too much bought?

- It was on sale or discounted (1)
- The package was too large (2)
- Don't know (3)
- Other (4) \_\_\_\_\_

If answered "Other" in Q156,

Type text answering why too much was bought, if answer is not included in the response list from Q156, text entry

Q157 Why was too much made?

- Made a larger batch to eat throughout the week (1)
- Thought Others would eat it (2)
- Made too much on accident (3)
- Don't know (5)
- Other (4) \_\_\_\_\_

If answered "Other" in Q157,

Type text answering why too much was made, if answer is not included in the response list from Q157, text entry

Q158 Where did it go?

- Trash (1)
- Compost picked up at curb (2)
- Home or other compost (3)
- Down the drain (4)
- Fed to pets/animals (5)
- Other (6) \_\_\_\_\_

If answered "Other" in Q158,

Type text answering where and how the food was disposed of, if answer is not included in the response list from Q158

Q133 Comments:

Text entry \_\_\_\_\_

Q159 Do you have another entry to make?

Yes (1)

No (2)

If No, end of survey.

If Yes, return to beginning of survey

If Yes and 10<sup>th</sup> entry made,

This will be the final item you can enter, but if you still have more entries to make you can click on your diary link again after clicking the next button below.

# Pre-Diary Survey

Thank you for taking time to participate in this important project. This is the initial survey and the first step in the Oregon Food Study. The purpose of the survey is to better understand how Oregonians purchase, use and dispose of food. The results will be used to develop programs to better manage food and leftovers. The survey takes about 20-30 minutes and is completely confidential. You may skip any item you don't want to answer, or stop the survey at any time.

First, a few questions about your household's shopping habits. Throughout the survey, when we say "household" we mean anyone you consider to be part of your household. Consider anyone you usually buy or cook food with or for. If you live alone or don't have anyone you buy or cook food with or for, consider yourself the "household".

*[response option codes for each item are shown in parentheses]*

Q1 Below is a list of possible places where your household may purchase or get food to eat at home. Please select all that apply.

- Superstores, like Costco (1)
- Grocery stores (2)
- Corner stores or mini-marts (3)
- Farmers market (4)
- Food pantries (5)
- Your backyard garden or local garden (6)
- CSA (Community-supported agriculture) (7)
- Online meal delivery for example, GrubHub, Blue Apron, or restaurants (8)
- Online grocery delivery for example, Amazon or Safeway (9)
- Other (Please specify) (66) \_\_\_\_\_

*Display This Question: If Below is a list of possible places where your household may purchase or get food to eat at home.... = Grocery stores*

Q1A On average, how often does your household purchase or get food from a grocery store? Please consider your purchasing habits over the past year.

- 3 or more times per week (1)
- 1 to 2 times per week (2)
- Less than once per week (3)

*Display This Question: If Below is a list of possible places where your household may purchase or get food to eat at home.... = Farmers market*

Q1B On average, how often does your household purchase or get food from a farmers market? Please consider your purchasing habits over the past year.

- 3 or more times per week (1)
- 1 to 2 times per week (2)
- Less than once per week (3)

Q2 Before shopping for food, how often does your household check to see what you already have?

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- Always (5)

Q2A Would you like to do that more?

- No (0)
- Yes (1)

Q3 Before shopping for food, how often does your household estimate how much of each item you need to buy?

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- Always (5)

Q3A Would you like to do that more?

- No (0)
- Yes (1)

Q4 When shopping for food, how often does your household do the following...

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Buy more of a product than you were planning to, because it is on sale? (Q4_A)	<input type="radio"/>				
Buy something unplanned, because it looks good at the time? (Q4_B)	<input type="radio"/>				
Buy food in larger quantities than desired, due to the way food is packaged? (Q4_C)	<input type="radio"/>				

Q15\_1 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
I buy more than what I need in case there are unexpected guests. (Q15_I)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I buy more than I need because I like my fridge to be full. (Q15_J)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find grocery shopping to be a hassle. (Q15_G)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Date labels are a key source of information I use when purchasing dairy and meat. (Q15_K)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When shopping at the grocery store, I only purchase fruits and vegetables with no blemishes. (N15_A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5 On which days of the week does your household usually shop for food? Please select all that apply.

- Monday (1)
- Tuesday (2)
- Wednesday (3)
- Thursday (4)
- Friday (5)
- Saturday (6)
- Sunday (7)

Q6 On a weekly basis, how many of your main meals do you plan ahead of time? Main meals would be breakfast, lunch, or dinner.

- Almost all of them (1)
- Most of them (2)
- A few of them (3)
- None of them (4)

Q6A Would you like to plan ahead more often?

- No (0)
- Yes (1)

Q15\_2 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
The person in my household who most often prepares meals is able to create meals based on what is on-hand. (If there is not one particular person that applies to, please consider yourself for this question.) (Q15_D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My household eats similar meals each week. (Q15_C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish I ate more healthily, for example eating more servings of fresh fruits and vegetables. (Q15_E)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work and social life can make managing food at home difficult, leading to food going uneaten. (Q15_F)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always eat the food that I have stored in the freezer. (Q15_H)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to finish all food that is on our plates for a meal. (N15_B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worry about whether I will have enough food in an average week. (N15_C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7 As part of your household's garbage and recycling service, do you have a separate container for food and yard waste?

- No (1)
- Yes (2)

Q8 Sometimes households have leftovers. How often are leftovers...

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
...eaten as another meal, without alteration or other food added? (Q8_A)	<input type="radio"/>				
...used as part of another meal, with other food added? (Q8_B)	<input type="radio"/>				
...composted or put in curbside composting? (Q8_C)	<input type="radio"/>				
...thrown in the garbage? (Q8_F)	<input type="radio"/>				
...fed to animals? (Q8_E)	<input type="radio"/>				
...put down the drain or garbage disposal? (Q8_D)	<input type="radio"/>				

Q9 Considering the food your household throws away or composts in the average week, how much of that do you think could be avoided?

- None (1)
- A Little (2)
- About half (3)
- A Lot (4)
- All (5)
- Not Applicable / Don't Compost or Throw Away Food (7)

SCREEN Do you live in a vegan or vegetarian household?

- Vegan household (1)
- Vegetarian household (2)
- Neither (3)

Q10 Food is often marked with a “use by,” “sell by,” or “best by” date. What do you generally do with the following foods after that date has passed?

	Don't pay attention to dates (1)	Throw it away or compost it (2)	Smell or look at it to determine if it's still good (3)	Not Applicable, everything is eaten or frozen before the package date (4)	None of the above (7)	Don't buy or eat this type of food (8)
<i>Do you live in a vegan or vegetarian household? = Neither</i> Fresh meat or fish (Q10_A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Do you live in a vegan or vegetarian household? ≠ Vegan household</i> Eggs or dairy <i>Dairy would include milk, cheese, yogurt, etc.</i> (Q10_B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fresh fruits or vegetables <i>This would include dates on packaged fruits and vegetables.</i> (Q10_C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Canned Foods (Q10_D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Condiments, for example, mayonnaise, mustard, or salad dressing (Q10_E)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

N1 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
I use the time food has been left out of the fridge to determine whether food is safe to eat? (N1_A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use the time food has been stored in the fridge to determine whether food is safe to eat? (N1_B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11 How often do you clean out your fridge?

- Every week (1)
- Every other week (2)
- Every month (3)
- Every 3 months or more (4)
- Never (5)

N2 In general, what proportion of your household leftovers are eaten?



Q12 Generally, how often do you or other household members take the following actions:

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Prioritize eating leftovers? (Q12_A)	<input type="radio"/>				
Freeze leftovers if you think you will not be able to eat them in time? (Q12_B)	<input type="radio"/>				
Remove the bad part and eat the rest, when fruits or vegetables are bruised? (Q12_C)	<input type="radio"/>				
Use vegetable peels and stalks in cooking (for example, soups)? (Q12_D)	<input type="radio"/>				
Use bones for cooking (in soups, for example)? (Q12_E)	<input type="radio"/>				
Manage food in the refrigerator, by storing items that need to be eaten the soonest in a designated area? (Q12_F)	<input type="radio"/>				

Q13 Thinking of the average American, do you think the amount of food you throw out or compost is:

- A Lot More (1)
- A Little Bit More (2)
- The Same (3)
- A Little Bit Less (4)
- A Lot Less (5)
- Don't Know (8)

Q14 How easy or difficult do you think it would be for you personally to reduce the amount of food that goes to waste in your household?

- Very difficult (1)
- Somewhat difficult (2)
- Neither difficult nor easy (3)
- Somewhat easy (4)
- Very easy (5)
- Not applicable (7)

Q15\_3 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
I feel less guilty about throwing out food that has been in the refrigerator for a long time, compared to food that has been in the refrigerator for a short time. (Q15_A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel less guilty about throwing out food that is composted. (N15_D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel less guilty about storing leftovers rather than throwing food away, even if they are thrown away later. (N15_E)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15\_4 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
Given the amount of food that is thrown away in this country, the actions of my household will not make a meaningful difference in the amount of food being wasted. (N15_F)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe my household should reduce the amount of food we throw away. (Q15_B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quantity of food that goes uneaten in my home costs my household very little money. (N15_G)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing how much food my household throws out would save resources used to grow and produce the food we eat. (N15_H)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

D1A Approximately how much money does your household spend on food and beverages EATEN AT HOME each week?

- \$100 or less (1)
- \$101 to \$200 (2)
- \$201 to \$300 (3)
- More than \$300 (4)
- Don't Know (8)

D1B Approximately how much money does your household spend on food and beverages EATEN AWAY FROM HOME each week?

- \$100 or less (1)
- \$101 to \$200 (2)
- \$201 to \$300 (3)
- More than \$300 (4)
- Don't Know (8)

D3 How many people live in your household, including yourself?

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D4 Other than yourself, how many people live in your household in each of the following age groups?

	None (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 or More (8)
0 to 5 years old (1)	<input type="radio"/>							
6 to 12 years old (2)	<input type="radio"/>							
13 to 17 years old (3)	<input type="radio"/>							
18 to 64 years old (4)	<input type="radio"/>							
65 years of age or older (5)	<input type="radio"/>							

D5 In what year were you born?

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D6 To verify, what is your gender?

