

Introduction

Each year, as much as 40 percent of food in the United States is wasted by producers and consumers. When food waste is sent to landfills, it competes for limited space and generates the greenhouse gas methane (EPA 2023). Globally, food loss and waste create 8 percent of anthropogenic greenhouse gas emissions (EPA 2021). Additionally, 34 million people endure food insecurity in the United States, and as many as 828 million people worldwide were affected by hunger in 2021 (Feeding America 2022, UN FAO 2022). Restaurants are a known contributor to food waste, creating 10 to 15 billion kg (22 to 33 billion lbs) of food waste each year, both in the kitchen and from consumers (NRDC 2017). Much of this food waste is thrown in the trash; however, some could be donated to people and the remainder composted. Therefore, understanding the opportunities and challenges associated with food recovery practices of restaurants is important to not only mitigating climate change but also reducing food insecurity.

Purpose

The purpose of this study was to document the food waste management practices of restaurants and to identify limitations related to food recovery, including donations and composting.

Methods

Fort Worth is the 13th-largest city in the United States with a population of 935,000 (US Census Bureau 2021). Approximately 13% of the city's population is food insecure. The city is home to more than 3,000 restaurants including full- and quick-service establishments. To understand the extent to which restaurants were combating food waste, we created a survey with questions focusing on the motivations and practices of restaurants on food waste management that was approved by the TCU Institutional Review Board. The survey included questions on current food waste practices, interest in food donation and composting programs, and business characteristics. We then entered the questions into Qualtrics and sent the survey to 342 Fort Worth restaurants (11.2% of total) with email addresses listed on Visit Fort Worth's restaurant directory. We received 11 responses and analyzed the data through descriptive statistics to evaluate how food donation and composting practices varied by business demographics. We also mapped current residential composting drop-off locations to identify what proportion of restaurants were within a distance that staff were willing to travel. Specifically, we used ArcGIS Business Analyst to plot Fort Worth restaurants and the drive-time network analysis to identify compost drop-off locations 5 to 10 minutes from restaurants (ArcGIS Pro 3.1).

