

5-2020

## **Chefs' Perceptions of Zero Waste Cooking in Restaurants**

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Chefs' Perceptions of Zero Waste Cooking in Restaurants

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Science in Human Environmental Sciences

by

Josephine Reardon  
University of Arkansas  
Bachelor of Science in Human Environmental Sciences, 2018

May 2020  
University of Arkansas

This thesis is approved for recommendation to the Graduate Council.

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## **ABSTRACT**

The purpose of this study is to examine chefs' perceptions and practices relative to current and potentially future efforts to decrease food waste. Through qualitative inquiry, this research aims to identify food waste reduction practices in Northwest Arkansas restaurants; chef's perceptions of these practices and zero waste cooking; the impact these practices have on successfully implementing sustainability; and the biggest challenges in reducing food waste in restaurants. The results of this study will assist chefs and restaurant owners by providing guidance on practices easily utilized in restaurants currently.

An interview protocol, with five sections, was conducted with ten chefs at different restaurants in Northwest Arkansas. The sections discussed food waste policy and tracking, training and communication, donation, food waste reduction practices, and perceptions of food waste. Chefs were asked to fill out a demographic questionnaire after the interviews were conducted.

The results of this study indicated that Northwest Arkansas chefs are implementing multiple food waste reduction practices in their restaurants. Many chefs have begun a composting program, where they are educated on the importance of reducing food waste in landfills. The most common food waste reduction methods that chefs utilized were repurposing ingredients, back-of-house training, portion size control, donating, and composting. Training was an important aspect in successfully implementing food waste, with chefs stating that chefs must be passionate about reducing food waste for the process to be successful. Cooperation and lack of knowledge emerged as the biggest challenges in reducing food waste.

The results of this study indicated that chefs tended to be confused on what constituted as zero waste cooking, suggesting that a more universal definition be created.

It is hoped the results from this study will lead to further research in food waste reduction practices and zero waste cooking, resulting in an awareness of the magnitude food waste has on the world. Results from this study can be used as a catalyst for conducting follow-up research on food waste reduction practices in other cities, allowing a more comprehensive look at food waste across the country.

## **ACKNOWLEDGEMENTS**

I would first like to thank my advisor, and mentor, Dr. Kelly Way. I truly would not be in the position that I am in without her constant support, enthusiasm, and patience. Her expertise guided me through this process and her constant words of affirmation instilled confidence in myself to complete this thesis. Words will never be enough to encapsulate the gratitude I have for her and what a great mentor, friend, and encourager she has been through my journey.

I would also like to thank my committee members, Dr. Betsy Garrison and Dr. Lisa Wood. They constantly challenged me to be the best that I could be and continued to see potential in myself and my thesis. Their valued input and insightful feedback allowed my thesis to reach its full potential.

I also want to acknowledge the chefs that participated in this study. I am forever grateful that they took time out of their busy schedules to sit down for an interview and provide me with amazing conversations. This study would not have been completed without their excitement for the study and their willingness to take me into the practices of their restaurants.

I must acknowledge my fellow graduate assistant, roommate, and best friend, Clarissa Mason. Thank you for seeing my abilities when I did not see them myself. I am not the same person that I was when I began this journey. We did it!

Finally, I must acknowledge all my family and friends who were with me through this journey. God truly blessed me with the most supportive family and friends and your words of support and encouragement never went unnoticed.

## **DEDICATION**

This thesis is dedicated to my incredible and strong mom. Thank you for always supporting me in everything that I do and showing me unconditional love. You always believed in me, even when I didn't believe in myself. Thank you for being such a great role model in my life and instilling in me a strong work ethic, empowering me to obtain a master's degree. I hope I have made you proud and continue to make you proud. You have given me more than anyone deserves and for that, thank you!

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# CHAPTER 1

## Introduction

Reducing food waste is known to be beneficial to the environment, so why are there not more restaurants utilizing food waste reduction methods in their establishments? Food waste refers to quality food that is worthy of human consumption, but gets discarded either before or after it spoils, thus never being consumed (Lipinski et al., 2013). Reducing food waste is environmentally important because it keeps food out of landfills, reduces methane emissions and lowers carbon footprints. Forty percent of the food produced in the United States wind up in landfills, with more than 365 million pounds of food being wasted daily. Americans throw away 15-25% of the food they purchase, equating to approximately 400 pounds per person, per year (Move for Hunger, 2018). In restaurants alone, approximately 11.4 million tons of food is wasted annually (ReFED, 2018). This alone emphasizes the importance of implementing food waste reduction methods in restaurants.

Evidence suggests that there are ongoing governmental efforts to reduce food waste in the United States. In 2015, the United States Department of Agriculture (USDA) and the United States Environmental Protection Agency (EPA) announced efforts to reduce food waste by 50% by the year 2030. They plan to work with leaders in food systems to “promote action and bring more successful interventions and tools” to advance sustainable management of food (Environmental Protection Agency, 2017). In 2015, ReFED was created, forming a network of business, nonprofit, foundation, and government leaders determined to combat food waste in the United States. ReFED developed the *Roadmap to Reduce U.S. Food Waste*, which identified opportunities to save resources and facilitate the achievement of the national reduction goal (ReFED, 2019).

The EPA developed a six-tiered food recovery hierarchy, detailing the actions organizations can take to prevent and divert wasted food. These six levels of the hierarchy include: source reduction, feed hungry people, feed animals, industrial uses, composting, and landfill/incineration (EPA, 2017). It was anticipated by teaching industry leaders that the impact of their actions would positively affect their decision to decrease their food waste in their own establishments, leading to more zero waste establishments.

Zero waste is a term that is difficult to define. The most accurate and representative definition of zero waste comes from the Zero Waste International Alliance (2018):  
the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health (para. 3).

However, for the purpose of this study, zero waste *cooking* must be defined. Zero waste cooking is a term that has several different interpretations of the definition. This study will use the definition from Auguste Escoffier School of Culinary Arts (2019), where they define it as, “reducing the amount of food so that you are ideally only stocking ingredients that you will actually use and serving in quantities that will be consumed” (para. 4).

Restaurants can reduce food waste in several ways (Restaurant Hospitality, 2018). Designing menus to reduce the number of ingredients, repurposing food prep trim and overproduction, using smaller plates in self-service/all-you-can-eat setting, and/or using “imperfect” produce are some of the attainable practices that restaurants have attempted to implement. Restaurant Hospitality (2018) states that the beginning of reducing food waste starts with the tracking of wasteful practices and then creating changes to reduce the amount of food

wasted. Technology can be used to track measures; however, it can be as simple as observing and recording contents in the establishment's waste bins. Restaurants can implement a food waste audit, to further examine where waste is coming from, thus finding ways to reduce that waste (WebstaurantStore, 2018).

When exploring the methods of reducing food waste in restaurants, donation is feared and avoided by many. Establishments are reluctant to donate their leftover food, thinking they could get sued (Leib, Chan, Hua, Nielsen, & Sandson, 2018). The Bill Emerson Good Samaritan Food Donation Act protects them from being sued. However, some restaurants are unfamiliar with this act (Lunsford, 2015). This act was enacted by Congress in 1996 and “absolves donors of potential civil and criminal liability for injuries, resulting from the use of donated items.” This act allows restaurants no excuses to not donate leftover food, but somehow, there is still a dearth of food donations from restaurants (Haley, 2013).

The number of restaurants is growing each year and there is no sign of slowing down, specifically in the state of Arkansas, where this research is set. In 2018, there were 5,288 eating and drinking locations in Arkansas (National Restaurant Association, 2018; Arkansas Hospitality Association, 2018). Arkansas is projected to grow by 9% over the next four or five years, with more national chains expanding into Arkansas, along with independent restaurateurs opening for business (National Restaurant Association, 2019). An opportunity exists to educate the restaurateurs in Northwest Arkansas about food waste reduction methods and to investigate the methods already being implemented in restaurants.