- Male (0)
- Female (1)
- Other (2)
- Prefer not to answer (3)

D8 Which of the following best describes your race or ethnicity? Please select all that apply.

- American Indian or Alaska Native (1)
- Asian (2)
- Black or African American (3)
- Hispanic or Latino (4)
- Native Hawaiian or Pacific Islander (5)
- White (6)
- Some other race or ethnicity (Please specify) (7)

D9 What is the highest level of education you have completed?

- Elementary or some high school (no diploma or GED) (1)
- High school diploma or GED (2)
- Some college, but no degree (3)
- Associate's degree (2-year degree, AA, AS, etc.) (4)
- Bachelor's degree (4-year degree, BA, BS, etc.) (5)
- Master's degree or higher (6)

D10 What was your approximate annual household income in 2016?

- Less than \$10,000 (0)
- \$10,000 to less than \$25,000 (1)
- \$25,000 to less than \$50,000 (2)
- \$50,000 to less than \$75,000 (3)
- \$75,000 to less than \$100,000 (4)
- \$100,000 to less than \$150,000 (5)
- \$150,000 to less than \$200,000 (6)
- \$200,000 or more (7)

Q37 Thank you again for taking time to participate in this important project! When you are ready, you can click "Submit" and your responses will be recorded.

## Post-Diary Survey

Thank you for taking time to participate in this important project. This is the follow-up survey described in your user guide, and is the final step in the Oregon Food Study. As a reminder, your participation in this project is voluntary and you may stop at any time. You may also skip any questions you do not wish to answer.

The following set of questions are about your experience in this study.

*[response option codes for each item are shown in parentheses]*

P1 What (if anything) would have made it easier to complete the kitchen diary or participate in this study in general?

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P2 What did you learn (if anything) from participating in this study?

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P8 How often is your garbage (landfill-bound trash, not separated recyclables) picked up?

- More than once a week (1)
- Once a week (2)
- Every two weeks (3)
- Once a month (4)
- Other (5)

P9 How many hours do you work in paid employment each week?

- More than 40 (1)
- 30-40 (2)
- 20-30 (3)
- 10-20 (4)
- less than 10 (5)
- Do not work in paid employment (6)

Q9 Considering the food your household throws away or composts in the average week, how much of that do you think could be avoided?

- None (1)
- A Little (2)
- About half (3)
- A Lot (4)
- All (5)
- Not Applicable / Don't Compost or Throw Away Food (7)

Q13 Thinking of the average American, do you think the amount of food you throw out or compost is:

- A Lot More (1)
- A Little Bit More (2)
- The Same (3)
- A Little Bit Less (4)
- A Lot Less (5)
- Don't Know (8)

Q14 How easy or difficult do you think it would be for you personally to reduce the amount of food that goes to waste in your household?

- Very difficult (1)
- Somewhat difficult (2)
- Neither difficult nor easy (3)
- Somewhat easy (4)
- Very easy (5)
- Not applicable (7)

P3-4 How strongly do you agree or disagree with the following statements?

	Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat Disagree (4)	Disagree (5)
Measuring the food that was discarded in our household reduced how much food we throw away. (P3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After measuring the food that was discarded in our household, I now believe that our household throws out or composts more food than I previously thought. (P4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15\_B How strongly do you agree or disagree that your household should reduce the amount of food you throw away?

- Agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Disagree (5)

P5 How strongly do you agree or disagree that being in this study increased how often you talked with *members of your household* about the issue of food being wasted (other than talking about using the diary)?

- Agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Disagree (5)
- Not applicable, I live alone (6)

P6 How strongly do you agree or disagree that being in this study increased how often you talked with *someone outside of your household* about the issue of food being wasted (other than talking about using the diary)?

- Agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Disagree (5)

Q2 Before shopping for food, how often does your household check to see what you already have?

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- Always (5)

Q2A Would you like to do that more?

- No (0)
- Yes (1)

Q3 Before shopping for food, how often does your household estimate how much of each item you need to buy?

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- Always (5)

Q3A Would you like to do that more?

- No (0)
- Yes (1)

Q6 On a weekly basis, how many of your main meals do you plan ahead of time?

- Almost all of them (1)
- Most of them (2)
- A few of them (3)
- None of them (4)

Q6A Would you like to plan ahead more often?

- No (0)
- Yes (1)

N2 In general, what proportion of your household leftovers are eaten?



Q12 Generally, how often do you or other household members take the following actions:

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
Prioritize eating leftovers? (Q12_A)	<input type="radio"/>				
Freeze leftovers if you think you will not be able to eat them in time? (Q12_B)	<input type="radio"/>				
Remove the bad part and eat the rest, when fruits or vegetables are bruised? (Q12_C)	<input type="radio"/>				
Use vegetable peels and stalks in cooking (for example, soups)? (Q12_D)	<input type="radio"/>				
Use bones for cooking (in soups, for example)? (Q12_E)	<input type="radio"/>				
Manage food in the refrigerator, by storing items that need to be eaten the soonest in a designated area? (Q12_F)	<input type="radio"/>				

P7 Imagine you could make all the decisions for the state of Oregon about how to waste less food... What do you think Oregon can do to help residents waste less food?

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END Thank you again for taking time to participate in this important project! When you are ready, you can click "Submit" and your responses will be recorded.

# Participant Support Materials

## User guide

The **online version** of the user guide can be found at:  
<https://sites.google.com/pdx.edu/fooddiaryguide/home>

The **paper version** of the user guide follows:

## Oregon Food Study User Guide

Welcome to the Oregon Food Study! We appreciate your participation in this important project. Below you will find information on what's involved in the study, instructions on how to complete the Food Diary, and answers to other frequently asked questions. If at any point you decide you would rather complete the surveys or diary online, please contact us and we will be glad to email you links so you can participate online.

You can find all of this information and more online at <https://sites.google.com/pdx.edu/fooddiaryguide/home>

**If you have questions, please contact our support staff at [ORfoodstudy@gmail.com](mailto:ORfoodstudy@gmail.com) or (503) 420-7340**

### SURVEYS

The first step is to complete Survey #1. Survey #1 should take approximately 20-30 minutes and asks questions about your households food-related behaviors, attitudes, and beliefs. Survey #2 is a shorter, follow-up survey done at the end of the study. We will mail you each survey. Please take the surveys as soon as possible after you receive them. Survey #1 needs to be completed before you begin your food diary. If you encounter any difficulties when trying to take the surveys, please contact us!

### HAVING YOUR GARBAGE AND CURBSIDE COMPOST COLLECTED

Project staff will come by to pick up your household's discarded trash and curbside compost, if you have curbside compost service. We ask that you simply put your garbage and compost out as you normally do. You do not have to do anything differently for this step. We will contact you to remind you to put out your trash and compost (where applicable) the day before your collection.

*For participants who live in an apartment or other multifamily housing, we have given you orange bags. Please use the bags for **all of your usual waste** and put it in the bin or dumpster as you normally would. You do not need to change any of your normal disposal habits, other than using the provided bags, before putting your trash in the bin or dumpster. We will send you a reminder the day before we collect, asking you to put out your orange bagged waste.*

### USING THE FOOD DIARY

You will weigh and record all food and drink you dispose of in your household for one week using the Food Diary. The diary can be done online or on paper, depending on your preference. You will have 2 weeks to complete the diary. If you complete the surveys, have your garbage collected, and complete seven days of the diary, you will receive a \$60 Amazon gift card. If you do the surveys and garbage collection AND can complete the diary in just one week, recording your food for **seven days in a row**, you receive a \$30 bonus. If you are able, please also record any food you personally discard outside of the home as well.

## How to use the food diary

1. Please record all of the food and drink discarded (thrown away, composted, poured down the drain, or fed to pets) in your household, including things you wouldn't normally eat (chicken bones, vegetable scraps, etc.), as well as any food/drink you personally discard outside of the home.
2. You should use a new page each day, and make an entry each time you discard food. You can use more than one page per day if you need to but **don't forget to fill in the date on the top of each page.**
3. The top portion is for food discarded in your household (by everyone) and the bottom section is for food you (only you) discard outside of the home. There is a comments section in the middle for any unusual circumstances or important notes. Please note if the food being discarded is part of a fridge or pantry "clean out."
4. Mark the box that applies for each section with a check or an X. If you choose other and want to write in the option, you can use the numbered lines on the bottom of the page. Just put the line number in the box instead of a check or an X.
5. If you and your household did not discard any food that day, please mark the box at the top of the page and indicate why in the comments section. You can use the numbered lines at the bottom if you need more space.
6. At the end of your diary period, please put all completed pages in the envelope and mail it back to us.

## Weighing your food

1. For all food and drink discarded at home, you will be asked to record the weight, using the provided scale (which is yours to keep). Please record ALL the food and drink that is discarded by all the people in your household, no matter what it is, why it is being discarded, or how small it is. For food and drink discarded outside of the home, you only need to record your own you don't need to record the weight.
2. Be sure the scale is set to ounces by pressing the UNIT button until "lb:oz" appears.
3. Set the scale to zero with the empty container on it, by pressing the Power/TARE button.
4. Record the weight in the weight box in the diary.
5. See the detailed instructions on using the scale in the following pages.

## The Diary Questions

Included with this guide are 10 pages of blank diary pages. Please use them each day for seven days. The questions below are for reference only and your entries should be marked on the diary tables provided.