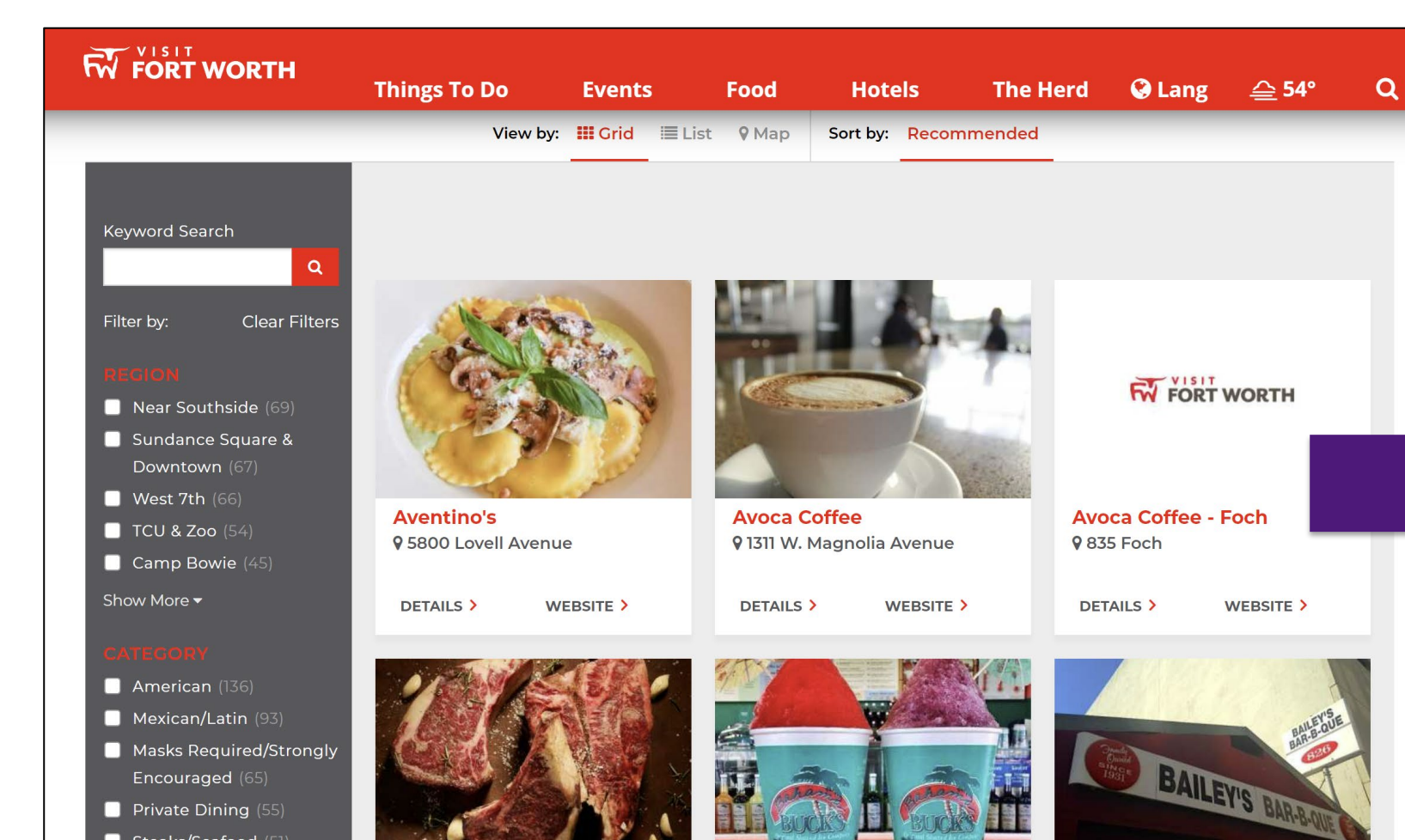


Figure 1. Researchers gathered emails of Fort Worth restaurants using fortworth.com.

