

CONTRIBUTORS TO FOOD WASTE IN LOCAL RESTAURANTS AND OBSTACLES TO
FOOD DONATION

by

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CONTRIBUTORS TO FOOD WASTE IN LOCAL RESTAURANTS AND OBSTACLES TO
FOOD DONATION

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ABSTRACT

Background: Approximately one-third of all food produced in America is wasted each year due to lack of infrastructure and support in waste-saving efforts. With over 49 million Americans food insecure, more attention needs to be drawn towards implications of food waste (Vogliano).

Methods: An electronic food waste survey was developed and emailed to local Fort Worth restaurants after recruiting through phone calls and in person interactions. An electronic food donation survey was sent via email to local homeless shelters after recruiting through phone calls. Twelve restaurant respondents and fourteen homeless shelter responses were entered into Statistical Package for the Social Sciences version 22 (SPSS), where frequencies and correlations were determined.

Results: Eighty-three percent of restaurant survey respondents were not concerned about food waste in their establishment, but 100% agreed that reducing food waste was important. There was a positive correlation ($p \leq .05$) between restaurants having knowledge of the Good Samaritan Act and believing they have successful food waste prevention measures. There was a positive correlation ($p \leq .01$) between concerns of expiration and adequate storage space for prepared food in respondents to the shelter food donation survey. Only 17% of restaurant survey respondents said they would not be interested in connecting with local shelters to donate food. Eighty-one percent of shelter respondents agreed that their shelters would benefit from excess food donations from restaurants.

Discussion: All restaurants believed food waste is important, but 83% were not concerned about it in their restaurant. Restaurants with successful food waste measures in place might have been more likely to respond to the survey. Most respondents to both the shelter and restaurant surveys

agreed that partnerships between restaurants and shelters for safe excess food donation would be beneficial.

Conclusion: Food waste is prevalent in the restaurant industry and reallocating excess food, as donations to shelters, would be beneficial for society.

Word count: 307

CHAPTER I

INTRODUCTION

The amount of food waste in the United States, as well as around the rest of the world, has been described as a crisis. In fact, in 2008 the estimated total value of food loss in the United States was \$165.6 billion (Buzby & Hyman, 2012). However, little has been done to address the issue. The purposes of this study were to 1) identify contributing factors to local restaurant food waste, 2) describe barriers to restaurant food donations, and 3) describe barriers to donation acceptance by shelter employees. In the United States, the cost of food to go through the process of growing, manufacturing, processing, distributing, and disposing, that never even makes it to the table, amounts to \$218 billion per year (Leib, 2016). Not only the food, but the labor of this entire process is wasted. Reducing current food waste by only 15% could feed more than 25 million Americans each year. This is crucial to consider when one in six Americans have trouble supplying food to their tables (Gunders, 2012).

This research is timely since food waste is currently such a pervasive problem in the U.S. where 14.5% of all Americans lived below the poverty line in 2017 (Mehdi, 2017). The rationale for this study varies from learning how to decrease food waste to connecting foodservice operations and food shelters to lead to partnerships in which food donations can be recovered from restaurants and donated to shelters. In addition, it could make food service operations that participate in the study more food waste conscious.

The researchers hypothesize that the food waste contributors will include portion sizes, serving methods, preparation methods, policies regarding food hold and storage time, and the laws regarding food donations. Regardless of the food cuisine, it is anticipated that restaurants that serve larger portion sizes will report more food waste.