1. **Meal:** Was the food from breakfast, lunch, or dinner? Choose the meal that the food was a part of or select "not a meal" if the food wasn't part of a regular meal.
  - Breakfast
  - Lunch
  - Dinner
  - Not part of a meal
2. **Item:** Use this space to give a detailed description of the food or drink [including inedible parts]. Examples: Apple core, leftover chicken breast, or pizza with cheese, tomato sauce, pepperoni, and olives.
3. **Weight:** Using the provided scale and tubs, please weigh the item(s) and record to the nearest tenth of an ounce [0.1 ounces]. *This is for food discarded at home by everyone.*

4. **Where's it from?** *This is only for food discarded outside of the home, only by you.*
- Restaurant or cafeteria
  - Grocery store or market
  - Brought from home
  - Other \_\_\_\_\_ (*remember to use the lines below and write the line number in this box*)
5. **Condition:** Select one that best describes the item(s)
- Unprepared food - (i.e. bread slices, an orange, block of cheese, canned beans)
  - Prepared, cooked, or leftovers - (i.e. macaroni salad, a sandwich, leftover pasta)
  - Inedible parts - (Use this option for items you would not normally eat, such as egg shells, avocado peels, or
  - Liquids - (any liquid you would normally consume as a beverage)
  - Other \_\_\_\_\_ (please write in any other conditions the item(s) were in.
6. **Reason:** Select the reason that best describes why you are getting rid of the item(s) rather than eating it.
- Past date on the label
  - Moldy or spoiled
  - Don't like or tired of eating
  - Worry that it might cause illness
  - Improperly cooked
  - Too little to save
  - Not good as leftovers
  - Unable to save or store (This option will be available for food discarded outside of the home, for situation when you are simply unable to save leftover food.)
  - Other \_\_\_\_\_
7. **Did you?** Please choose the option that best explains why the food was not eaten.
- Bought too much
  - Made too much
  - Lost track of in the fridge or cupboard
  - Too busy
  - Didn't know what to do with it or how to use
  - None of these apply
8. **Where did it go?** What was the final destination for the item?
- Trash
  - Compost picked up at curb
  - Home or other compost
  - Down the drain
  - Fed to pets or animals
  - Other \_\_\_\_\_

## What Food To Include

Please include ALL food and drink you get rid of. This includes things you would normally eat or drink, such as:

- Fruit and vegetables
  - Meat or fish
  - Dairy and eggs
  - Bread, pasta, rice, boxed cereal
  - Prepared meals (like Lasagna, soup, salads, pizza, burrito, etc.)
  - Milk, soft drinks, coffee, tea, juice, beer, wine, and alcohol
  - Leftovers, frozen foods, and that little bit you just couldn't finish
  - Condiments, sauces, dressing, and oils
- This also includes items that you would not normally eat, but are still part of your food, such as:
- Egg shells
  - Coffee grounds (you can include the filter) and tea bags
  - Bones, skin, and other parts from meat or fish
  - Fruit and vegetable cores, husks, peels, pits, pods, rinds, roots, stems, skins, seeds, and stalks
  - Cheese rinds
  - When using the diary, only select "inedible parts" for food or drink that you or your household considers to be inedible.

## Using the Scale

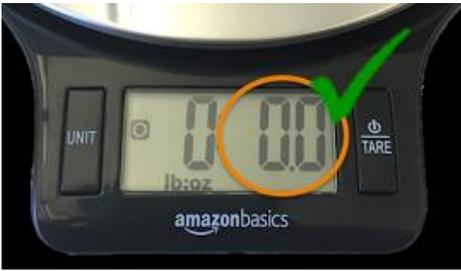
1) After inserting the batteries, turn the scale on by pressing the POWER/TARE button.



2) Be sure the scale is set to ounces by pressing the UNIT button until "lb:oz" appears.



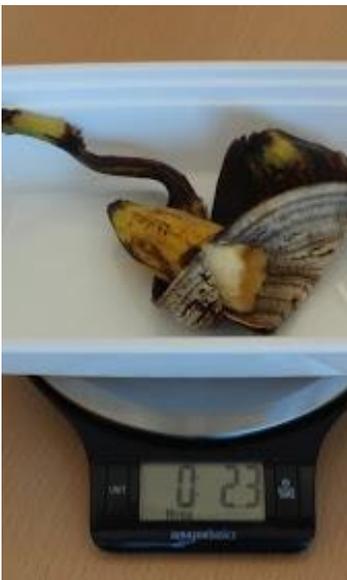
3) Before weighing items, set scale to zero by pressing the POWER/TARE button.



4) If you are using a container, place the empty container on the scale and then press the POWER/TARE button.



5) Once you add your items to the scale, there will be two numbers on the screen. The first is pounds and the second is ounces (for example a weight of 3 lbs. and 9.3 oz would be displayed as 3 : 9.3). Please record the displayed pounds and ounces in the diary.



## Support & Contact

You may contact the project support staff by email or phone. We will respond as quickly as possible. Email us at [ORFoodStudy@gmail.com](mailto:ORFoodStudy@gmail.com) or call us at (503) 420-7340.

# FAQ

## The Food Diary

Q: What if I forgot to complete the diary for one of the days?

A: Don't worry, you have 14 days to complete 7 days of the diary, and you can still receive a \$60 gift card. If you can complete the diary for seven days in a row you get a \$30 bonus for a total of \$90 gift card.

Q: Am I supposed to record food/drink discarded outside of the house?

A: Yes, but only the food you personally discard, and you will not be asked to weigh it.

Q: We didn't discard anything in our house for a day and I did not discard anything outside of the home either. What do I record?

A: The first question in the diary asks if you discarded any food today. If you didn't discard any food or drink for a whole day, then select "no" and that is all you have to do that day. You can also explain if there was an unusual cause for this in the comments section.

Q: Should I record food/drink discarded outside of the household for every family member?

A: No. Only the primary participant should record the food/drink they discard outside of the household.

Q: How should I note if the amount of food/drink discarded is different than usual because of a special event (e.g. party, barbeque, cleaned out refrigerator)?

A: Write a note in the comments section that indicates there was a special event or clean-out.

## Kitchen Scale

Q: What if I can't get my scale to work?

A: First, ensure that your batteries are properly installed and that you have read the page on how to use the kitchen scale. If the scale still doesn't work, please contact participant support.

## Surveys

Q: What if I didn't receive my survey in the mail? Or I forgot to complete the survey before starting the diary?

A: If you didn't receive your Survey #1, contact us immediately. Survey #2 will be sent to you after we receive your completed diary.

If you didn't yet complete the Survey #1, please complete it as soon as possible, send it back to us in the enclosed SASE and contact us to let us know.

## Waste collection

Q: What if I forgot to place my trash and/or compost out on the curb?

A: If this occurs, please contact us as soon as possible.

# Additional Diary Instructions

These notes were distributed with each scale.

## Oregon Food Study: Kitchen Diary Important Notes

Thank you for completing the Survey #1, either online or on paper. Now, it is time to start the kitchen diary. We will contact you with the two week period you can use to record your food. You will find full instructions for the kitchen diary in the User Guide. This reference sheet will help you with some important details and questions you may have.

**Please weigh and record all of the food** (including inedible food parts, e.g. banana peels, eggshells, and coffee grounds) **and beverages you discard in your household for one week** using the online diary link or the kitchen diary pages provided you, if you requested paper copies.

Additionally, we do not ask that you *weigh* any food/drink discarded outside of your home, but we do ask that you *record it*, either in the online diary or in the second section on each paper kitchen diary page.

You can help us by filling out the kitchen diary as completely and accurately as possible. To help everyone in your household remember to record all of the food and drink that gets thrown away during the week, you may want to select one person to take the lead in your household. **It is very important that you record ALL of the food and drink that is thrown away:**

- By all the people in your household
- No matter what it is or why it is being discarded (even food that you would not normally eat such as fruit pits, bones, or vegetable peels)
- No matter where you discarded it (in your trash, curbside compost, put down the drain, fed to pets or animals, or composted in your backyard)
- No matter the amount being discarded (nothing is too small to measure)
- Do not include food purchased for the main intention of feeding animals.
- Don't change how you usually prepare or discard food/drinks. If you would normally do a refrigerator or cupboard clean out during the week, do that.
- If anything unusual occurs in your weekly food-related activities (like you throw a party or eat out more than usual), please note that in the comments section.
- Any food discarded in your household trash or compost should be recorded as food disposed of in the household even if it was not prepared at home (for example: you should record leftovers from restaurants that are later discarded at home).
- If you did not discard any food/drink at home or outside of the home on a given day, please check the box that notes this.
- It is best to record discarded food/drink as it happens; however, you or other household members may want to set discarded food aside until you can record it in the kitchen diary. You can also take photos of it and refer to it later. Online diary users have the option of uploading these photos.

For those using the paper diary:

- If you run out of room to record information, there are extra pages (10).
- Describe any food/drink discarded in detail and fill out the required boxes in each row of the kitchen diary. If there are many ingredients, please provide as much detail as possible (for example: one pan of homemade lasagna including two zucchini, ground beef, tomato sauce, and cheese).
- When checking the box that best describes the state of the food/drink when discarded, please see the definitions below. If none of them apply, please write the state of the food/drink in the “Other” box.
  - Unprepared (meaning it was not cooked or prepared – for example: a whole onion, bread slices, an orange, a block of cheese, canned beans)
  - Prepared, Cooked or Leftovers (meaning food was cooked or in the final state before eating – for example: salads, lasagna, sandwiches)
  - Inedible Parts (meaning these are items you would not normally eat – for example, egg shells, pits, peels, or coffee grounds)
  - Liquids – any liquid you would normally consume as a beverage
  - Other (for any other conditions the items were in)

For those using the online diary:

- Describe any food/drink discarded in detail and fill out each question the online form guides you to enter. If there are many ingredients, please provide as much detail as possible (for example: one pan of homemade lasagna including two zucchini, ground beef, tomato sauce, and cheese). There is a question where you will be asked to provide as much detail as possible.
- You may re-use your link to make as many entries as needed; be sure to note the correct date for the entry.

#### A special note on weighing food in packaging

Page 6-7 of the User Guide shows you how to use the scale to weigh your food that you dispose of.

It may be easier to place the discarded food/drink in a separate container to weigh it, either the one we provided you or one of your choosing. If you use a container, tare it while empty, prior to weighing the food. You do not need to indicate that you used a container in this way for weighing.