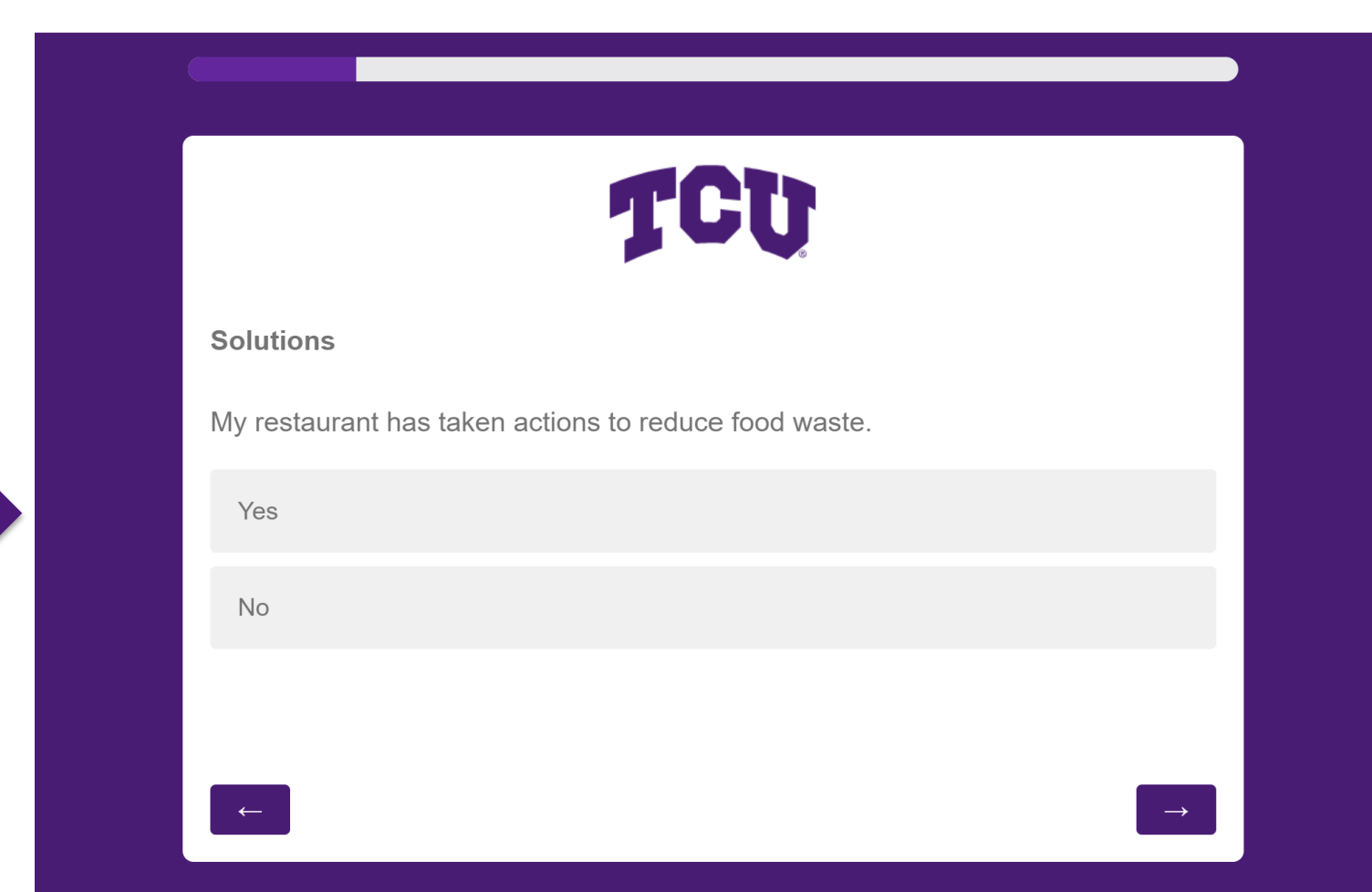


Figure 2. Qualtrics survey

Results and Discussion

We sent 342 surveys to Fort Worth restaurants and received 11 responses. All survey responses were completed by the restaurant owner or manager.

Current Practices

All restaurants reported that some food scraps are put in the trash (100%). Five respondents indicated that food scraps from the kitchen were reused (45.45%).

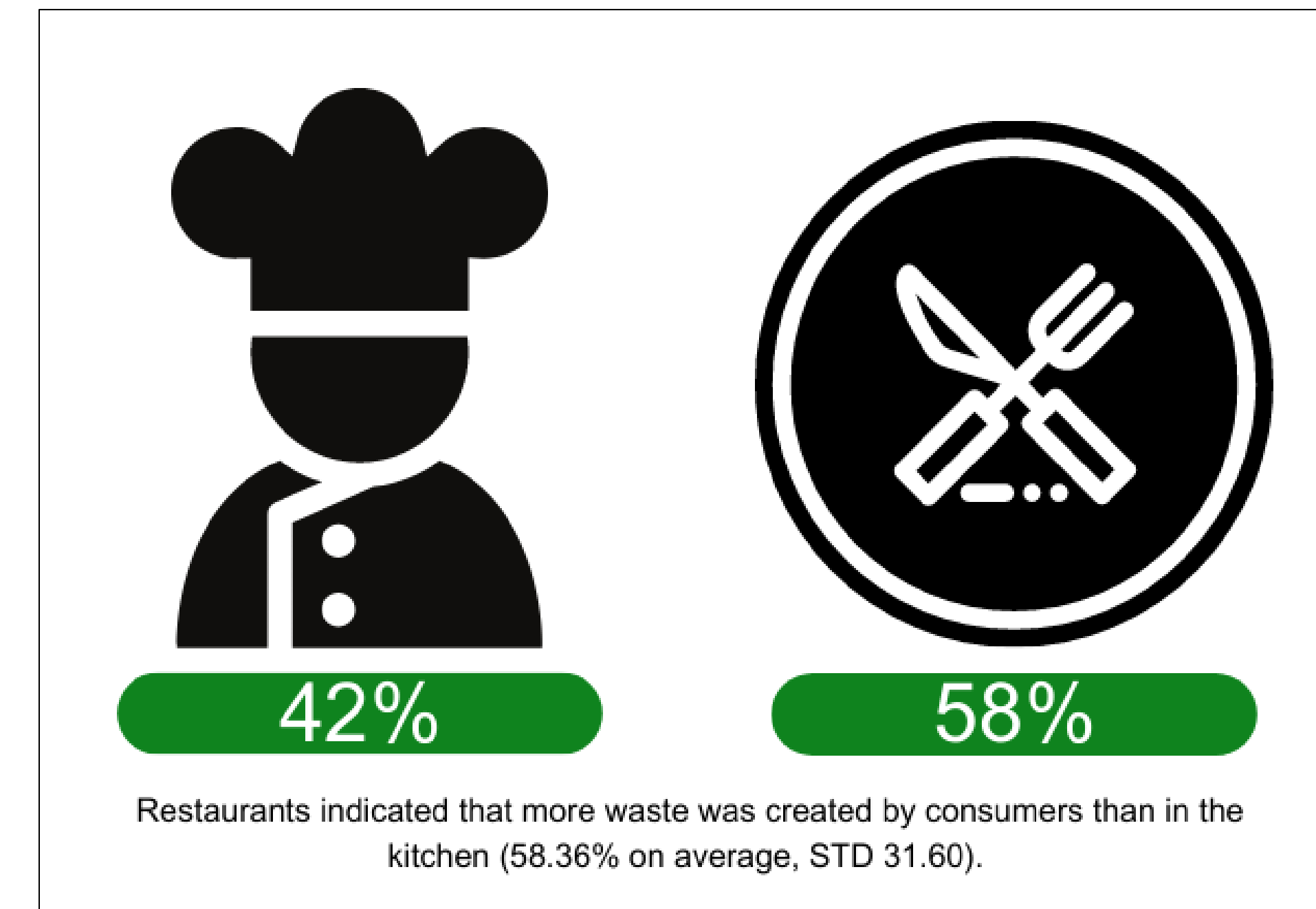


Figure 3. Examining the key reasons that food waste occurs in Fort Worth restaurants by number of survey response selections.