CHAPTER II

REVIEW OF LITERATURE

Food insecurity is the lack of access to enough food for which poverty is one of the key factors affecting all underlying determinants. The inability to gain food causes a continuous inadequate diet resulting in hunger or undernutrition (Saad, 2013). Forty percent of all food produced in America goes to waste each year because of lack of infrastructure and support in recycling, re-using and waste saving effort (Gunders, 2012). Food waste includes the component of food loss which happens when an item that is edible goes uneaten due to it being discarded by retailers because of undesirable color/blemishes and plate waste from consumers (Buzby, 2014). This unparalleled scale of food waste occurs across all levels of the American food supply chain including in production, processing, distribution, consumption and disposal. With over 49 million Americans food insecure, more attention has been drawn on the economic, social and environmental implications of food waste. Currently, researchers are studying food contributor's and solutions to address preventable food waste. At every step in the food supply chain, food is being wasted, and there are multiple strategies that can be implemented to decrease this waste. Prioritizing avertible factors within the food supply chain will lead to significant changes in food handling practices and potentially enable food surplus distribution to the impoverished.

Food waste has multiple hidden implications such as water impact, climate/global greenhouse gas impact, and economic impact (Vogliano & Brown, 2016). Worldwide, wasted food uses approximately 28% of the world's land area (*Food Wastage Foodprint*, 2013). In addition to feeding the hungry, reducing food waste can save money and help the environment. The usage of agricultural inputs from when food is harvested and the methane and carbon dioxide emissions from decomposing food that is not eaten contributes to climate change. These

agricultural inputs include fresh water, fertilizers, pesticides and fossil fuels used to grow crops and raise animals. Ten percent of global greenhouse gas emissions originate from animal agriculture. Food in landfills contributes 23% of all methane emissions in the United States. If everyone would contribute to decreasing food waste, the amount of money wasted and environment damaged would decrease as well and ultimately benefit everyone.

Differentiating between the different sources of food waste is imperative to creating methods of reduction. Various studies estimate that overall food waste in the U.S. amounts to approximately \$90-100 billion per year, with household consumer waste contributing to \$48 billion in total food loss costs (Gunders, 2012). On farms, low market prices, higher labor costs, and market demands of perfect-looking produce cause farmers to leave a large amount of food unharvested in the field. In restaurants and grocery stores, food waste is due to over-ordering and trying to meet consumer demands. Consumers are the largest contributor to food waste. Not only do they waste food in restaurants, but consumers waste food in their own homes due to inefficient shopping/cooking techniques, lack of knowledge about food date labels and lack of understanding of how to recover food through composting (Vogliano & Brown, 2016). Although composting is a good way to divert food from landfills, it is preferable for food to be eaten.

Despite difficulties with reliable measurements, assorted attitudes and lifestyle factors have been found to contribute to wasteful behaviors. The root of wasteful consumer traits range from cultural influences, extent of food and food labeling knowledge, and overall value of food (Tagtow, Nguyen, Johnson-Bailey, & Schap, 2015). Finding approaches to alter these attitudes and increase knowledge in consumers may contribute to reducing avoidable food waste in the household. There are multiple behaviors at every step in the cycle of food preparation and consumption that both households and restaurants can initiate to decrease food waste. These

behaviors include planning menus in advance, checking levels of food in storage prior to ordering, storing meat and cheese in appropriate packaging, using the freezer to extend the shelf-life of food, portioning foods adequately, using appropriate leftovers for future dishes, and using date-labels on food (Quested, Marsh, Stunell, & Parry, 2013).

A large contributor of food waste is that from retail and food service operations. Retail spaces wasted an estimated 43 billion pounds of food, which is 10% of the total retail food supply (Buzby & Hyman, 2012). Food service operations contributed a loss of 86 billion pounds of food, or 19% of the total retail food supply before it was sold to the consumer (Gunders, 2012). The reason for this occurrence of wasted food in these settings include kitchen loss during preparation, consumer plate waste, and larger meal portion sizes. Many strategies can be implemented within these food service operations to reduce food waste such as decreasing portion sizes served on plates, creating a composting program, repurposing wasted food and donating unserved, excess food to local food shelters.

As of 2015, 42.2 million Americans live in food-insecure households, and only 7% of eligible excess food is being donated (Coleman-Jensen, 2016). It was estimated that wasted food results in 141 trillion lost calories in a year which could nourish 31 million hungry and food-insecure individuals in America (Buzby, 2014). If the United States could decrease food waste and feed people instead of landfills it would protect the planet's environment, economy, and overall future generations.