If your food or drink is in packaging that is not easy to remove before weighing it, then you do not need to remove the food/drink from the packaging and follow the guidelines below:

- If the discarded food was in glass, metal, or hard plastic when weighed, estimate the size of the packaging (dimensions or volume) and note the type of packing in the comments.
- Do not record lightweight packaging such as plastic wrap or paper packaging in the diary, as these materials are much lighter than the weight of the food/drink

# Additional Data Tables

## Waste Sort

**Table A1: Weights for Landfill/Incinerator Bound Waste Sort Data, One Week**

Food Category	Urban (n=134)			Rural (n=96)			Total (n=230)		
	% of Food	% of Trash	Total Weight	% of Food	% of Trash	Total Weight	% of Food	% of Trash	Total Weight
<b>Inedible</b>	<b>23.8%</b>	<b>9.1%</b>	<b>166.1</b>	<b>30.2%</b>	<b>10.8%</b>	<b>181.5</b>	<b>26.8%</b>	<b>10.0%</b>	<b>347.6</b>
Vegetables & Fruit	24.0%	9.2%	167.5	21.4%	7.7%	128.5	22.8%	8.5%	296.0
Prepared Foods & Leftovers	15.2%	5.8%	106.0	13.3%	4.8%	80.1	14.3%	5.3%	186.2
Baked Goods	7.7%	3.0%	53.8	10.9%	3.9%	65.3	9.2%	3.4%	119.1
Meat & Fish	7.7%	3.0%	53.7	9.3%	3.3%	55.7	8.4%	3.1%	109.5
Snacks, Condiments, Sauces	7.6%	2.9%	53.0	7.1%	2.6%	43.0	7.4%	2.7%	95.9
Dry Foods	7.6%	2.9%	52.8	1.8%	0.6%	10.8	4.9%	1.8%	63.6
Liquids, Oils, Grease	3.4%	1.3%	23.8	2.0%	0.7%	12.3	2.8%	1.0%	36.0
Dairy	2.5%	0.9%	17.2	2.7%	1.0%	16.2	2.6%	1.0%	33.4
Eggs	0.2%	0.1%	1.3	0.9%	0.3%	5.4	0.5%	0.2%	6.6
Unidentifiable	0.3%	0.1%	1.9	0.5%	0.2%	2.8	0.4%	0.1%	4.7
<b>Subtotal Edible Food</b>	<b>76.2%</b>	<b>29.2%</b>	<b>530.9</b>	<b>69.8%</b>	<b>25.1%</b>	<b>420.0</b>	<b>73.2%</b>	<b>27.2%</b>	<b>950.9</b>
<b>All Food</b>		<b>38.4%</b>	<b>697.0</b>		<b>35.9%</b>	<b>601.4</b>		<b>37.2%</b>	<b>1298.4</b>
<b>Total Trash Weight</b>			<b>1817.1</b>			<b>1675.5</b>			<b>3492.6</b>

Weights are in pounds.

**Table A2: Weights for Curbside Compost Bound Waste Sort Data, One Week**

Category	Urban (n=53)		Rural (n=4)		Total (n=58)	
	% of Food	Total Weight	% of Food	Total Weight	% of Food	Total Weight
<b>Inedible</b>	<b>49.7%</b>	<b>163.8</b>	<b>84.0%</b>	<b>9.6</b>	<b>50.9%</b>	<b>173.4</b>
Vegetables & Fruit	27.0%	88.9	4.3%	0.5	26.2%	89.4
Unidentifiable	10.3%	33.8	<0.1%	<0.1	9.9%	33.8
Baked Goods	5.0%	16.4	11.7%	1.3	5.2%	17.7
Prepared Food & Leftovers	3.3%	10.9	<0.1%	<0.1	3.2%	10.9
Dry Foods	2.8%	9.4	<0.1%	<0.1	2.7%	9.4
Meat & Fish	1.0%	3.4	<0.1%	<0.1	1.0%	3.4
Snacks, Condiments, Sauces	0.4%	1.5	<0.1%	<0.1	0.4%	1.5
Dairy	0.4%	1.3	<0.1%	<0.1	0.4%	1.3
Eggs	0.1%	0.2	<0.1%	<0.1	0.1%	0.2
Liquids, Oils, Grease	<0.1%	<0.1	<0.1%	<0.1	<0.1%	<0.1
<b>Subtotal Edible Food</b>	<b>50.3%</b>	<b>165.6</b>	<b>16.0%</b>	<b>1.8</b>	<b>49.1%</b>	<b>167.4</b>
<b>All Food</b>		<b>329.5</b>		<b>11.4</b>		<b>340.9</b>

Weights are in pounds.

**Table A3: Weights for Combined Landfill and Compost from Waste Sorts, One Week**

Food Category	Urban (n=134)		Rural (n=96)		Total (n=230)	
	% of Food	Total Weight	% of Food	Total Weight	% of Food	Total Weight
<b>Inedible</b>	<b>32.1%</b>	<b>329.9</b>	<b>31.2%</b>	<b>191.1</b>	<b>31.8%</b>	<b>521.0</b>
Vegetables & Fruit	25.0%	256.4	21.0%	129.0	23.5%	385.4
Prepared Foods & Leftovers	11.4%	116.9	13.1%	80.1	12.0%	197.0
Baked Goods	6.8%	70.2	10.9%	66.6	8.3%	136.8
Meat & Fish	5.6%	57.2	9.1%	55.7	6.9%	112.9
Snacks, Condiments, Sauces	5.3%	54.4	7.0%	43.0	5.9%	97.4
Dry Foods	6.0%	62.1	1.8%	10.8	4.4%	72.9
Unidentifiable	3.5%	35.7	0.5%	2.8	2.3%	38.5
Liquids, Oils, Grease	2.3%	23.8	2.0%	12.3	2.2%	36.0
Dairy	1.8%	18.5	2.6%	16.2	2.1%	34.6
Eggs	0.1%	1.5	0.9%	5.4	0.4%	6.8
<b>Subtotal Edible Food</b>	<b>67.9%</b>	<b>696.5</b>	<b>68.8%</b>	<b>421.8</b>	<b>68.2%</b>	<b>1118.3</b>
<b>All Food</b>		<b>1026.5</b>		<b>612.9</b>		<b>1639.3</b>

Weights are in pounds.

The sample size in the per capita analyses were smaller than the household level analyses because 43 households did not specify the number of members in the household. Excluding these 43 households, the remaining 187 households accounted for 535 individuals in the sample. Independent-samples t-tests were conducted to assess differences in the per capita mean weights of food disposed between the urban and rural samples. Only inedible parts of foods were thrown away at significantly different levels ( $t = -1.976$ ,  $p = 0.05$ ), with the rural households throwing away .3 lb more inedible food on average than urban households.

**Table A4: Food Disposed to Landfill, Waste Sorts (Per Capita, Weekly)**

Food Category	Urban (n=311)		Rural (n=224)		Total (n=535)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible*</b>	<b>25.9%</b>	<b>0.5</b>	<b>31.3%</b>	<b>0.8</b>	<b>28.5%</b>	<b>0.6</b>
Vegetables & Fruit	21.2%	0.4	23.8%	0.6	22.4%	0.5
Prepared Foods & Leftovers	12.7%	0.2	11.2%	0.3	12.0%	0.3
Baked Goods	8.8%	0.2	11.6%	0.3	10.1%	0.2
Snacks, Condiments, Sauces	7.2%	0.1	7.7%	0.2	7.5%	0.2
Meat & Fish	8.3%	0.2	5.9%	0.2	7.2%	0.2
Dry Foods	8.6%	0.2	1.7%	<0.1	5.3%	0.1
Dairy	3.2%	0.1	3.1%	0.1	3.1%	0.1
Liquids, Oils, Grease	3.9%	0.1	1.9%	<0.1	2.9%	0.1
Eggs	<0.1%	<0.1	1.5%	<0.1	0.7%	<0.1
Unidentifiable	0.3%	<0.1	0.4%	<0.1	0.3%	<0.1
<b>Subtotal Edible Food</b>	<b>74.1%</b>	<b>1.4</b>	<b>68.7%</b>	<b>1.8</b>	<b>71.5%</b>	<b>1.5</b>
<b>All Food</b>		<b>1.8</b>		<b>2.6</b>		<b>2.1</b>
<b>Edible Food/Total Bag Weight</b>	<b>26.8%</b>		<b>25.1%</b>		<b>26.0%</b>	
<b>All Food/Total Bag Weight</b>	<b>36.2%</b>		<b>36.6%</b>		<b>36.4%</b>	

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  no notation: statistically significant difference not detected  
Mean weights are in pounds.

Three urban households within the curbside compost sample did not provide the number of members of household, precluding them from the per capita analyses. The remaining 55 households accounted for 143 individuals in the sample.

**Table A5: Food Disposed to Curbside Compost from Waste Sorts (Per Capita, Weekly)**

Food Category	Urban (n=132)		Rural (n=11)		Total (n=143)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible</b>	<b>51.4%</b>	<b>1.4</b>	<b>64.2%</b>	<b>0.5</b>	<b>51.8%</b>	<b>1.3</b>
Vegetables & Fruits	26.4%	0.7	3.8%	<0.1	25.7%	0.6
Unidentifiable	10.1%	0.3	<0.1%	<0.1	9.8%	0.2
Baked Goods	4.9%	0.1	32.0%	0.3	5.7%	0.1
Dry Foods	2.9%	0.1	<0.1%	<0.1	2.8%	0.1
Prepared Foods & Leftovers	2.8%	0.1	<0.1%	<0.1	2.7%	0.1
Meat & Fish	0.8%	<0.1	<0.1%	<0.1	0.8%	<0.1
Snacks, Condiments, & Sauces	0.4%	<0.1	<0.1%	<0.1	0.3%	<0.1
Dairy	0.3%	<0.1	<0.1%	<0.1	0.3%	<0.1
Eggs	0.1%	<0.1	<0.1%	<0.1	0.1%	<0.1
Liquids, Oils, & Grease	<0.1%	<0.1	<0.1%	<0.1	<0.1%	<0.1
<b>Subtotal Edible Food</b>	<b>48.6%</b>	<b>1.3</b>	<b>35.8%</b>	<b>0.3</b>	<b>48.2%</b>	<b>1.2</b>
<b>All Food</b>		<b>2.7</b>		<b>0.8</b>		<b>2.5</b>

Mean weights are in pounds.