Barriers to Food Recovery

However, most restaurants also indicated they were unaware of food donation programs (80%) or composting programs (70%) in their area, and 45% reported that a major barrier to composting more food waste was "insufficient options."

Composting Barriers	Number of Restaurants
Insufficient composting options	5
Other barrier(s)	2
Transportation constraints (distance, cost, fleet, etc.)	1
Regulatory constraints	1
Liability concerns	1
Food safety concerns regarding storage before donation	1
Management or building constraints	0

Donation Barriers	Number of Restaurants
Liability concerns	8
Food safety concerns regarding storage before donation	7
Transportation constraints (distance, cost, fleet, etc.)	6
Other barrier(s)	5
Regulatory constraints	3
Insufficient refrigeration and/or storage on site	3
Insufficient refrigeration and/or storage at Food Bank or other donation site	2
Management or building constraints	2

Interest in improving food waste strategies

Restaurants also showed interest in participating in food recovery programs. Most respondents reported moderate interest or higher in donating (72.72%) and in composting food waste (81.81%).

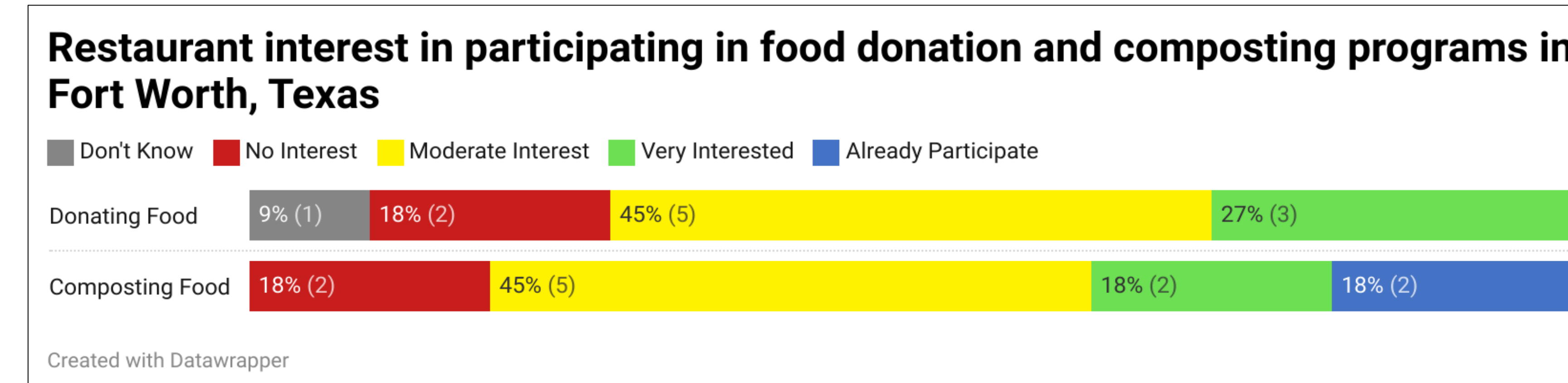


Figure 4. Analyzing restaurant interest in participating in food donation and composting programs in Fort Worth, Texas.