Through qualitative inquiry, this research aims to identify food waste reduction practices in restaurants; chefs' perceptions of these practices; the impact these practices have on

successfully implementing sustainability; and the challenges of reducing food waste in restaurants.

### **Problem Statement**

Approximately 85% (Move for Hunger, 2019) of food not used or consumed in restaurants is thrown away. This waste is a result of customers not consuming all the food and/or kitchen staff disposing of food due to inadequate quality, overcooking, and spoilage.

### **Purpose of Study**

The purpose of this study is to examine chefs' perceptions and practices relative to current and potentially future efforts to decrease food waste.

### **Research Questions**

1. To what degree are chefs in Northwest Arkansas tracking food waste?
2. How do chefs in Northwest Arkansas train employees to reduce food waste?
3. How important do chefs in Northwest Arkansas perceive zero waste cooking and what are their practices utilized to reduce food waste?
4. What do chefs in Northwest Arkansas identify as the biggest challenges in reducing food waste?

### **Assumptions and Limitations**

It is assumed that participants in this study will answer the interview protocol honestly and accurately and be provided with the knowledge of food waste and zero waste cooking.

The research is limited due to the following factors:

- The participants of this study will be limited to chefs in the Northwest Arkansas region; therefore, the results cannot be generalized outside of this population.
- There was no way to confirm whether responses represent the true opinion of all participants.

## CHAPTER 2

### Literature Review

#### Food Waste

##### *Scale of the Problem*

Food waste is a global issue, both economically and environmentally. Between 33-50% of all food produced globally is never eaten and the value of this wasted food is worth over \$1 trillion dollars (OLIO, n.d.). In the United States alone, food waste represents 1.3% of the total GDP (OLIO, n.d.) and in the UK, 7.1 million metric tons of food is thrown away each year (Eco & Beyond, n.d.). According to Dou et al. (2016), around 70 million metric tons of edible food is lost annually in the United States, with nearly 60% occurring at the consumer level. Since the 1970s, food waste has increased by 50%, with 35% of waste taking place at the consumption stage and 24% taking place at the production and storage stage (Albright, 2014). The percentage of waste is strongly dependent on the kind of food. The FAO SAVE FOOD Initiative (2018) found 20% of beef meat, 35% of fish products, and 45% of fruits and vegetables were wasted.

Environmentally, food waste is a major source of greenhouse gas emissions (GHG). Food produced and not eaten has an annual carbon footprint of 3.3 gigatonnes of carbon dioxide equivalents (CO<sub>2</sub>-eq) and greenhouse gas emissions associated with the production of this food loss are estimated at 1.4 kilograms CO<sub>2</sub>-eq capita<sup>-1</sup> day<sup>-1</sup> (Heller & Keoleian, 2014). Food waste contributes 8% of total global emissions and 2.6% of all U.S. emissions. According to the Food and Agriculture Organization of the United Nations, "if food waste were a country, it would be the third-largest emitting country in the world, after China and the U.S" (2011, p.1).

Food waste also deprives precious resources like land, energy, and water. It takes a

landmass larger than China to grow the food each year that is ultimately never eaten, all to produce food that will eventually be thrown away (OLIO, n.d.). According to National Consumers League (Albright, 2014), producing food takes up 51% of our land, requiring irrigation and depleting topsoil for 1.17 billion acres of land. Food production also uses 10% of the United States' energy supply and 25% of the world's freshwater consumption. According to the Food and Agriculture Organization of the United Nations (2013), around 3.3 billion metric tons of CO<sub>2</sub> equivalent, 250 km of blue water, and 1.4 billion hectares, around one third of the world's agricultural sector, is associated with wasted food. ReFED (2019) estimates that 21% of water, 18% of cropland, and 19% of fertilizer in the United States is dedicated to food that has never been eaten. Food waste is a global epidemic and is occurring in many related sectors, including in packages, in retail, in fields, in transit, in homes, and in restaurants.

### *Packaging*

Packaging of food products has been shown to be a significant player in environmental effects. Globally, 348 million metric tons of plastic are produced each year (PlasticsEurope, 2018), giving rise to about 400 million tons of CO<sub>2</sub> (Ellen MacArthur Foundation and McKinsey & Company, 2016). Around 30 percent of all packaging is not disposed of appropriately, having the potential to accumulate in the world's oceans (Ellen MacArthur Foundation, 2016) and accounting for 1% to 12% of greenhouse gas emissions (Silvenius, Grönman, Katajajuuri, Soukka, Koivupuro, and Virtanen, 2013). In 2017, packaging containers accounted for almost 30% of the materials landfilled, amounting to 80.1 million tons of generation (EPA, 2017). Dilkes-Hoffman et al. (2018) researched the environmental impact of biodegradable food packaging and found a possible packaging replacement for those that are non-recyclable and non-degradable. They envisioned that a biodegradable thermoplastic starch (TPS) and

polyhydroxyalkanoate (PHA) layered material could be a useful replacement for current non-recyclable and non-degradable packaging. They wanted to identify the GHG tradeoffs associated with using this biodegradable packaging and developed three conclusions. First, food packaging design needs to focus on the reduction of food waste. Second, GHG emissions that are associated with disposal of a PHA-TPS packaging in landfills can be offset if the package reduces beef wastage by around 6%. Lastly, they concluded that biodegradable packaging could provide GHG benefits through increasing the amount of food waste available for biological processing.

Packaging impacts more than the environment. Multiple studies have shown that packaging contributes to increased food waste among consumers. ReFED (2016) reported that packaging adjustments alone have the potential to divert 189,000 metric tons of food waste annually in the United States, with an economic value of \$715 million dollars. A Swedish survey determined that 20% to 25% of household food waste was related to packaging design attributes (Williams, Wikström, Otterbring, Löfgren, & Gustafsson, 2012). Other studies have created solutions to reduce food waste through improved packaging. Verghese, Lewis, Lockrey, and Williams (2015) developed several appropriate packaging systems to reduce food waste, one being packaging materials and technologies that extend shelf life. Food brand owners are trying to achieve a better product shelf life, producing goods in advance of the dates they are required while also having the items on the shelf for longer (Verghese et al., 2015). The confusion behind date marking has also been a topic of investigation. There is evidence to suggest that confusion about the meaning of date labeling such as “best-before date” and “use-by date” results in edible food being thrown out by consumers. There are several different date labeling phrases: “sell-by” “use-by” “best-before” “best-by,” “best if used by,” “best if used before,” “durable life date,” “frozen on,” “display until” and “best if purchased by.” Consumers confuse best before and use

by dates and state that they need more information about the shelf life once the package has been opened (Rohm et al., 2017). Newsome et al. (2014) called for action to move toward uniformity in date labeling to reduce confusion and food waste. Poyatos-Racionero, Ros-Lis, Vivancos, and Martínez-Mañez (2018) concluded that intelligent packaging (a system able to inform about the real state of food) can be a fundamental tool to confront future challenges and reach a more sustainable society by reducing food waste.

### *In Shops*

In 2012, retail food waste was estimated as 4.6 million tons, about 5% of the total food wasted along the supply chain (Stenmarck, Jensen, Quedsted, and Moates, 2016). In a Finnish community, food waste was estimated to be around 65-75 million kilograms per year in the retail sector (Katajajuuri, Silvenninen, Hartikainen, Heikkilä, and Reinikainen, 2014). A meta-analysis was performed analyzing the multiple studies that have researched reasons of food waste in the retail sector (Cicatiello, Franco, Pancino, Blasi, and Falasconi, 2017). Stock management practices have been linked to food waste, with food items being discarded due to damaged packaging (Parfitt, Barthel, and Macnaughton, 2010). Customer behaviors and preferences are strong determinants of food waste, with sub-standard products often being rejected by consumers (Gunders, 2017). Holiday-themed foods often remain unsold as their purchase is only for a limited period (Cicatiello et al., 2017). Food waste is greater for organic products than non-organic ones (Eriksson, Strid, and Hansson, 2014) and small stores were found to produce more food waste than large stores (Gustavsson & Stage, 2011). Cicatiello et al. (2017) measured the mass and value of food waste in a retail store (Figure 1).