Food waste not only hurts the environment but it is also a large burden to the economy. Yearly, all the food waste costs an estimated \$750 million in disposal fees and uses 4% of the total U.S. oil consumption. The majority of this waste is from residential sources, with 45% coming from consumers at home (Vogliano & Brown, 2016). This is surprising due to the fact

that price is an important factor in consumers' food choice (Tobler, Visschers, & Siegrist, 2011). Therefore, it is logical to expect people to pay more attention to decreasing food waste if they knew it would decrease price and ultimately save them money. If the country could decrease food waste in all settings, it would save millions that could improve the U.S. economy.

In order to address food waste, increased efforts should be made to push for restaurants, retailers, and other food businesses to donate reusable foods. Liability is the largest concern for foodservice organizations which prevents them from donating. However, the Federal Bill Emerson Good Samaritan Act protects both food donors and food recovery organizations (Bill Emerson Good Samaritan Act). The act was put in place by President Bill Clinton on October 1, 1996 to increase food donations, although the lack of knowledge about it decreases its use. There are four requirements that donors must abide by to receive protection: food must be donated to a nonprofit organization in good faith, food must meet all federal, state, and local quality and labeling requirements, nonprofit organization must distribute the donated food to needy individuals, and the recipient must not pay anything for the donated food (Leib, 2016). By donating in good faith, it means that the act does not provide protection if the liability from the food donated comes from "gross negligence or intentional misconduct." If more food service operators were aware of this protection act and fear off litigation was removed, many more donations would be made and there would be a decrease in food-insecurity and food waste. Tax deductions are often forgotten incentives for food donations. Donating food is expensive because of the money requirements for harvesting, packaging, storing, and shipping food. In addition, organizations also must ensure that the food follows federal, state, and local food safety and labeling laws (Leib, 2016). Providing knowledge of these tax incentives will improve organizations willingness to donate.

The federal government does not regulate food dates (Leib, 2016). Instead, each individual state indicates their rules and therefore they all vary state-to-state. The two federal agencies responsible for food safety and labeling include the U.S. Food and Drug Administration and the U.S. Department of Agriculture. Both agencies do not require food date labels, besides a required “pack date” for poultry, certain labeling requirements for USDA-certified egg products, and some technical requirements for those manufacturers that do use date labels on their foods.

Misinformation on food labeling and food safety increase the amount of food that is wasted by both consumers and producers of food. Many people believe that when a food is past its “use by,” “sell by,” or “best by” date, it is no longer safe to eat and should be thrown away. “Sell by” dates are used to inform the retailer for stocking purposes. “Use by,” “best by” and “sell by” dates communicate information about the peak food *quality* and do not relate to food *safety*. However, many consumers are unaware of the meaning of the labels. In fact, 51% of the U.S. population throws out food based on the “best used by” and another third (36 percent) throws out food based on the “sell by” date, leading to unnecessary food waste and higher grocery bills (“Food Expiration Dates Survey,”). Because of these misconceptions, food dates have a large impact on consumers and food vendors. Research has shown that consumers rely on these labels when deciding to throw foods away. States should consider providing education about food labeling and safety so that food waste can be prevented.

Foods that shelters will accept must meet all federal, state, and local quality and labeling requirements. If the food is in a defective condition but is still safe to consume, the donor must inform the receivers and the receivers must know how to properly recondition the food, or prepare it in a safe way to serve. Both donors and receivers also must abide by food safety laws. This can sometimes be a barrier to donations because of the extra work involved. However,

donors must abide by food safety laws for their daily food service, so keeping the food to be donated safe should not be a problem. Food shelters need all the resources they can get. There are places that would be able to accept a variety of foods, some may only be able to handle shelf stable products, while others can take foods that will be reheated and served. It is beneficial when foods that can be shelf stable for a while are donated since they will not go bad if not used right away. Some of these items include canned meals, peanut butter, low-sodium canned vegetables, dry cereals, rice, and pasta. Food shelters help benefit those people who are struggling to get by due to underemployment, stagnant wages and rising costs of living (Leib, 2016). The impact that foodservice operations can have on the world in regards to fighting hunger, economical problems, and the environment is large. Problems arise mainly due to lack of knowledge about the subjects of food safety, quality, food labeling, impact of food waste, and the Good Samaritan Act.