**Table A6: Food Disposed to Landfill and Curbside Compost from Waste Sorts (Per Capita, Weekly)**

Food Category	Urban (n=311)		Rural (n=224)		Total (n=535)	
	% of Food	Mean Weight	% of Food	Mean Weight	% of Food	Mean Weight
<b>Inedible</b>	<b>35.9%</b>	<b>1.1</b>	<b>32.1%</b>	<b>0.8</b>	<b>34.5%</b>	<b>1.0</b>
Vegetables & Fruit	23.2%	0.7	23.4%	0.6	23.3%	0.7
Prepared Foods & Leftovers	8.8%	0.3	10.9%	0.3	9.6%	0.3
Baked Goods	7.3%	0.2	12.0%	0.3	9.0%	0.3
Snacks, Condiments, Sauces	4.5%	0.1	7.5%	0.2	5.6%	0.2
Meat & Fish	5.3%	0.2	5.8%	0.2	5.5%	0.2
Dry Foods	6.3%	0.2	1.6%	<0.1	4.6%	0.1
Unidentifiable	4.1%	0.1	0.4%	<0.1	2.8%	0.1
Dairy	2.1%	0.1	3.0%	0.1	2.4%	0.1
Liquids, Oils, Grease	2.4%	0.1	1.8%	<0.1	2.2%	0.1
Eggs	<0.1%	<0.1	1.4%	<0.1	0.5%	<0.1
<b>Subtotal Edible Food</b>	<b>64.1%</b>	<b>1.9</b>	<b>68.0%</b>	<b>1.8</b>	<b>65.5%</b>	<b>1.9</b>
<b>All Food</b>		<b>3.0</b>		<b>2.6</b>		<b>2.9</b>

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  no notation: statistically significant difference not detected

Mean weights are in pounds.

## Diaries

**Table A7: Wasted Food by Edibility in Diaries**

Edibility	% of Food	Urban (n = 110)	Rural (n = 72)	Total (n = 182)
		Total Weight	Total Weight	Total Weight
Typically Edible	61.3%	<b>603.9</b>	62.1%	<b>391.1</b>
Questionably Edible	9.4%	<b>92.8</b>	9.4%	<b>59.0</b>
Inedible	29.3%	<b>289.0</b>	28.5%	<b>179.2</b>
<b>Total</b>		985.7		629.4
				1615.0

Weights are in pounds for a seven day period.

**Table A8: Wasted Food by Discard Destination from Diaries, One Week**

Discard Destination	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% of Food	Total Weight	% of Food	Total Weight	% of Food	Total Weight
Trash	27.0%	254.6	54.5%	333.2	37.8%	587.8
Curbside Compost	45.6%	429.9	11.6%	71.0	32.2%	500.8
Home Compost	13.0%	122.3	17.0%	104.2	14.6%	226.5
Down the Drain	11.3%	106.5	11.2%	68.4	11.2%	174.9
Fed to Animals/Pets	2.8%	26.4	5.2%	32.1	3.8%	58.5
Other	0.4%	3.8	0.4%	2.7	0.4%	6.5
<b>Subtotal Edible Food (For Trash + Curbside Compost only)</b>	<b>68%</b>	<b>465.7</b>	<b>69.5%</b>	<b>280.9</b>	<b>68.6%</b>	<b>746.6</b>
<b>Subtotal Trash + Curbside Compost only (of All Food)</b>	<b>72.5%</b>	<b>684.5</b>	<b>66.1%</b>	<b>404.2</b>	<b>70.0%</b>	<b>1088.6</b>
<b>Total All Food</b>		<b>943.5</b>		<b>611.5</b>		<b>1555</b>

Weights are in pounds for a seven day period. 60.02 lb of food did not have a discard destination recorded and are excluded from this analysis.

**Table A9: Wasted Food by Categories in Diaries, All Discard Destinations, Weekly**

Food Category	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% of Food	Total Weight	% of Food	Total Weight	% of Food	Total Weight
Inedible	29.3%	288.96	28.5%	179.24	29.0%	468.2
Vegetables & Fruits	26.5%	261.6	30.6%	192.4	28.1%	454.01
Prepared Foods & Leftovers	16.7%	165.05	15.4%	96.8	16.2%	261.83
Liquids, Oils, & Grease	8.4%	82.72	8.2%	51.7	8.3%	134.45
Dry Foods*	6.6%	65.2	3.1%	19.6	5.2%	84.78
Meat & Fish	4.3%	42.9	4.4%	27.9	4.4%	70.77
Baked Goods	4.2%	41.2	3.9%	24.8	4.1%	65.94
Snacks, Condiments, & Sauces	2.0%	19.6	3.3%	20.7	2.5%	40.28
Dairy	1.3%	13.3	2.2%	14.0	1.7%	27.21
Eggs	0.5%	5.1	0.4%	2.4	0.5%	7.53
<b>Subtotal Edible</b>	<b>70.7%</b>	<b>696.7</b>	<b>71.5%</b>	<b>450.12</b>	<b>71.0%</b>	<b>1146.8</b>
<b>Total</b>		<b>985.6</b>		<b>629.36</b>		<b>1615.0</b>

Weights are in pounds for a seven day period.

**Table A10: Wasted Food by Category in Diaries, All Destinations, (Per Capita Means, Weekly)**

Food Category	Urban	Rural	Total
	(n = 292) Mean Weight	(n = 201) Mean Weight	(n = 493) Mean Weight
<b>Inedible</b>	1.0	0.9	0.9
Vegetables & Fruit	0.9	1.0	0.9
Prepared Items & Leftovers	0.6	0.5	0.5
Liquids, Oils, Grease	0.3	0.3	0.3
Dry Foods	0.2	0.1	0.2
Meat & Fish	0.1	0.1	0.1
Baked Goods	0.1	0.1	0.1
Snacks, Condiments, Sauces	0.1	0.1	0.1
Dairy	<0.1	0.1	0.1
Eggs	<0.1	<0.1	<0.1
<b>Subtotal Edible</b>	<b>2.4</b>	<b>2.2</b>	<b>2.3</b>
<b>Total Food</b>	<b>3.4</b>	<b>3.1</b>	<b>3.3</b>

Weights are in pounds for a seven day period.

**Table A11: Immediate Loss Reasons for Wasted Edible Food in Diaries**

Immediate Loss Reasons	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% of Edible Food	Total Weight	% of Edible Food	Total Weight	% of Edible Food	Total Weight
Moldy/Spoiled	30.5%	185.0	34.7%	130.5	32.1%	315.5
Don't like/tired of eating	13.4%	81.3	21.3%	80.1	16.4%	161.4
Not good as leftovers	15.5%	93.9	11.9%	44.6	14.1%	138.6
Other	13.0%	78.7	5.8%	22.0	10.2%	100.6
Past date	7.3%	44.3	10.2%	38.5	8.4%	82.8
Too little to save	8.0%	48.8	7.5%	28.2	7.8%	77.0
Worry about illness	9.0%	54.4	4.9%	18.3	7.4%	72.7
Contaminated	1.8%	10.9	0.8%	3.2	1.4%	14.1
Damaged (stale, soggy, freezer burned)	0.4%	2.5	2.1%	8.0	1.1%	10.5
Improperly cooked	1.1%	6.9	0.7%	2.7	1.0%	9.6
Unrefrigerated too long	0.0%	0.0	0.1%	0.4	0.0%	0.5

Weights are in pounds for a seven day period. Excludes entries of inedible food (n=1914) and food missing data for immediate loss reasons (n=2860).

**Table A12: Wasted Edible Food by Root Loss Reasons in Diaries**

Root Loss Reasons	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	% of Edible Food	Total Weight	% of Edible Food	Total Weight	% of Edible Food	Total Weight
Made too much	22.7%	120.3	25.4%	87.7	23.8%	208.0
Lost track in fridge	22.1%	117.2	25.9%	89.3	23.6%	206.4
Other	21.0%	111.5	11.2%	38.6	17.1%	150.1
Bought too much	12.2%	64.7	9.5%	32.8	11.1%	97.5
Didn't know how to use	7.9%	42.0	5.6%	19.4	7.0%	61.4
Preventable other (storage, left out, source problem)	5.0%	26.5	10.0%	34.4	7.0%	60.9
Schedule problem (too busy, change of plans)	5.0%	26.5	7.9%	27.1	6.1%	53.6
Served too much, portion too large	2.0%	10.6	2.8%	9.5	2.3%	20.1
Full/not hungry	1.3%	7.0	0.7%	2.3	1.1%	9.3
Trying something new	0.6%	3.1	1.0%	3.3	0.7%	6.4
Package too large	0.3%	1.7	0.1%	0.3	0.2%	2.0

Weights are in pounds for a seven day period. Excludes entries of inedible food (n=1914) and food missing data for root loss reasons (n=3180).

**Table A13: Crosstabs of Immediate Loss Reasons and Root Loss Reasons in the Diaries**

**Root Loss Reasons**

**Immediate Loss Reasons**

	Bought too much	Made too much	Lost track in fridge	Schedule problem	Didn't know how to use	Package too large	Portion too much	Full/not hungry	Trying new	Preventable other
<b>Past date</b>										
Count	18	2	49	5	2	1	0	0	1	2
%	22.50%	2.50%	61.30%	6.30%	2.50%	1.30%	0.00%	0.00%	1.30%	2.50%
<b>Moldy/ Spoiled</b>										
Count	64	47	225	50	7	0	8	0	0	19
%	15.20%	11.20%	53.60%	11.90%	1.70%	0.00%	1.90%	0.00%	0.00%	4.50%
<b>Don't like/tired</b>										
Count	41	161	18	14	56	1	30	27	3	12
%	11.30%	44.40%	5.00%	3.90%	15.40%	0.30%	8.30%	7.40%	0.80%	3.30%
<b>Worry about illness</b>										
Count	2	13	18	8	4	0	3	1	1	7
%	3.50%	22.80%	31.60%	14.00%	7.00%	0.00%	5.30%	1.80%	1.80%	12.30%
<b>Improperly cooked</b>										
Count	1	1	2	0	0	0	0	0	0	2
%	16.70%	16.70%	33.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	33.30%
<b>Too little</b>										
Count	16	95	4	8	48	3	13	19	0	0
%	7.80%	46.10%	1.90%	3.90%	23.30%	1.50%	6.30%	9.20%	0.00%	0.00%
<b>Not good as leftovers</b>										
Count	21	138	10	5	56	2	18	7	1	2
%	8.10%	53.10%	3.80%	1.90%	21.50%	0.80%	6.90%	2.70%	0.40%	0.80%
<b>Contaminated</b>										
Count	0	0	1	0	1	0	0	0	0	3
%	0.00%	0.00%	20.00%	0.00%	20.00%	0.00%	0.00%	0.00%	0.00%	60.00%
<b>Unrefrig. too long</b>										
Count	0	0	0	0	0	0	0	0	0	3
%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
<b>Damaged</b>										
Count	2	0	5	1	0	0	0	0	0	8
%	12.50%	0.00%	31.30%	6.30%	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%
<b>Totals</b>	<b>165</b>	<b>457</b>	<b>332</b>	<b>91</b>	<b>174</b>	<b>7</b>	<b>72</b>	<b>54</b>	<b>6</b>	<b>58</b>
%	<b>11.70%</b>	<b>32.30%</b>	<b>23.40%</b>	<b>6.40%</b>	<b>12.30%</b>	<b>0.50%</b>	<b>5.10%</b>	<b>3.80%</b>	<b>0.40%</b>	<b>4.10%</b>