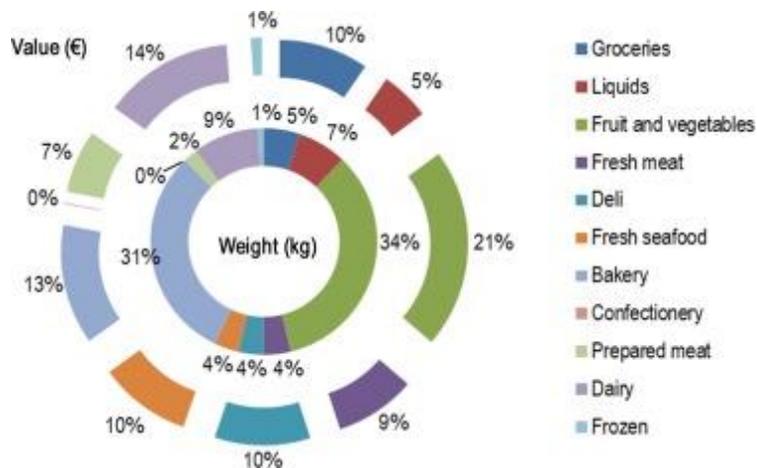


Figure 1. Value and Weight of Food Waste by Store Department in 2015. Reprinted from “The dark side of retail food waste: Evidences from in-store data” by C. Cicatiello, S. Franco, B. Pancino, E. Blasi, and L. Falasconi, 2017, *Resources, Conservation and Recycling*, 125, p. 277.

Out of the total food waste, they found that nearly 25 tons of food were still perfectly suited for human consumption, meaning that at least 35% of the total food waste produced at the store did not lose its original function and could be saved from wasting. The WRAP movement in 2007 worked with retail companies to try to reduce the amount of household food waste by emphasizing the importance of buying the right amount, keeping what people buy at its best, and helping people use what they buy (Quested, Parry, Easteal, and Swannell, 2011). The WRAP movement helped the UK significantly reduce the amount of household food waste. Between 2006-2007 and 2010-2011, household food waste was reduced by 1.1 metric tons and avoidable food waste was reduced by 950,000 metric tons (Parry, 2011).

In 2018, WRAP restated UK food waste figures to drive for greater international consistency in measurement, reporting, and action on food waste (WRAP, 2018). Some key baseline figures include 7.1 million metric tons for household food waste and 260,000 metric tons for UK retailers. The Director at WRAP stated that they are continuously aiming to drive down food waste in the supply chain and in the home and hope to achieve their goal of reducing

food waste by 1.5 million metric tons by 2025 (WRAP, 2018).

### *In the field*

Farm-level food loss is defined as food that is either not harvested or lost between harvest and purchasing (Gunders, 2017). There is a dearth of research about on-farm food loss using in-field measurements, only two such studies were found. Baker, Gray, Harwood, Osland, and Tooley (2019) measured 11,299 kilograms per hectare of food loss at the farm level, equating to 31.3% of the marketed yield. In a comprehensive study, which conducted 68 field surveys on 8 different crops, Johnson et al. (2018) found an average of 42% of marketed yield left in the field. Most farmers showed discontentment while leaving food waste behind, stating that a mix of consumer preferences, market prices, environmental factors, buyer specifications, and labor availability play a role in the amount of food loss (Baker et al., 2019). In a California study, the most important variable driving grower decisions was the cost of labor, with the agriculture labor market driving up wages, resulting in workers being asked to pick only the best quality produce to limit labor expenses (Wozniacka, 2019).

### *In transit*

Between harvest and consumption, food must pass through a complex supply chain, often traveling to and from various processing or storage facilities before it ends up in the hands of retailers and later, consumers. Research conducted has shown that losses during the transportation of finished goods exist. Lipińska, Tamaszewska, and Kolożyn-Krajewska (2019) identified factors associated with food losses during transportation in Poland. The causes of losses during transportation that were found were human factor, environment, management, methods, inadequate materials securing the products, and mechanical. They found that

inadequate storage conditions were a main cause of food waste and that long loading and unloading times led to an undesired increase in the temperature of the unit.

Temperature violations had been a major issue for trucking companies, since many did not have established standards for accepting or rejecting temperature-controlled shipments (Load Delivered, 2016). Management played a role in this, emphasizing the importance of organizing the processes of loading, circulation of the means of transportation, and unloading of the products. Transportation units were making longer drives to deliver food products, resulting in the necessity of maintaining the refrigeration for a longer period (Priefer, Jörissen, and Bräutigam, 2013). Progress in transportation technology is required to arrange and safeguard food products and to avoid mistakes made during transport (Hammond et al., 2015). Palka (2018) found that temperature inconsistencies were less common, but that mechanical damage was the most frequent transport damage.

Packaging also plays a role in transportation food loss and aspects such as their hardness, brittleness, elasticity, durability, and gas or water impermeability are all important (Robertson, 2013). Contamination of a single pack part of a bulk pack resulted in the whole product either being sent back or disposed of (Lipińska et al., 2019). Another factor that Lipińska et al. (2019) indicated was a short time to the expiration date, which 15% of participants responded with their reasoning behind discarding the product. Lipińska et al. (2019) also found that accidents and collisions along the way could result in food loss, causing multiple products to show failures, resulting in recalls. Reviewing the literature on food loss in transit suggests that it is possible to recover part of the food during the loading, transportation, and unloading stages.

### *In the home*

In developed nations, food waste generated in homes is a large contributor to the total amount of food waste. There have been several UK studies identifying household food waste. In the UK, the largest contribution to food waste was from homes, with 8.3 million metric tons per year, costing consumers 12 billion pounds (approximately 15 billion dollars) and contributing 3% of UK greenhouse gas emissions (Quested et al., 2011). Quested et al. (2011) also found that 5.3 million metric tons were avoidable. In a Finnish study, the amount of avoidable food waste per person for two weeks ranged from 0 to 23.4 kilograms (Katajajuuri et al., 2014). Food was mainly disposed of due to spoilage, with 29% being from mold, 19% being past the “best before” date, 14% being leftovers from dining, and 13% from food being prepared in excess of needs. Quested et al. (2011) found that fresh fruit, vegetables, and salad account for around one quarter of all avoidable food waste. In addition, there are studies working to identify motivations to minimize household food waste.

Graham-Rowe, Jessop, and Sparks (2014) developed three primary motivations to minimize household waste: the desire to not waste money, the desire to do the right thing, and food management. Graham-Rowe et al. (2014) also provided barriers to minimizing household food waste: the need to feel like a good provider; the desire to shop, cook, and prepare food with convenience and time constraints in mind; the low priority given to food waste by some of the household food purchasers; and the perception that the responsibility for food waste lay with the food industry and supermarkets rather than the individual. Quested, Marsh, Stunell, and Parry (2013) found that 41% of the population stated that saving money was a powerful motivating factor in reducing food waste. It was also found that guilt plays an important role in food waste reduction and that many relate eating a healthy diet to reducing food waste. A significant

government-funded program of work was implemented to reduce household food waste by the WRAP program and since 2007, approximately 380,000 metric tons of food waste from UK households has been reduced and there is more awareness of the issue of food waste (Quested et al., 2011).