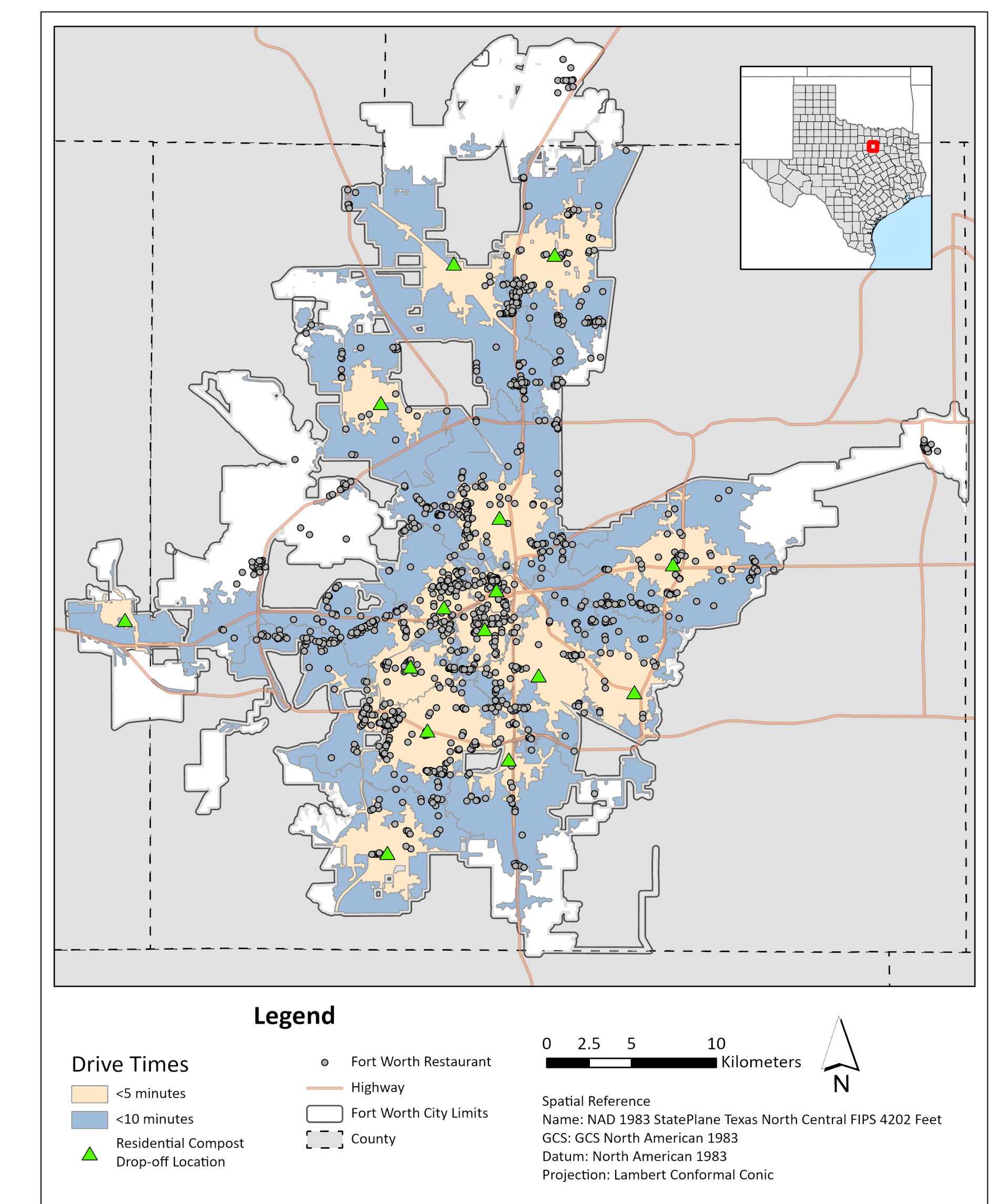
Results indicated restaurants were more willing to have food collected than take food waste to a drop-off location (77.8% vs 57.14%), even at an average cost of \$55.71 per month to participate in a collection program.



Only 1 restaurant was willing to travel more than 10 minutes to drop off food waste at a location. The other respondents were willing to travel ≤10 minutes (57%) and ≤5 minutes (28.5%). Based on this information, we limited drive time intervals to ≤5 minutes and ≤10 minutes.

We found that 40.2% of restaurants are within a 5-minute drive of current composting drop-off locations, and 80.17% of restaurants are within 10 minutes of a drop-off location.

Figure 6. Map of Fort Worth, TX city limits with restaurants and residential composting drop-off sites plotted to indicate the distance within 5 to 10 minutes that encompass the pre-existing residential drop-off sites.



From these results, we found that the key barriers to food recovery within Fort Worth restaurants included a lack of information about available food donation and composting options and concerns about regulatory, food safety, and transportation constraints.

Our results indicate restaurants are interested and taking steps to limit food waste, but they lack some of the resources and education necessary to further reduce their impact. We suggest an expansion of the pre-existing residential composting programs and drop-off sites within Fort Worth to include restaurants. We also encourage the city to offer composting bins to all Fort Worth restaurants, which would be most effective if used as part of a pickup service rather than as a means to transport food waste to a drop-off location. Most of all, we suggest the City of Fort Worth offer regular training to inform restaurant owners on affordable and accessible food donation and composting options that will help restaurants close the gap between interest and realization of food waste reduction goals.

Acknowledgments

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References