% = Percent within Immediate Loss Reasons

**Table A14: Wasted Food by Meal in Diaries**

Meal	Urban (n = 110)		Rural (n = 72)		Total (n = 182)	
	%	Total Weight	%	Total Weight	%	Total Weight
Breakfast	17.5%	164.2	21.0%	129.8	18.9%	294.0
Lunch	8.0%	75.0	9.1%	56.0	8.4%	131.0
Dinner	28.4%	266.7	28.1%	174.1	28.3%	440.8
Not Part of a Meal	46.0%	431.5	41.8%	258.9	44.4%	690.4

Weights are in pounds for a seven day period. Excludes entries with missing data where participant did not record the meal type (58.8 lb)

## Additional Analyses

### Money Spent on Food at Home

#### Waste sort results

Participants were divided into four groups based on their response in the pre-diary survey to a question about how much money their household spent on food at home per week (\$100 or less, \$101 to \$200, \$200 or more, and Don't Know). 187 participants responded to this survey item and had their waste sorted. The 'Don't Know' group (n = 9) was excluded from this analysis.

Independent-samples t-tests were conducted to assess differences in the mean household weights of edible wasted food between the urban and rural samples for each household type. A one-way between subjects analysis of variance was conducted to assess differences between levels of money spent on food at home for the total sample. **No statistically significant differences were found.**

**Table A15: Mean Weights of Edible Food in Waste Sorts, by Money Spent on Food at Home**

Money Spent on Food at Home	Urban (n = 109)		Rural (n = 69)		Total (n = 178)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
\$100 or less	5.6	2.8	3.4	1.7	4.7	2.3
\$101 to \$200	4.5	1.5	3.6	1.6	4.2	1.5
\$201 or more	5.9	1.6	9.3	2.1	8.1	1.9

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds.

#### Diary results

175 diary participants responded to the item "how much money the household spends on food eaten at home every week" in the survey.

Independent-samples t-tests were conducted to assess differences in the mean household weights and per capita weights of food disposed between the urban and rural samples for each household type. A one-way

between subjects analysis of variance was conducted to assess differences between household types for the total sample. **No statistically significant differences were found.**

**Table A16: Mean Weights of Edible Food in Diaries, by Money Spent on Food at Home**

Money Spent on Food at Home	Urban (n = 107)		Rural (n = 68)		Total (n = 175)	
	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita	Mean Household	Mean Per Capita
\$100 or less	5.0	2.4	5.1	3.1	5.0	2.7
\$101 to \$200	7.3	2.5	6.7	2.4	7.1	2.5
\$201 or more	10.6	2.7	8.2	2.3	9.0	2.4

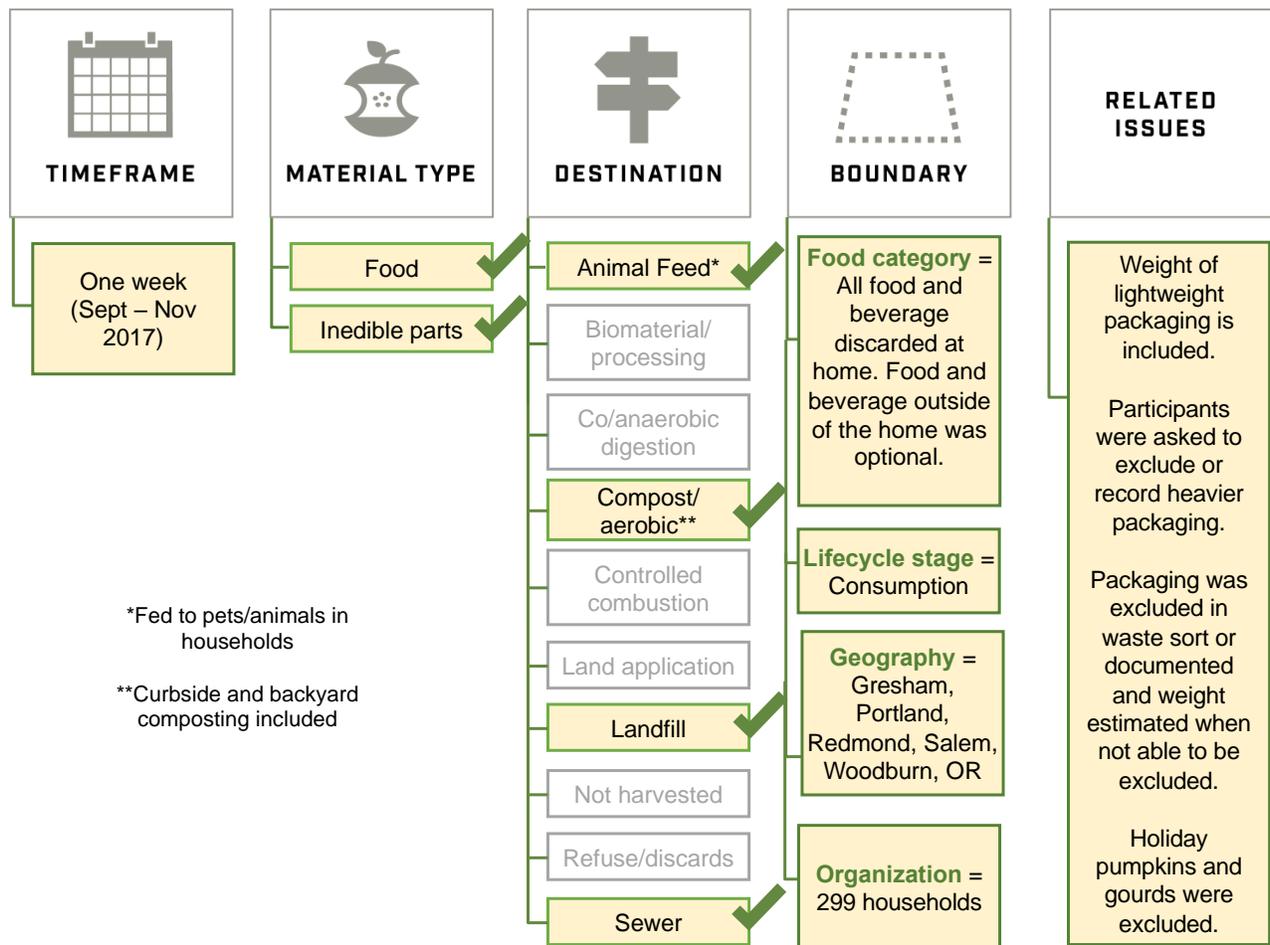
\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ , no notation: statistically significant difference not detected.

Mean weights are in pounds.

# Conformance to Food Loss and Waste Reporting Standard

[The Food Loss & Waste Protocol](#)<sup>9</sup> is a multi-stakeholder partnership, which has developed the global Food Loss and Waste Accounting and Reporting Standard – also known simply as the FLW Standard. Launched in 2013, the Food Loss & Waste Protocol’s mission is to ensure wide adoption of the FLW Standard so companies, governments, cities and others are better informed about food loss and waste and motivated to curb this inefficiency.”

The graphic below describes the scope of the residential assessment of the Oregon Wasted Food Study using the FLW Standard.



The Oregon Wasted Food Study was designed and conducted to meet the FLW Standard as detailed below.

<sup>9</sup> See, <http://flwprotocol.org>

## **Requirement 1: Base FLW accounting and reporting on the principles of relevance, completeness, consistency, transparency, and accuracy**

### **Relevance**

Categorizes wasted food at the household level by food type and category, weight, edibility, meal type, loss reasons (immediate and root loss reasons), and discard destination.

Identifies, explores, and analyzes behaviors related to FLW, particularly as they relate to the amounts of FLW at the household level.

Provides a baseline standard and a replicable model to enable other cities and communities to conduct their own FLW assessments.

### **Completeness**

299 households were recruited from five cities/towns, representing either urban or rural regions, to record and weigh all foods and beverages discarded to ten possible destinations for a total of seven days. These data, along with meal type, immediate and root loss reasons, and detailed descriptions of food discarded were entered by the participants into an online diary database (Qualtrics), or recorded on a paper form, if preferred. 185 participating households completed the kitchen diary. Waste sorts of participants' curbside landfill and compost were conducted, using the same ten categories as in the diary task, plus an unidentifiable category. 230 participants had their curbside waste sorted. Pre and post-diary surveys were also conducted assessing attitudes and behaviors related to food procurement, planning, use, leftover management, and disposal.

### **Consistency**

Compilation, storage, and analyses of data, whether entered online or mailed in paper form, were standardized across all five study areas and participants.

### **Transparency**

Methodology, including definition of terms, inclusion/exclusion of data, assumptions, and types of analyses employed are explicitly detailed in the report and supporting appendices. Additional clarification may be available upon request.

### **Accuracy**

Calculations, analyses, and methodology have been approved and verified by the study analysis team. Slight differences in the precision of numbers and figures are to be expected when working to a limit of tenths of units (percentages, lb, etc.).

## **Requirement 2: Account for and report the physical amount of FLW expressed as weight**

Reported in pounds and fractions up to tenths of a pound.

## **Requirement 3: Define and report on the scope of the FLW inventory**

### **Timeframe**

The kitchen diaries should account for one week's (seven days) worth of residential wasted food. The waste sorts, which were collected before the diaries were started, were adjusted to one week's (seven days) worth of residential waste. The adjustments were necessary due to the different collection schedules of the participants, ranging from twice a week to once a month.

**Gresham:** Households were instructed to start their kitchen diary on the day after their trash was collected. Gresham participants had a two-week period between October 7, 2017 to October 21, 2017 to finish the diary. The waste sorts, along with a pre-survey, were completed prior to the start of diary data collection.