### *In restaurants*

According to the Food Waste Reduction Alliance (2014), 84.3% of unused food in U.S. restaurants ends up being disposed of, while 14.3% is recycled, and only 1.4% is donated. Sakaguchi, Pak, and Potts (2018) studied restaurants in Berkeley, California to understand how restaurateurs perceive food waste. This study found that 38% of restaurateurs ignore food waste generation and 14% toss edible leftovers into landfill bins. This study also found that 14% of chain restaurants offer staff incentives to act more sustainable and 38% of restaurants proactively offer customers take-out bags. Stöckli, Dorn, and Liechti (2018) found that informational prompts were reduce consumer food waste in restaurants by encouraging diners to take their leftovers home.

Food waste in restaurants is not only indicative of the restaurant staff's actions, but the consumers as well. A study by Silvennoinen, Heikkilä, Katajajuuri, and Reinikainen (2015) found that the leading cause of food waste in restaurants was from served food to consumers. Bloom (2011) found that when both front-of-house and back-of-house waste is accounted for, around a half pound of food waste is created per meal served at a restaurant. Lavén (2017) studied consumers' food waste behaviors in restaurants and created a model describing factors influencing food waste behavior (intention to avoid food waste, environmental attitudes, environmental beliefs, moral norms, situational factors, and socioeconomics). This study mainly

found that environmental concerns and attitudes affect consumers' food waste behavior significantly. They concluded that more awareness should be put on the environmental impact of food waste, which supports the study of Stöckli et al. (2018). Overall, there is a dearth of research that focuses on food waste in restaurants and the perceptions of the chefs and kitchen staff; this study begins to bridge that gap.

## **Landfills**

A landfill is defined as “a carefully designed structure built into or on top of the ground in which trash is isolated from the surrounding environment” (American Environmental, n.d.). Compost is “organic matter that can be added to soil to help plants grow” (EPA, 2018). The difference between a compost and a landfill, is that a landfill is designed to keep the trash away from people but does not allow it to decompose quickly. According to EPA (2015), only 5.3% of all food waste was diverted from landfills for composting. Food decomposing in landfills results in the production of methane, a greenhouse gas roughly 20 times more potent than carbon dioxide (EPA, 2019). Overall, landfills account for 34% of all methane emissions in the United States (Antonsen, 2017).

### *How Landfills Work*

Americans generate approximately 600,000 tons of trash per day and about 57% is buried in landfills (American Environmental, n.d.). In 2015, 30.6 million tons of food waste went to landfills (EPA, 2015). Trash put in landfills typically stays there for a long time, since there is little oxygen and moisture. Landfills are not meant to break down trash, merely to bury it. There are several parts of a landfill, including the bottom liner system, old and new cells, storm water drainage system, leachate collection system, methane collection system, and covering or cap.

Williams (2016) described the “dry tomb” process that landfill managers use to bury the waste. Landfills are lined with geo-textiles and clay, creating a shield between the waste and the earth surrounding it. Landfills are filled with waste, compact it, cover it, and finally cap the pile with another layer of clay and geo-textiles. Fluid run-off is collected and treated, which lowers the moisture level of the landfill. This results in the buildup of methane and other gases. Figure 2 below shows the structure of a landfill and the flow of leachate (contaminated substances):

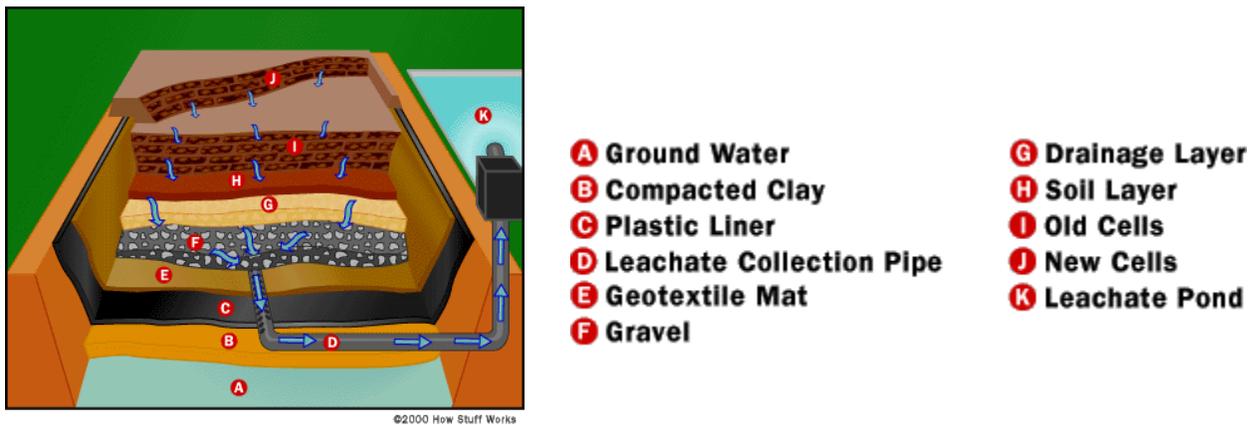


Figure 2. Structure of a Landfill. From *How Landfills Work*. Retrieved from <http://science.howstuffworks.com/environmental/green-science/landfill6.htm>. Copyright [2000] by How Stuff Works

### *Food in Landfills*

The amount of food ending up in landfills has been increasing since the 1960s. In 1960, 12,200 tons of food was landfilled, whereas in 2015, landfilled food totaled 30,250 tons (EPA, 2019). Foods buried in landfills are left without oxygen, thus the matter is broken down in a process called anaerobic digestion (Wreglesworth, 2019). This process has three stages: microorganisms breaking down the organic compounds, the conversion into organic acids, and the methane-producing bacteria converting acids into methane and carbon dioxide. Those gases either can end up in the atmosphere or be captured. When gases end up in the atmosphere, heat is trapped, potentially affecting climate change throughout the world.

According to the EPA (2019), between 5% and 20% of global human-caused methane emissions are from solid waste in landfills. It is becoming more common to capture the gases before they are released into the atmosphere. According to EPA, majorities of landfill managers are required to collect gases and burn them, or use them as an energy source (Williams, 2016). This action results in the production of electricity and heat and can be used to power vehicles (Wreglesworth, 2019).

The integration of composting has been a solution for a healthier environment. A compost pile is full of living organisms that munch away at decomposing matter. Moisture and air are allowed in and out, creating an aerobic environment that generates heat and releases carbon dioxide instead of methane (Williams, 2016). Since 2000, the amount of food composted has increased significantly, from 680 tons in 2000 to 2,100 tons in 2015 (EPA, 2019). Research has shown that composting is an environmentally friendly option for food scraps, since those scraps can be turned into something useful, instead of piling up in a landfill (Vanderlinden, 2019).

## **Sustainability**

### *Importance of Sustainability*

Sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs” (Strategic Imperatives, 1987). The United Nations developed 17 sustainable development goals to promote prosperity while also protecting the planet. They work to achieve no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable

cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice, and strong institutions; and partnerships for the goals (United Nations, 2019). Sustainability encompasses many areas and in terms of food, this study will be using the definition of Burlingame and Dernini (2012) from FAO:

Sustainable diets are those diets with low environmental impact that contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy, while optimizing natural and human resources (p. 7).