There are still many studies that need to be completed to address food waste in restaurants and identify methods to redistribute and utilize safe food excess. It is important to determine the largest contributors to food waste in restaurants, implement changes that will lead to reduction, and identify barriers to donation delivery and acceptance. Once these contributors are recognized, more strides can be made to improve food practices, decrease food waste, and deliver useable food for distribution to those in need.

CHAPTER III

METHODS

Study Design

This study was a descriptive survey design. Two electronic surveys were designed utilizing Survey Monkey, one for owners and/or managers of foodservice operations, and one for individuals in charge of accepting or utilizing food donations at food shelters. They were distributed to either local restaurant managers/owners or to employees involved in food donation acceptance in local shelters/kitchens following phone calls and/or personal visits by researchers to facilities. Restaurant survey questions addressed service style, average meal cost, facility type (franchise/chain, fast-food, fine dining, café), existence of measures in place at facility to reduce food waste, contributing factors to the facility's food waste, and familiarity with the Federal Bill Emerson Good Samaritan Food Donation Act. Shelter survey questions addressed existence of policies and procedures required to receive food donations, factors that influence ability to accept food donations, and frequency of offered donations. The participants either took the survey on their own which were sent via email, or they were provided the option for a researcher to come in and complete the survey with them one-on-one. The Texas Christian University (TCU) Institutional Review Board (IRB) approved the study protocol, and all participants provided written informed consent prior to survey completion.

Participants

The participants in this study were owners and/or managers of foodservice operations and individuals in charge of accepting food donations for food pantries, soup kitchens, and homeless shelters. Researchers identified local restaurants and food shelters within 20 miles of TCU's campus. Restaurant owners, managers and shelter personnel were contacted by phone or in-person

(if necessary) to request their participation. Email addresses were obtained. The survey was sent out utilizing a link to Survey Monkey.

Statistical Analyses

After data was collected, it was coded and analyzed with SPSS software. Correlations were analyzed using Spearman's rho with significance deemed $p \leq 0.05$ to identify relationships between perceived levels of food waste and barriers/contributors of food waste. Frequencies were used to describe current levels of food waste, current measures taken to reduce food waste, descriptive of the restaurant type, any perceived contributors to food waste, barriers to food donations, whom food shelters serve, barriers to shelters accepting foods, and familiarity with the Good Samaritan Law.

CHAPTER IV

RESULTS

In total, 14 food shelters and 72 restaurants were contacted. There was a 17% (n=12/72) and 100% (n=14/14) response rate for restaurants and shelters requested to participate, respectively. While only 16% (n=2) of restaurant survey respondents (RSR) were concerned about food waste in their establishments, 100% of RSR (n=12) agreed that reducing food waste in their facilities was important. Over 83% (n=10) of RSR reported having successful food waste prevention measures in their restaurants. There was a positive correlation with report of presence of prevention measures and knowledge of the Good Samaritan Act ($r=.67$, $p\leq 0.05$). Approximately 42% (n=5) of RSR reported they would be interested in connecting with local shelters to donate food and agreed that liability is a barrier to safe food donations. Among shelter respondents, 81% (n=9) agreed that their facilities would benefit from excess restaurant food donations.

Table 1 lists multiple contributors posed in the surveys that were potential causes of restaurant food waste (portion size, mislabeling, storage space, employee/staff training, size of menu/number of food items offered, complimentary items, service style, overproduction, spoiled food, consumer waste, incorrectly prepared food). The top three contributors to food waste at the restaurants that responded include employee/staff training, incorrectly prepared food, and consumer waste. Among the 12 respondents, 50% (n=6) agree or strongly agree that employee/staff training is a contributor; 58.3% (n=7) agree or strongly agree that incorrectly prepared food is a contributor; 66.7% (n=8) agree or strongly agree consumer waste contributes to the amount of food waste. Over two-thirds of RSR (66.7%) disagree or strongly disagree that their portion sizes contribute to food waste.