**Salem:** Households were instructed to start their kitchen diary on the day after their trash was collected. Salem participants had a two-week period between October 11, 2017 to October 26, 2017 to finish the diary. The waste sorts, along with a pre-survey, were completed prior to the start of diary data collection.

**Woodburn:** Households were instructed to start their kitchen diary on the day after their trash was collected. Woodburn participants had a two-week period between October 28, 2017 to November 11, 2017 to finish the diary. The waste sorts, along with a pre-survey, were completed prior to the start of diary data collection.

**Redmond:** Households were instructed to start their kitchen diary on the day after their trash was collected. Redmond participants had a two-week period between October 19, 2017 to November 2, 2017 to finish the diary. The waste sorts, along with a pre-survey, were completed prior to the start of diary data collection.

**Portland:** Households were instructed to start their kitchen diary on the day after their trash was collected. Portland participants had a two-week period between November 1, 2017 to November 15, 2017 to finish the diary. The waste sorts, along with a pre-survey, were completed prior to the start of diary data collection.

## Material type

All food items disposed of in the kitchen diaries and the waste sorts were classified according to edibility. Diary participants were asked to weigh and record all foods and beverages that were discarded. These food items were classified by study analysts under three edibility categories: typically edible, questionably edible, and inedible. The levels of edibility and categories of food type were based on those used by the NRDC in their 2017 wasted food assessment study for the purposes working towards standardization and more accurate comparison. “Typically edible” refers to any food items intended for human consumption. It does not describe the state of the food item at disposal (such as rotten or spoiled) but rather whether it would have been considered edible at some point in time. “Questionably edible” food items are those that can be safely consumed but may not be considered edible by some people because of preference or culture. Food items in this category may require additional cooking or processing to be considered edible by a majority of consumers. “Inedible” are parts of food items that are not typically considered edible in the United States (e.g. coffee grounds, eggshells) and/or items wherein considerable effort and energy are required to make this part of the food item “edible” (e.g. citrus peels).

For both the diary and waste sorts, items were classified into eleven wasted food categories. This common categorization enables direct comparisons between the kitchen diaries and waste sort data.

**Inedible** – Items or parts of the wasted food not intended for human consumption. At times, tiny amounts of edible food such as vegetable and fruit included peels were considered in this category.

**Edible – Meat/Fish** – Raw or cooked meat (with mostly edible parts) unmixed with other foods. Examples include but are not limited to beef, chicken, pork, fish, seafood.

**Edible – Dairy** – Solid or semi-solid dairy products unmixed with other food items. Examples include but are not limited to cheese, yogurt, butter.

**Edible – Eggs** – Raw or cooked eggs and egg products unmixed with other food items. Examples include hard-boiled eggs, scrambled eggs, and egg whites.

**Edible – Fruits and Vegetables** – Raw or cooked fruits and vegetables (with mostly edible parts) unmixed with other food items. Examples include but are not limited to tomatoes, pears, and lettuce.

**Edible – Baked Goods** – Baked items and bread-like food items usually prepared in an oven and unmixed with other food items. Examples include but are not limited to bread, cakes, and croissants.

**Edible – Dry Foods** – Raw or cooked grains, pastas, legumes, nuts, and cereals unmixed with other food items. Examples include but are not limited to spaghetti, flour, peanuts, and oatmeal.

**Edible – Snacks, Condiments, & Sauces** – Confections, processed snacks, condiments, and sauces unmixed with other food items. Examples include but are not limited to candy, potato chips, ketchup, and salsa.

**Edible – Liquids, Oils, & Grease** – Food items that are liquid, especially beverages. Examples include but are not limited to coffee, fruit juice, and cooking oil.

**Edible – Prepared Food, Cooked Items, & Leftovers** – Foods that have many food items mixed together because of cooking or preparation. Examples include but are not limited to fajitas, pizza, beef stew, and sandwiches.

**Edible – Unidentifiable** – This category is used only if necessary.

Waste that was not classified as food was not included, for example, pet food and holiday gourds.

## Discard Destinations

For all five study areas, six discard destinations were given as options in the kitchen diary:

- Landfill (municipal curbside trash collection)
- Curbside compost (municipal curbside compost collection)
- Home compost (e.g. garden composting, home worm bins)
- Down the drain
- Fed to pets or other animals
- Other

Municipal, curbside pickup of compost that allowed all types of food was a possible discard destination for two of the five study areas. Curbside collection of compost including food was just being launched in one study area and was not well-known by participants. One study area had an opt-in subscription option for curbside compost collection, limited to produce scraps only, and was not utilized by most/any study participants.

## Boundary

**Food Category:** Includes all food and beverage items discarded in the home. The 11 categories included in this study are detailed above in Requirement 2 – b. Material type.

**Food Lifecycle Stage:** Consumption at home. Participants were also instructed to track food and beverage items discarded and consumed away from home, but were not expected to weigh them, excluding them from the quantitative analyses of this study.

**Geography:** Within Oregon, the study encompassed 3 urban sites (Portland, Gresham, and Salem) and 2 rural sites (Woodburn, Redmond).

**Organization:** 299 recruited households

**Gresham:** 51 recruited households, 39 of which had their landfill-bound waste collected and sorted. 25 households completed the kitchen diaries.

**Salem:** 55 recruited households, 27 of which had their landfill-bound waste collected and sorted, in addition to 17 households that had both their landfill-bound waste and curbside compost collected and sorted. 41 households completed the kitchen diaries.

**Woodburn:** 60 recruited households, 41 of which had their landfill-bound waste collected and sorted, in addition to 5 households that had both their landfill-bound waste and curbside compost collected and sorted. 31 households completed the kitchen diaries.

**Redmond:** 70 recruited households, 50 of which had their landfill-bound waste collected and sorted. 41 households completed the kitchen diaries.

**Portland:** 63 recruited households, 15 of which had their landfill-bound waste collected and sorted, in addition to 36 households that had both their landfill-bound waste and curbside compost collected and sorted. 44 households completed the kitchen diaries.

## Related issues

- **Packaging and other non-FLW material:** Participants recording wasted food in the diary were instructed to remove food from packaging. Food was weighed in a re-usable container and participants were instructed to use the tare button on the scale to exclude the container weight from the food weight they recorded. Packaging was removed whenever possible in the waste sorts. When it was not possible to remove food from a package, the packaging was noted and a standard weight for the given packaging was deducted from the weight of the item.
- **Water added/removed:** No water was added or removed from assessed wasted food.

**Requirement 4: Describe the quantification method(s) used AND Requirement 5: If sampling and scaling of data are undertaken, describe the approach and calculation used, as well as the period of time over which sample data are collected (including starting and ending dates)**

### Participant Incentives:

In all five study sites, participants received a free digital kitchen scale. Participants who completed a pre-diary survey, a post-diary survey, and kept a diary for seven consecutive days received a \$90 gift card. Participants who completed a pre-dairy survey, a post-diary survey, and kept a diary for seven non-consecutive days (within a two-week period) received a \$60 gift card. Participants who did not keep 7 days' worth of kitchen diary entries did not receive any additional incentives beyond the free digital kitchen scale.

### Recruitment:

For the study, 3 urban and 2 rural sites were selected for participant recruitment. Urban and rural sites were identified using the definitions provided by the [Oregon Office of Rural Health](#). In each of these 5 sites, single waste hauling route was selected for household recruitment as waste for waste sorts would need to be collected on a single day. The trash haulers serving these routes were contacted to confirm collection days, frequency, and route boundaries.

Potential household participants were visited by door-to-door recruiters. Door hangers were left with households where no one answered the door. Overall, 299 households were recruited to participate in the kitchen diary study out of 3,430 distinct households that were approached, for a recruitment rate of 8.7%. Landfill-bound waste was collected and sorted for 230 households. During the diary phase, 28 participants were removed due to lack of participation or asking to be removed from the study, leaving 271 active

participants. 182 of these households completed 7 days' worth of diary entries. The breakdown for each city/town follows:

### **Gresham**

The door-to-door recruiters approached 744 different households in Gresham, a city immediately due east of Portland. 51 households agreed to participate for a recruitment rate of 6.9%. Before beginning the data collection for the kitchen diary, 39 households in Gresham had their landfill-bound waste collected and sorted. During the diary phase, from October 7, 2017 to October 21, 2017, 5 participants were removed from the study, leaving 46 active participants. 25 of these households completed 7 days' worth of diary entries.

### **Salem**

The door-to-door recruiters approached 471 different households in Salem, Oregon's state capital. 55 households agreed to participate for a recruitment rate of 11.7%. Before beginning the data collection for the kitchen diary, 27 households in Salem had their landfill-bound waste collected and sorted, in addition to 17 households that had both their landfill-bound waste and curbside compost collected and sorted. During the diary phase, from October 11, 2017 to October 26, 2017, 3 participants were removed from the study, leaving 52 active participants. 41 of these households completed 7 days' worth of diary entries.

### **Woodburn**

The door-to-door recruiters approached 1131 different households in rural Woodburn, 30 miles south of Portland. 60 households agreed to participate for a recruitment rate of 5.3%. Before beginning the data collection for the kitchen diary, 41 households in Woodburn had their landfill-bound waste collected and sorted, in addition to 5 households that had both their landfill-bound waste and curbside compost collected and sorted. During the diary phase, from October 28, 2017 to November 11, 2017, 6 participants were removed from the study, leaving 54 active participants. 31 of these households completed 7 days' worth of diary entries.

### **Redmond**

The door-to-door recruiters approached 394 different households in rural Redmond, 150 miles southeast of Portland. 70 households agreed to participate for a recruitment rate of 17.8%. Before beginning the data collection for the kitchen diary, 50 households in Redmond had their landfill-bound waste collected and sorted. During the diary phase, from October 19, 2017 to November 2, 2017, 10 participants were removed from the study, leaving 60 active participants. 41 of these households completed 7 days' worth of diary entries.

### **Portland**

The door-to-door recruiters approached 690 different households in the city of Portland, Oregon. 63 households agreed to participate for a recruitment rate of 9.1%. Before beginning the data collection for the kitchen diary, 15 households in Portland had their landfill-bound waste collected and sorted, in addition to 36 households that had both their landfill-bound waste and curbside compost collected and sorted. During the diary phase, from November 1, 2017 to November 15, 2017, 4 participants were removed from the study, leaving 59 active participants. 44 of these households completed 7 days' worth of diary entries.