Food sustainability is important because food production is the largest factor threatening species with extinction (Tilman et al., 2017), causes nutrient overload and dead zones in lakes and coastal areas (Diaz & Rosenberg, 2008), uses 70% of freshwater (Comprehensive Assessment of Water Management in Agriculture, 2007), and has led to around 60% of the world fish stocks to be fully fished or overfished (FAO, 2018). Food production has also been found to be exceeding environmental limits, with nitrogen synthesis exceeding the planetary boundary and phosphorus reaching the planetary boundary (European Commission, 2016). When thinking about sustainable development, the goal is to ensure that the future growing population has both enough food to eat and access to high quality, nutritious food (The Nutrition Source – Harvard, 2019). The current environmental changes caused by food production only increases the risk of irreversible and catastrophic shifts in the world, marked by rising mortality, morbidity, conflict, and food insecurity (Oppenheimer, et al., 2014). Currently, there is more than 821 million people suffering from hunger in the world (FAO, 2019), and the world's population is only increasing, with estimates of approximately 10 billion people by 2050 (United Nations, Department of

Economic and Social Affairs, Population Division, 2019). This creates an irony behind the Feed the World campaign and the world's efforts in food reduction.

### *Feed the World Irony*

While the population is wasting an exorbitant amount of food, there are millions of people struggling to feed themselves and their families. Global food production is efficient, producing enough food to feed 1 1/2 times the global population (Holt-Giménez, Shattock, Altieri, Herren, & Gliessman, 2012). That is currently enough to feed 10 billion people; however, there are roughly 795 million people in the world that do not have enough food to lead a healthy lifestyle (Food Aid, n.d.). There is enough food to feed every person on earth, so why is there still hunger around the world?

WhyHunger (n.d.) believed that it is more than just food wastage causing this irony and was more about poverty and injustice. They have a vision for food security that included seven main missions to achieve a full table and a just food system. Those goals included: increased access to jobs and affordable housing, investments in local food and farm economies, social justice, support for social movements, strengthened government nutrition programs, policies and practices that reduce climate change, and the right to nutritious food for all. According to FAO (The State of Food Security and Nutrition in the World, 2019), over two billion people do not have access to safe, nutritious, and sufficient food, including eight percent of the population in North America and Europe. In the United States alone, 37.2 million people lived in food-insecure households, where 5.6 million experienced severe food insecurity (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2019). According to the most recent estimates, 736 million people, globally, live on the equivalent of less than \$1.90 dollar per day (The World Bank, 2015).

Erdman (2018) stated that food waste is the main cause of the insufficiency of food distribution; however, he also mentioned how climate change influences food insecurity. The production of methane reshapes the world's agricultural landscape, thus causing many agricultural powerhouses to see significant declines in yield. The nation has a goal to reduce food loss and waste by half by 2030, but the U.S. continues to throw away unnecessary food, causing the abundance of methane emissions. WWF (2019) says that the nation's challenge should not be how to grow more food, but how to feed more people while wasting less of what is produced. Donating leftovers is an action that restaurants are able to incorporate; however, research has shown that there is a lack of these donations in the restaurant industry (Light, 2015; Food Waste Reduction Alliance, 2013).

### *Restaurant Food Donation*

According to Food Waste Reduction Alliance (2014), only 1.4% of unused food in restaurants is donated. The underlying problem of food waste from restaurants is not that no one wants to donate; instead, it is the confusion around the donation process. Sakaguchi et al. (2018) found that 75% of restaurants surveyed indicated that liability uncertainties kept them from donating excess food. There is a lack of knowledge and readily available guidance regarding safety procedures for food donation. Most states in the U.S. do not include provisions regarding food safety for donated foods; instead, using the Food and Drug Administration Food Code (Leib et al., 2018). The FDA Food Code does not include language relating to food donations, so very few states mention this topic in their laws and regulations.

Health inspectors are often concerned that the donation of food may create or increase food safety risks, leading to the discouragement to donate any excess food. The Natural

Resources Defense Council (NRDC) is committed to getting surplus foods to people, rather than to trash bins. NRDC recognizes that health inspectors can make or break a business's decision to donate excess food (Berkenkamp, 2019). In Denver, Colorado, there have been steps taken between NRDC and health inspectors to try to increase food donations. NRDC held a training session for health inspectors, highlighting food insecurity challenges, the environmental impacts of wasted food, and how health inspectors can play an important role in the decision to donate excess food. NRDC also consulted with local food rescue organizations, reviewed food establishment rules and regulations, compiled relevant regulations into an easy-to-use online summary, and distributed new brochures on safe food donation.

Leib et al. (2018) performed a fifty-state survey of state practices regarding food donations. They found that 19 states responded that their states had legislation or regulations related to food safety for donation; however, the research team only verified the laws from 12 states. The states with verified legislation or regulations addressing food safety for food donations were: Alaska, Connecticut, Illinois, Kentucky, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Washington, and Wyoming; however, Texas was the only state with *comprehensive* regulatory language regarding food safety for food donations. They found that most of the verified states only focused on a specific category of food, like game meat. Among others, Arkansas was a state without legislation or regulations to food donations; however, do restaurants owners have reason to be fearful of donating food?

In 1996, the Federal Bill Emerson Good Samaritan Food Donation Act was passed, in hopes of encouraging donation of food to non-profit organizations (Feeding America, 2019). This Act protects donors from liability when they donate, protects donors from civil and criminal liability should the product donated in good faith cause harm, standardizes donor liability

exposure, and sets a floor of gross negligence for donors who donate grocery products. While debating this new act, Senator Santorum noted that liability concerns were the prime reason that wholesome food is destroyed rather than donated (143 Cong. Rec. S9533, 1996). In order for parties to be covered the donated item must be “apparently wholesome,” the covered parties must donate items in good faith, the donation must be made to a nonprofit organization, and the nonprofit must distribute donated items to needy individuals (Haley, 2013). This Act was passed with the intention of increasing donations to non-profit organizations; however, this Act has not been as effective as Congress intended.

Munger (2018) researched areas of the Act that had the potential to confuse potential donors. She found that the Act failed to clearly define key terms, like ‘good faith’ and ‘food quality.’ The Act also failed to define the procedures to recondition food, describing it only as “the process that removes the potential injury if consumed.” She also found that the Act was not clear on whether it preempted state law. The Act conflicted with most state laws concerning food donation (Haley, 2013); however, the general rule was that federal law preempted state law (U.S. Const. art. VI.). It does; however, remain unclear whether Congress intended the Act to preempt state law. The Act plainly stated in one of the clauses that, “nothing in this section shall be construed to supersede State or local health regulations” (Bill Emerson Good Samaritan Food Donation Act § 1791f). Thus, there is still confusion on which health laws must be followed.

Munger (2018) also found that the Act did not protect all parties involved in food donation. The Act strictly protected food donors that donate to nonprofit organizations but failed to protect people who allowed food donors on their property to recover food. Food recovery organizations can be valuable to the food loss on farms; however, this Act fails to protect these organizations. Munger (2018) recommended that the Act account for food-safety liability

protection for those farms that rely on those organizations to move produce off the farm. The Federal Bill Emerson Good Samaritan Food Donation Act has promise; however, research also showed that vague explanations and inconsistent protections may be the main hindrances to more organizations donating leftover food.

## Methods of Reduction

There have been several attempts by organizations to reduce food waste. One of the most prevalent actions taking place in restaurants is measurement of food. Measuring food is important because it sends a message to workers about values and priorities, thus shaping the culture to accept and persist change. Figure 3 shows the proven tracking process, detailing the importance of sending a message to the front-line team about values and priorities, thus shaping the culture to accept and persist change.



*Figure 3. The Tracking Theory for Measuring Food Waste. From Food Waste Management. Retrieved from <https://www.nacufs.org/documents/conference/Measuring%20Resource%20Performance%20-%20Part%201.pdf>. Copyright [n.d.] by LeanPath.*

A study completed in Berkeley, California found that 65% of the restaurants measured food waste and 84% of those used compost bins to dispose of inedible food waste (Sakaguchi et

al., 2018). Duursma, Vrenegoor, and Kobus (2016) studied one individual restaurant and started measuring the food waste from that restaurant to get a better insight into how much food and what type of food was being wasted more abundantly. Over a 10-day measuring period, 17.1% of baguettes, 6.3% of French fries, and 11.6% of carrots were wasted. They concluded that kitchen staff needed better instruction and awareness of the importance of good measurement. Sakaguchi et al. (2018) also found that businesses lacked knowledge in the proper way to measure food waste.