TABLE 1: Contributors to Amount of Food Waste at Restaurant

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	No Response
Portion sizes (n=12)	16.7%	50.0%	16.7%	8.3%	8.3%	N/A
Mislabeled food products (n=12)	41.7%	33.3%	8.3%	8.3%	8.3%	N/A
Storage space (n=12)	33.3%	58.3%	N/A	N/A	8.3%	N/A
Employee/Staff Training (n=12)	33.3%	8.3%	8.3%	33.3%	16.7%	N/A
Size of Menu/Number of food items available (n=12)	25.0%	58.3%	N/A	8.3%	8.3%	N/A
Complimentary food items (n=12)	25.0%	33.3%	16.7%	8.3%	8.3%	8.3%
Service Style (n=12)	N/A	41.7%	16.7%	8.3%	8.3%	25.0%
Food Overproduction (n=12)	16.7%	58.3%	8.3%	8.3%	8.3%	N/A
Spoiled Food (n=12)	16.7%	41.7%	N/A	25.0%	16.7%	N/A
Consumer Waste (n=12)	8.3%	8.3%	16.7%	41.7%	25.0%	N/A
Incorrectly prepared food (n=12)	16.7%	8.3%	16.7%	33.3%	25.0%	N/A

Restaurants that reported transportation as a barrier to donating also said that overproduction of foods were contributors to the amount of food waste ($p > 0.05$). A positive correlation ($p > 0.05$) existed between employee/staff training being a contributor to amount of food waste and that most of their restaurant's food waste resulting from overproduction. There were also positive correlations ($p > 0.05$) between restaurants that have successful food waste prevention measures in place and

reporting that reducing food waste in their restaurant important, and of restaurants who consider themselves environmentally conscious also having successful food waste prevention measures in place. Restaurants that reported they would be interested in connecting with facilities to donate food also reported that their establishment composts ($p > 0.05$). There was a positive correlation ($p > 0.05$) between restaurant respondents that reported they were concerned about food waste in their restaurant and those that stated that policies related to donating excess food are burdensome.

Table 2 lists barriers that would hinder the shelters from accepting food donations posed in the survey distributed to the shelter respondents (lack of storage-dry, lack of storage-refrigerated, food safety policies, expiration dates, insufficient staff, insufficient volunteers, transportation, maintaining proper temperature, number of people being served the food, lack of notice before receiving food, lack of space to serve food, lack of equipment to serve food). The top three barriers to accepting food waste donations included transportation of food from restaurant to facility, food safety policies, and expiration dates. Of the 14 respondents, only 11 responses were useful. Of those 11 respondents, 81.8% ($n=9$) reported that transportation is a barrier to accepting food donations; 72.7% ($n=8$) reported that food safety policies are a barrier; 63.6% ($n=7$) reported that expiration dates are a barrier to accepting.

TABLE 2: Barriers to Food Shelters Accepting Food Waste Donations

	A Barrier	Not a Barrier
Lack of storage (dry) ($n=11$)	27.3%	72.7%
Lack of storage (refrigeration) ($n=11$)	45.5%	54.5%
Food safety policies ($n=11$)	72.7%	27.3%
Expiration dates ($n=11$)	63.6%	36.4%
Insufficient staff ($n=11$)	18.2%	81.8%
Insufficient volunteers	18.2%	81.8%

(n=11)		
Transportation of food from restaurant to facility (n=11)	81.8%	18.2%
Maintaining proper temperatures (n=11)	27.3%	72.7%
Number of people being served the food (n=11)	18.2%	81.8%
Lack of notice before receiving food (n=11)	45.5%	54.5%
Lack of space to serve food (n=11)	18.2%	81.8%
Lack of equipment to serve food (n=11)	18.2%	81.8%