### **Kitchen Diaries and Surveys:**

Households were asked to complete a survey before the start of the scheduled diary data collection. This survey asked about demographic data and household behaviors toward food purchasing habits, food

consumption, and food disposal. Furthermore, curbside landfill-bound waste and compost (if available) were also collected and sorted from recruited households. This was done before the onset of the kitchen diary data collection so as not to change or influence the routine, normal disposal behavior of households. Once the kitchen diaries are completed, a post-survey was conducted for further assessment of household behavior regarding food consumption.

The following data were collected in the kitchen diary for all food, food items, and beverages discarded in the home:

- **Date:** Date when food item was disposed?
- **Meal:** Was the food item disposed from breakfast, lunch, dinner, or not part of a meal?
- **Photo (optional, online only):** The participant had the option of attaching a photo of food item disposed.
- **Food Description:** The participant detailed food being disposed (e.g. 3 strawberries, lettuce, beef burrito, chicken alfredo, etc.)
- **Food Weight:** Weight of the food in pounds and ounces, down to tenths of an ounce, as measured by the supplied digital kitchen scale.
- **Condition of Food at Time of Disposal:** At the time of discard, was the food raw, cooked, prepared, inedible parts, liquids, or other?
- **Immediate Loss Reason:** Was the food: past date, moldy/spoiled, don't like/tired of eating, worry about illness, improperly cooked, too little to save, not good as leftovers, contaminated, other, unable to store (outside of home only), unrefrigerated too long, or damaged (stale, soggy, freezer-burned)
- **Root Loss Reason:** Was the food disposed because: bought too much, made too much, lost track of it in the fridge, schedule problem (too busy, change of plans), other, didn't know how to use, package too large, served too much/portion too large, full/not hungry, trying something new, preventable other (storage, left out, source problem)
- **Follow Up:** If the participant either answered "bought too much" or "made too much", a follow-up question as to why was posed. For "bought too much", was it because: it was on sale or discounted, the package was too large, other, don't know. For "made too much", was it because: made a larger batch to eat throughout the week, thought others would eat it, made too much on accident, other, don't know.
- **Discard Destination:** Was the food discarded to: trash, curbside compost, home compost, down the drain, fed to pets/other animals, other.

Kitchen diary participants were given the option of filling out the diary online through the Qualtrics website or on pre-printed paper, which we provided. Of the 182 households that completed 7 days' worth of entries, 139 households opted to input their data online and 43 opted to fill out the paper diaries. Diary participants were also supplied a free digital kitchen scale and a container to facilitate and standardize with weighing of disposed food and beverages. A User's Guide was supplied to participating households detailing the diary reporting process, including the proper use of the digital kitchen scale. Throughout the two weeks of diary data collection, participants had access to support from CES staff via phone, e-mail, and text. On the weekends, phone and e-mail inquiries were routed to on-call staff to help participants with questions and concerns. Participants were asked to separately weigh and record every food item disposed within the household by all household members. Foods discarded outside of the home were described but not weighed.

All kitchen diaries, whether online or on paper, were collected and transferred into an SPSS database. Recoding of some of the entries was necessary to standardize responses and to facilitate direct comparisons between the diaries and the waste sorts. Whenever possible, questions that were answered with “Other” were revisited to see if the entries were a better fit with other existing values, depending on the context. Furthermore, new values and categories were created if enough values in the “Other” were observed. To enable direct comparison with the waste sort data, 3 new variables were created and recoded from the individual entries. These were:

**Standardized name:** This is a uniform name for the food item being disposed (e.g. apple, potato, sandwich, pizza, etc.)

**Edibility:** Food items were categorized exclusively as edible, questionably edible, or inedible.

**Standardized Category identical to waste sorts:** Kitchen diary entries were coded according to the 11 food categories described in the waste sort data.

### **Waste Sort:**

All of the 299 households that were initially recruited for the kitchen diary study were asked to have their trash and curbside compost (if applicable) collected before the study. This was done so as not to significantly alter the households’ behavior regarding wasted food disposal. Households were asked to leave out their trash and curbside compost the night before their respective hauler services were scheduled to pick them up. CES notified the waste haulers servicing the study areas to coordinate. CES staff collected, sorted, and categorized these materials into the 11 categories detailed in Requirement 3, b. Material Type. Overall, 230 households had their landfill-bound trash sorted. 58 of these households also had their curbside compost sorted.

In order to normalize the waste sort to a week’s worth of waste disposal, landfill-bound trash was adjusted to reflect for frequency of trash pick-up. In our 5 study sites, frequency of pick-up ranged from twice a week to once a month, which was noted in the post-survey. Based on the pre-survey answers, landfill-bound trash was adjusted to approximate one week’s worth of trash. For example, for households that had trash pick-up every two weeks, weights for their landfill-bound trash were multiplied by two. For households that had trash pick-up twice a week, weights for their landfill-bound trash were divided by two. Only 3 households indicated in the pre-survey that their frequency of trash pick-up was more than once a week; they were assumed to have their trash picked up twice a week. All 4 households that did not know the frequency of their trash pick-up were considered to have their trash pick-up once a week.

## **Requirement 6: Provide a qualitative description and/or quantitative assessment of the uncertainty around FLW inventory results**

The kitchen diaries were conducted within a two-week period covering October and early November. Therefore, seasonal differences in wasted food generation and disposal were not captured. Moreover, this particular study occurred around Halloween when ornamental quasi-food items such as pumpkins were included in the waste stream. To adjust for this, all entries for pumpkins that did not explicitly detail use in cooking or baking were excluded from analyses.

Accuracy and consistency of reporting in the diary varies from household to household. Wasted food generation and disposal of all members of the household may not be recorded. Self-selection among participants is a real probability, as being aware of wasted food issues may predispose some households into participating in the study. Households that agreed to participate but ultimately did not complete the

study could contribute to a non-response bias. Altering or changing behaviors because of participation in the diary study can also be a factor in under/over-reporting in the study. For instance, refrigerator cleanouts may not be done during the study period because it increases wasted food generation. Disposal of liquids and beverages also present a challenge. Weights of glass and plastic bottles and containers containing liquids and beverages may have been included in the entries.

## **Kitchen Diary Under-reporting**

**Convenience:** Some participants may not have recorded all food items disposed. Some may deem small food amounts to be too small to weigh and record. Some fruit and vegetable peels, pits, and rinds could have gone unrecorded. Cleaning out the refrigerator could also have been postponed during the study period.

**Mixed Food Items:** A common observation regarding the food descriptions in the diaries is the large number of entries with mixed food items. Participants were explicitly instructed to record and weigh different food items separately. In the process of preparing meals however, this can be inconvenient. This was not an insignificant number, so we have accommodated some of these entries with new standardized names such as mixed vegetable peels/ends, mixed fruit/vegetable peels/ends, and unidentifiable inedibles. However, mixed food items become more problematic when they have a mix of edible and inedible items or when they have different categories of food items combined.

# Standard food names

## Edible

almond milk	coffee	green beans	nachos	raisins
apples	coffee creamer	green onions	non-meat dish	red meat dish
applesauce	coleslaw	greens	noodles	rice
asparagus	collard greens	guacamole	nuts	salad
avocados	condiment	guacamole	oatmeal	salsa
bananas	cones	ham	oil	sandwich
batter	cookies	herb	olives	sauce
bean dip	corn	hot chocolate	onions	seafood dish
beans	crackers	hotdogs	orange juice	shrimp
beef	cranberries	hummus	oranges	soda
beer	cream	ice	pancakes	soup
beets	cream cheese	ice cream	pasta	sour cream
bok choy	crepe	jalapeno	pastry	spice
bread	cucumbers	jam	peaches	spinach
broccoli	curry	jello	pears	split peas
brownie	dates	kale	peas	squash
brussels sprouts	donuts	kiwis	peppers	strawberries
burritos	eggplant	lemons	persimmons	sugar
butter	eggs	lentils	pickled	sunchokes
cabbage	empanadas	lettuce	vegetables	orange
cake	enchiladas	limes	pie	tea
candy	fig skins	lunchmeat	pineapples	tofu
carrots	fish	mac and cheese	pizza	tomatoes
cashews	flour	mangoes	plums	tortilla
cauliflower	french toast	marshmallows	popcorn	turkey
celery	fruit	mayonnaise	pork	unidentifiable
cereal	fruit juice	meat	potatoes	used batter
cheese	ginger	milk	poultry dish	waffles
chicken	grains	mixed fruits &	pretzels	watermelons
chili	granola	vegetables	protein powder	wine
chips	grapefruit	mixed snacks	prunes	yogurt
chives	grapes	muffins	pudding	yucca
coconut milk	grease	mushrooms	radish	zucchini

### Questionably edible

apple cores/skin  
asparagus ends  
beet tops/skins  
broccoli stalks  
brussels sprouts ends/leaves  
cabbage core  
carrot peels/tops  
cauliflower stalks  
celery tops/ends  
cheese rind  
cucumber peels

green bean ends  
green onion roots/ends  
greens stems/stalks  
herb stems  
kiwi peels  
leek ends  
lettuce core  
meat/fish parts (fat/skin)  
mixed fruit/vegetable  
peels/ends  
mixed vegetable peels/ends

mushroom stems  
onions  
pear core/skin  
potato peels  
radish tops  
tomato core/skin  
turnip tops  
zucchini peels/ends

### Inedible

avocado peels & pit  
banana peels  
bean shells  
bones  
citrus rinds/peels  
coffee grounds  
corn cobs/husks  
eggplant tops  
eggshells  
garlic skins  
hard stems/stalks  
hard stems/stalks  
jicama peels

kombucha scoby  
lettuce roots  
inedible liquid  
mango peels/pit  
mixed fruit/vegetable inedibles  
mixed inedibles  
mixed vegetable inedibles  
onion skins/root ends  
pepper cores/stems  
persimmon peels  
pineapple peels/leaves  
pomegranate skin  
popcorn kernels

shells  
squash rinds/seeds  
stone fruit pit  
strawberry tops  
tea bags/leaves  
unidentifiable  
used berries  
used ginger  
used lemons  
used meat  
used sauce  
used spices  
watermelon rinds