ReFED (2018) developed a Restaurant Food Waste Action Guide, identifying action-oriented solutions, tools, and best practices to properly reduce food waste. They determined that there was no “one size fits all” solution for reducing food waste in restaurants; however, they identified 15 solutions for restaurants to reduce food waste. They broke the solutions into 3 sections: prevention, recovery, and recycling. Prevention solutions included menu design and service style; portion choices and customized dishes; smaller plates and tray-less dining; optimized quantities; produce specifications; waste tracking and analytics; and, inventory management and production planning. Surplus Recovery solutions include donations tax incentives; donation liability education; donation matching partnerships; and, donations, storage, handling, and transportation. Recycling solutions include centralized composting or anaerobic digestion, on-site processing, animal feed, and cooking oil recycling. The following graphic (Figure 4) explains the flow of food, highlighting the opportunities to implement solutions mentioned in the Food Waste Action Guide. ReFED developed best practices relating to each solution, in hopes of educating businesses on the feasibility of reducing food waste.

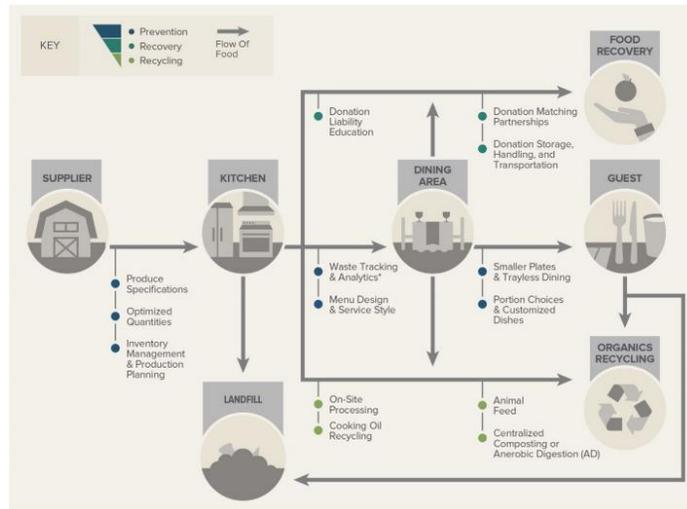


Figure 4. Flow of Food through the Restaurant Supply Chain. From *Restaurant Food Waste Action Guide*. Retrieved from [https://www.refed.com/downloads/Restaurant\\_Guide\\_Web.pdf](https://www.refed.com/downloads/Restaurant_Guide_Web.pdf). Copyright [2018] by ReFED.

The Food Waste Action Guide recommended using different parts of ingredients in multiple menu items to reduce food waste. Burgess (2016) studied the practices that Michelin-starred chefs were taking to reduce food waste, which included: eliminating a la carte menu items, offering smaller selections of dishes and providing three-course menus or tasting menus. Gallion (2018), whose research also included food reduction, observed restaurants and grocery stores and found that some local restaurants served more daily specials, allowing chefs to repurpose extra ingredients that would otherwise go to waste. Gallion (2018) concluded by stating that although utilizing food scraps is not a universal action currently, slight efforts have been made to incorporate this action into restaurants, getting the kitchen staff involved as well.

Portion control and customized dishes are two other practices that can help reduce food waste. The Food Waste Action Plan suggested providing smaller amounts of a standard menu item; in addition to, offering a range of sides to ensure that guests are served what they are most likely to consume. Berkowitz, Marquart, Mykerezzi, Degeneffe, and Reicks (2016) collected plate waste of reduced-size entrees and found that food waste, food costs, and waste disposal costs

were significantly lower when those entrees were served.

Bloom (2011) found that consumers left 17% of restaurant food uneaten and only 45% of those leftovers were taken home in a to-go container or doggie-bag. Hamerman, Rudell, and Martins (2017) investigated the factors influencing consumers' decision to take home food and found that social norms and embarrassment were driving factors in this decision. They also found that concern for the environment increased the likelihood of taking home leftovers.

Portion control determined by chefs is a practice that can decrease food waste; however, plate size has also been determined to influence food waste. Wansink & van Ittersum (2013) observed buffets and determined that plate size was a main factor in food waste. Diners that used large plates served themselves 52% more and wasted 135% more food than those that used smaller plates. Ravandi & Jovanovic (2019) found that reducing plate size from large to small decreased plate waste up to 30%. Several research articles have discussed the Delboeuf illusion, which is noted as the science behind plate size and food waste (McClain, van den Bos, Matheson, Desai, McClure, and Robinson, 2014; van Ittersum & Wansink, 2011). The Delboeuf illusion determined that plate size contributed to people's perceptions of portion size. Furthermore, McClain et al. (2014) studied plate rims in relation to perceived portion size and found that participants overestimated food portion size on plates with wider rims.

Previous literature discussed has focused on food waste reduction practices that should be implemented; however, not many have studied practices that are being implemented by chefs. Chef Daniel Bucher explained the practices that he has implemented at his buffet at Bangkok Marriott Marquis Queen's Park in Thailand that have proven effective in reducing food waste (D. Bucher, personal communication, November 6, 2019). He utilizes 12 main practices to help

reduce food waste, mostly all of which are supporting the literature reviewed. Chef Bucher emphasized the importance of building a team that is responsible for the performance towards food waste. This includes training, informing, and “exciting” chefs to reduce food waste. He stated that, “only when they start to understand that we have a problem and that we are generating it with all the little things we do differently – only then can we see change.” Once the chefs are excited about reducing food waste, they can start implementing cooking strategies that reduce food waste.

Chef Bucher measures, separates, centralizes, and repurposes food on-site, aligning with previous literature, which indicates that measuring food informs chefs of the amount of food being wasted, leading to changes in the way food is prepared. Along with measuring, separating items educates chefs of the different types of items being wasted. Bucher has found that centralized production increases efficiency, which produces less waste. He has trained his employees to only order the amount of a food needed, while also repurposing ingredients, enabling every part of an ingredient to be used.

As previously stated, plate size has a relationship to food waste (Rovandi & Jovanic, 2019; Wansink & van Ittersum, 2013) and Chef Bucher has found that changing to a smaller plate size reduced plate waste visibly. Along with plate size, Chef Bucher emphasized the importance of knowing the items that are selling and the questions chefs must ask to improve bottom line food waste performance. Chef Bucher found that asking questions pertaining to variety of and refilling of buffet items makes a huge difference in food wasted. No data exists about the overall contribution of buffets to the overall food waste in the United States; however, one study observed all the facets of buffets and found that guests ate just over half of the food put out (New York Times, 2017). Chef Bucher is one chef that has tested and implemented

several practices that show positive results; however, what does the literature say about other chefs' perceptions of food waste reduction practices?

### **Chefs' Perceptions of Zero Waste Cooking**

There is a dearth of literature studying chefs' perceptions of food waste; however, the idea of zero waste cooking is a growing trend. According to the National Restaurant Association (2019), zero waste cooking was the number three culinary trend for 2019. Celebrity chefs are following this trend and practicing sustainable cooking. Alex Guarnaschelli, an executive chef at multiple restaurants and a Food Network celebrity, believes owners of any establishment can do more to curb waste. Guarnaschelli treats her staff to meals made from leftovers or excess food to avoid an abundance of food waste (Curley, 2019). Some chefs utilize recipes and cooking methods that use every part of the product. Daniel Angerer utilizes "nose-to-tail cookery" by using every part of an animal and Morgan Jarrett practices "root-to-stem cooking," where she uses every part of the vegetable (Curley, 2019).