Regarding food shelters, there was a positive correlation ($p > 0.05$) that has potential to help other food shelters become more accepting of foods. Of the restaurants whom reported that they currently accept foods from restaurants, they also said that they have established policies in place. There was a positive correlation ($p > 0.05$) between restaurants that are offered food from grocery stores and those who say expiration dates are a barrier. Another included a positive correlation ($p > 0.05$) of shelters that had policies set in place for what types of food donations they would accept also responded that there were only certain types of foods that could be accepted because of legal food safety regulations.

CHAPTER V

DISCUSSION & CONCLUSIONS

Although all RSR agreed that food waste prevention measures were important, the majority were not concerned about food waste in their facilities. Due to the overall poor response rates among restaurant owners/managers, the RSR in this survey may represent a segment that were more interested in preventing food waste and more likely to respond to the survey. Most respondents to both surveys agreed that partnering with restaurants and shelters for safe excess food donation was desirable. A low response rate from restaurants and a full response rate from food shelters indicates that there may be some fear of exposure of food waste by restaurants whom did not care to respond. It is possible that restaurants believe that by reporting their waste they may lose customer support, although all answers were anonymous. Higher may also show how important food waste is in certain aspects of the community. Restaurants may be blind to the problem of food waste since there is such a high prevalence of food insecurity. The results indicated multiple points of contact that could be improved so that contributors to food waste and barriers to food donations could be lessened.

The top three contributors to food waste at the restaurants that responded included employee/staff training, incorrectly prepared food, and consumer waste. To decrease these contributors there are many actions that restaurants could take. For example, employee/staff training and incorrectly prepared food are related problems. If restaurants would increase their training of employees, incorrectly prepared foods would be prevented and thus decrease food waste. Another action that could take place in response to these contributors is that to decrease consumer waste, restaurants could make portions smaller or work to begin a composting program to divert food from landfills. Further research would need to be conducted to see if these changes

would be possible and if the amount of food waste would decrease. Offering education to local restaurants on methods to prevent these top three food waste contributors and educate restaurant owners/managers about money saving tactics to benefit their businesses would also be beneficial.

Restaurants that reported transportation as a barrier to donating and overproduction of foods as a contributor to the amount of food waste could work to decrease their overproduction by educating their employees which will result in a decreased need to transport less food waste. Concern also plays a big role in food waste since it was shown that restaurants that have successful food waste prevention measures in place also find reducing food waste in their restaurant important, and consider themselves environmentally conscious. If restaurants could see how beneficial being food waste conscientious and environmentally friendly can increase the economic state of their facility, then maybe they would be more interested in preventing food waste. Restaurants that reported they would be interested in connecting with facilities to donate food also reported that their establishment composts, showing that they already are educated on the benefits. Education is the primary barrier in food waste. Restaurant owners are not aware of the value and ease of decreasing food waste contributors and food donation barriers. Knowledge of these topics in restaurant owners/managers/employees should be further researched to see if increasing awareness could ultimately decrease food waste in restaurants.

The top three barriers to accepting food waste donations included transportation of food from restaurant to facility, food safety policies, and expiration dates. These barriers can be overcome by working alongside restaurants and local community volunteer services to come up with ways to transfer foods safely to the facilities. These barriers can also be avoided by training staff at both the restaurants and the food donation shelters on the food safety policies and expiration dates. This way, food being donated will be more monitored and less likely to become expired

and/or unsafe. If food shelters would all work to have established policies in place to accept food donations, it would make the process much easier when working with local restaurants. These policies would also increase the education of their employees about expiration dates, food safety, and other laws about food donations that could decrease amounts wasted due to employee/staff error.