Tim Ma, a food waste crusader in Washington D.C., believes that his thrifty cooking is not only good for the planet; it is also good for business (Koenig, 2018). Ma had to find ways to stop throwing away revenue while still growing his business and found that monitoring ingredients, repurposing items, and portion control were part of his strategy. Ma's kitchen aims to serve portions that satisfy customers, while also reducing food left on the plate. Ma also considers food waste when planning menus, by using the same ingredients in separate dishes. Internal efforts have been made by chefs to reduce food waste; however, efforts have also been made to spread awareness of zero waste cooking.

The NYC Food Waste Fair (2019) was an expo and workshop series that connected

others to the resources and knowledge to obtain zero food waste. A Zero Food Waste Challenge was also administered, where chefs competed to make the ultimate zero food waste dish.

Featured workshops included:

- Seeing the Unseen: Using Culinary Innovation to Design Waste Out of the Food System
- From Fin to Tail: Cooking the Entire Fish
- A Conscious Kitchen: Reducing Food Waste at Home
- Commercial Kitchen Design for Zero Food Waste
- Building a Culture of Zero Food Waste
- Screening of Wasted! The Story of Food Waste

The 2019 NYC Food Waste Fair had more than 1,000 attendees and more than 70 exhibitors conversing on the importance of tackling food waste (“NYC Food Waste Fair,” 2019). Appel (2019) provided six takeaways from the event:

- Food should never go to a landfill;
- Combating food waste is not just good for the environment; it is good for business;
- Sustainability may be a journey, but innovation is here now;
- Supporting small businesses with the 2019 Microgrant Program;
- Looking to chefs to inspire change; and,
- A new mantra: I am not waste. I was never waste. I am food.

Although zero waste cooking is a growing trend, achieving zero waste is still a challenge for restaurants. Tim Ma has found that some repurposed dishes can be too hard to sell to diners (Koenig, 2018). In an interview with Tanya Holland, a chef at Brown Sugar Kitchen in West Oakland, California, it was found that her biggest source of wasted food was not meal prep or kitchen ordering; it was her customers’ ordering habits (Harrison, 2017). Natural Resources

Defense Council (NRDC) found that the biggest source of wasted food in restaurants was from the front-of-house and advised consumers to be more mindful of their ordering habits (Harrison, 2017).

Chef Bucher believes difficulty arises from the definition – or lack of definition – of food waste (D. Bucher, personal interview, 2019). Confusion on what constitutes as wasted food (surplus food, excess food, edible food, organic waste, etc.) provides difficulty identifying different actions to reduce food waste. There is a lot of learning and innovating to be done to safely control food waste and this study hopes to provide more understanding on chefs' perceptions of zero waste cooking and the practices that can be implemented to reduce the environmental footprint of restaurants.

## **CHAPTER 3**

### **Methodology**

#### **Research Design**

A qualitative approach was used in this study in order to develop an exploratory research design for the purpose of investigating chef's perceptions of zero waste cooking in restaurants. Qualitative methods were selected as the method of data collection for this study as the research is seeking answers to questions about chef's experience with zero food waste, their understanding and perspectives on zero food waste, and each participant's perception on zero food waste. This research technique allows for small-group or one-on-one discussions with the participant(s) where the researcher can investigate their beliefs, attitudes and behavior on zero food waste. This type of data is not as amenable to counting or measuring.

Planning and development for the research design began in Fall 2019. An extensive literature review, along with a panel of experts provided valuable insight to construct the interview protocol. Due to the exploratory nature of this study, the expert panel aided in the design where literature was not found. The goal was to identify food waste reduction practices in restaurants and chef's perceptions of these practices; and the impact these practices have on implementing sustainability successfully. This study proposes that zero waste cooking is a growing trend among restaurant staff; however, chefs feel like they can do more to reduce food waste in their establishments. Although some portions of the design were able to be drawn from the literature review, no research that combines the examination of chef's perceptions and the inclusion of zero waste cooking has yet to be published. A qualitative research design allows the researcher of this study to collect data in order to capture real-life experiences, are not identical from one chef to the next.

A form for research involving human subjects was approved by the Institutional Review Board. An interview protocol was designed and in-person interviews with chefs were conducted with chefs in Northwest Arkansas.

### *Credibility and Reliability of Qualitative Research Design*

Based on Guba's model (1985), Krefting (1990; 2018) compared the credibility and reliability of quantitative and qualitative research. The model suggested for qualitative research to meet the same trustworthiness of quantitative research it must present strategies to verify credibility through truth-value, transferability through applicability, dependability through consistency, and confirmability through neutrality.

Credibility is the criterion for evaluating the truth value or internal validity of qualitative research (Sandelowski, 1986). This qualitative study's credibility is determined by its results, presented with adequate descriptions of context and was recognized by the participants (chefs) who shared the same experience. Regarding the instrument in this qualitative research study, the researcher defends its credibility through practices such as reflexivity (reflection on the influence of the researcher on the research), triangulation (where appropriate, answering the research question in several ways, such as through interviews, observation and documentary analysis) and substantial description of the interpretation process; verbatim quotations from the data will be supplied to illustrate and support their interpretations (Sandelowski, 1986). Sandelowski suggested that a qualitative study is credible when it presents such accurate descriptions or interpretation of human experience that people who also share that experience would immediately recognize the descriptions. Truth value is perhaps the most important criterion for the assessment of qualitative research.

Applicability refers to the degree to which the findings can be applied to other contexts and settings or with other groups; it is the ability to generalize from the findings to larger populations (Krefting, 1990; 2018). A strength of the qualitative method is that it is conducted in naturalistic settings with few controlling variables. Each situation is defined as unique and thus is less amenable to generalization. Consequently, as Sandelowski (1986) explained, generalization is some-what of an illusion because every research situation is made up of a particular researcher in a particular interaction with particular informants. Applicability, then, is not seen as relevant to qualitative research because its purpose is to describe a particular phenomenon or experience, not to generalize to others (Krefting, 1990; 2018). Guba (1981) presented the second perspective on applicability in qualitative research by referring to fittingness, or transferability, as the criterion against which applicability of qualitative data is assessed. Research meets this criterion when the findings fit into contexts outside the study situation that are determined by the degree of similarity or goodness of fit between the two contexts. Lincoln and Guba (1985) noted that transferability is more the responsibility of the person wanting to transfer the findings to another situation or population than that of the researcher of the original study. They argued that as long as the original researcher presents sufficient descriptive data to allow comparison, he or she has addressed the problem of applicability.

The third criterion of trustworthiness considers the consistency of the data, that is, whether the findings would be consistent if the inquiry were replicated with the same subjects or in a similar context. Unlike the relatively controlled experimental environment of quantitative data collection, qualitative research is often unstructured and often spontaneous. The key to qualitative work is to learn from the informants rather than control for them (Duffy, 1985). Moreover, instruments that are assessed for consistency in qualitative research are the researcher

and the informants, both of whom vary greatly within the research project. Qualitative research emphasizes the uniqueness of the human situation, so that variation in experience rather than identical repetition is sought (Field & Morse, 1985). Thus, variability is expected in qualitative research, and consistency is defined in terms of dependability. Guba's (1981) concept of dependability implies trackable variability, that is, variability that can be ascribed to identify sources. Explainable sources of variability might include increasing insight on the part of the researcher, informant fatigue, or changes in the informant's life situation. Another source of variability stems from the fact that qualitative research looks at the range of experience rather than the average experience, so that atypical or non-normative situations are important to include in the findings (Krefting, 1990; 2018).