Most respondents to both the shelter and restaurant surveys agreed that partnering with one another for safe excess food donation would be beneficial. Increased education on both ends, the restaurants and the accepting food shelters, would ultimately be the best way to work to decrease food waste. Since it was agreeable that the partnership would be of great value, programs can be piloted to take advantage of these opportunities. By decreasing the 40% of food produced in America that is wasted each year restaurants could feed the 49 million Americans who are food insecure.

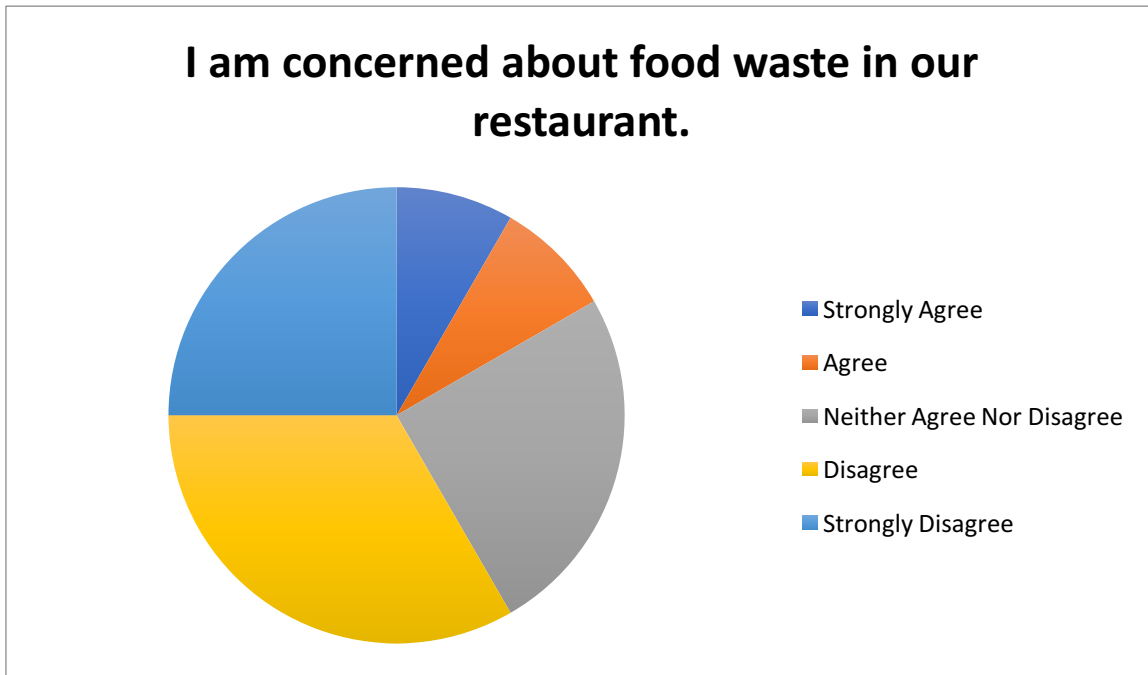
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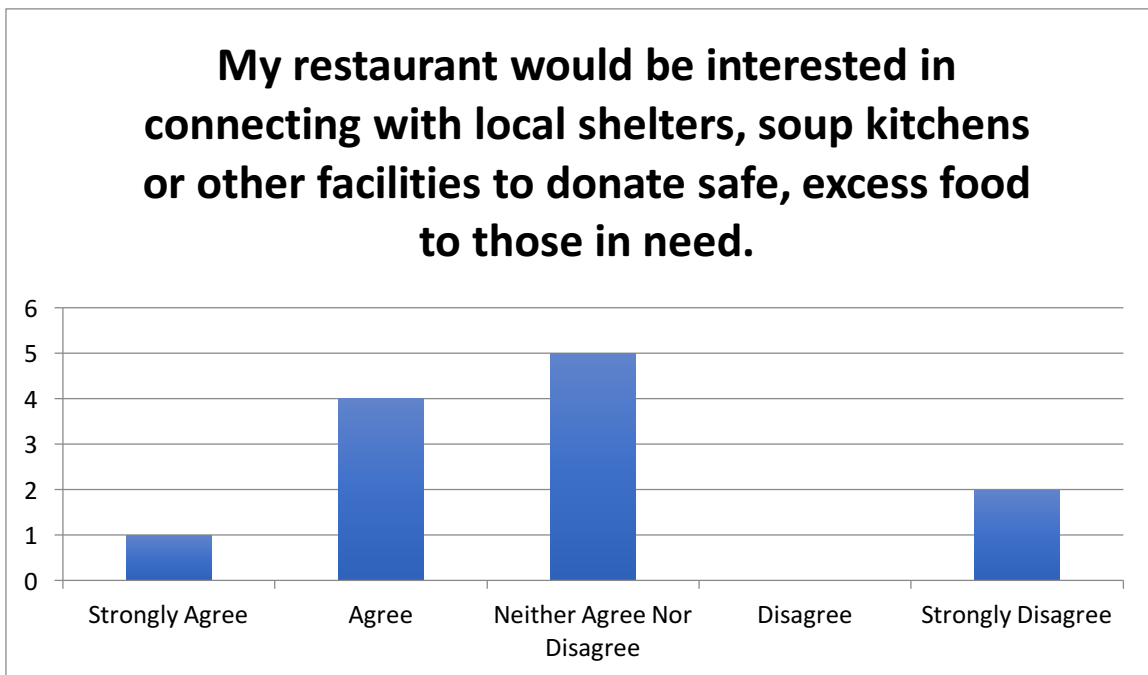
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APPENDICES

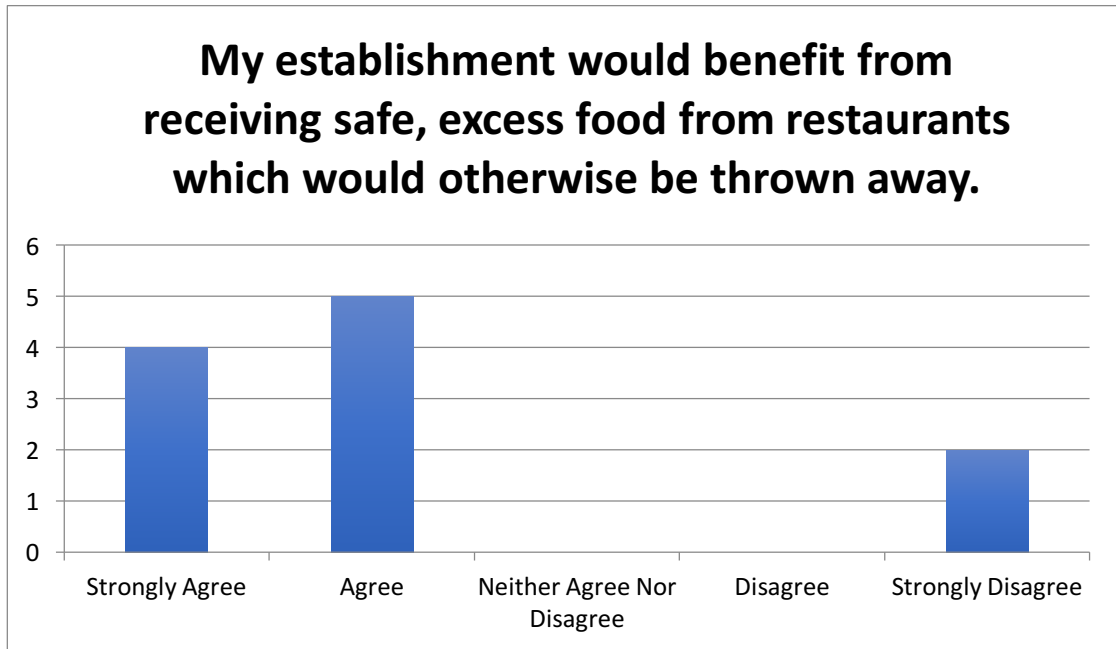
A.



B.



C.



D.