The last strategy of trustworthiness is neutrality, the freedom from bias in the research procedures and results (Sandelowski, 1986). Neutrality refers to the degree to which the findings are a function solely of the informants and conditions of the research and not of other biases, motivations, and perspectives (Guba, 1981). In quantitative research, objectivity is the criterion of neutrality and is achieved through rigor of methodology through which reliability and validity are established. Objectivity also refers to the proper distance between researchers and participants that minimizes bias and is achieved through such procedures as instrumentation and randomization. Thus, the objective researcher is seen as scientifically distant, that is, as someone who is not influenced by, and does not influence, the study (Krefting, 1990; 2018). Whereas qualitative researchers try to increase the worth of the findings by decreasing the distance between the researcher and the participants. Lincoln and Guba (1985) shifted the emphasis of neutrality in qualitative research from the researcher to the data, so that rather than looking at the neutrality of the investigator, the neutrality of the data was considered. They suggested that

confirmability be the criterion of neutrality. This is achieved when truth value and applicability are established (Krefting, 1990; 2018). Therefore, based on studies by Krefting (1990; 2018); Lincoln and Guba (1985); and Sandelowski, (1986) it was determined that Guba's Model was a suitable determination of creditability and reliability for this research by establishing truth value, applicability, consistency, and neutrality. As Guba suggested these to be the four criteria applicable to the assessment of research of any type.

### **Population and Sampling Method**

The population used in this study was current chefs in Northwest Arkansas, who volunteered to participate in this study, using convenience sampling. Research participants were selected using the "NWA Chef's & Culinary Collaborative" web page on Facebook. Chefs were contacted via instant messenger and asked if they would like to participate in the study by agreeing to be interviewed by the researcher. The researcher arranged nine interviews within a two-week span, with the tenth participant being scheduled the following week. All ten chefs were from different restaurants. Along with convenience sampling, this study utilized snowball sampling by asking the participants for names of chefs that they would recommend for this study. However, none of the chefs that were recommended by chefs were interviewed in this study, due to the researcher stopping interviews after theoretical saturation had been met. Theoretical saturation is where no new information is discovered in data analysis (Faulkner & Trotter, 2017). After the 10 original chefs were interviewed, the researcher believed that the purposes and goals of the study could be answered.

### **Data Collection Techniques**

Data collection first began by identifying chefs in Northwest Arkansas using the Facebook group. If they identified themselves as an executive chef at a Northwest Arkansas restaurant, they were sent a direct message asking for their participation in the study.

A qualitative interview protocol was developed to examine chefs' perceptions in further detail involving the systematic collection, organization, description, and interpretation of verbal and visual data. The verbal protocol included examination of participants' perceptions of challenges and benefits associated with zero waste cooking, along with practices chefs are utilizing in their restaurants. Each interview lasted between 15 to 48 minutes, with the average interview lasting 29 minutes; all interviews were recorded. One interview recording was affected by background noise, with some conversation being lost; however, many answers were still able to be transcribed. At the end of the interviews, chefs were asked to fill out 11 demographic questions about themselves and the restaurant that they currently were chefs at. For the purpose of analyzing the data and keeping chefs anonymous, all chefs were given a gender-neutral name, which is illustrated in the results section.

Triangulation is a powerful strategy for enhancing the quality of the research and can result in an increase in both quality and quantity of data gathered enhancing credibility. It is based on the idea of convergence of multiple perspectives for mutual confirmation of data to ensure that all aspects of a phenomenon have been investigated (Knafl & Breitmayer, 1989). This study used the most common triangulation of data methods, in which data collected by various means are compared (e.g., data from structured interviews, participant observation, life histories). A second type of triangulation of data sources (methodological) was also utilized. This allowed the researcher to maximize the range of data that might contribute to complete understanding of the concept of zero food waste. This strategy is based on the importance of

variety in time, space, and person in observation and interviewing. Examples of triangulated sources include different seasons or days, different settings, and different groupings of people (Krefting, 1990; 2018).

## **Instrument**

In qualitative research, the objective stance is obsolete, the researcher is the instrument, and ‘subjects’ become ‘participants’ who may contribute to data interpretation and analysis (Denzin & Lincoln, 1998).

An interview protocol was developed to measure food waste reduction practices, perceived benefits of zero waste cooking, perceived challenges of zero waste cooking, and acceptability of zero waste cooking in restaurant. The protocol was divided into six sections: Food Waste Policy and Tracking; Training and Communication; Donation; Perceptions of Food Waste; Food Waste Reduction Practices; and. Demographics. The demographics section was the only section that was not recorded. A copy of the interview protocol is attached in Appendix D.

## **Data Analysis**

The researcher transcribed audio recordings from each interview verbatim. Transcripts were analyzed using thematic coding, where the researcher developed general codes into thematic concepts. Themes were categorized to provide a comprehensive understanding of participants’ perceptions of zero waste cooking, food waste, and practices they are implementing in their restaurants. Thematically descriptive quotes are used to convey final thematic categories, emphasizing similarities and differences across participants. Demographic data was completed by the chefs after the interview process. Demographic tables were constructed (listed below).

Table 1  
*Demographics: Gender, Age, Ethnicity, and Race*

|   | n        | %            |
|---|----------|--------------|
| Gender  |          |              |
| <b>Male</b>                                     | <b>8</b> | <b>80.0%</b> |
| Female  | 2        | 20.0%        |
| Age   |          |              |
| 18-24   | 0        | 0.0%         |
| 25-39   | 4        | 40.0%        |
| <b>40-59</b>                                    | <b>5</b> | <b>50.0%</b> |
| 60+   | 1        | 10.0%        |
| Ethnicity                                       |          |              |
| Hispanic or Latino or Spanish origin            | 1        | 10.0%        |
| <b>Not Hispanic or Latino or Spanish origin</b> | <b>9</b> | <b>90.0%</b> |
| Race  |          |              |
| American Indian or Alaska Native                | 0        | 0.0%         |
| Asian   | 0        | 0.0%         |
| Black or African America                        | 1        | 10.0%        |
| Native Hawaiian or Other Pacific Islander       | 0        | 0.0%         |
| <b>White</b>                                    | <b>8</b> | <b>80.0%</b> |
| Other   | 1        | 10.0%        |

Table 1 consists of basic demographic information about the chefs interviewed. Only two females were in the sample, which can be explained by the male-dominated field. According to the Census Bureau (2019), there are 356,000 male chefs and head cooks, compared to only 103,000 female chefs and head cooks. The high proportion of Whites can also be explained by the Census Bureau (2019), where it estimates that 56.7% of chefs and head cooks are white. The Census Bureau (2019) also estimates that the average age of chefs is 40, which supports the data.

Table 2

*Demographics: Restaurant Type, Position Title, Length of Employment, Educational/Culinary Background, Number of Environmentally Friendly Restaurants*

|                                       | <i>n</i> | %            |
|---------------------------------------|----------|--------------|
| Restaurant Type                       |          |              |
| Fine Dining                           | <b>4</b> | <b>40.0%</b> |
| Casual Dining                         | 2        | 20.0%        |
| Family Style                          | 0        | 0.0%         |
| Fast Casual                           | 1        | 10.0%        |
| Fast Food                             | 0        | 0.0%         |
| Café                                  | 0        | 0.0%         |
| Buffet                                | 0        | 0.0%         |
| Other: Contract Foodservice           | 1        | 10.0%        |
| Other: Fine Casual                    | 1        | 10.0%        |
| Other: All of the Above               | 1        | 10.0%        |
| Position Title                        |          |              |
| Owner/Chef                            | 3        | 30.0%        |
| Executive Chef                        | <b>5</b> | <b>50.0%</b> |
| Corporate Executive Chef              | 1        | 10.0%        |
| Sous Chef                             | 1        | 10.0%        |
| Length of Employment                  |          |              |
| Less than 1 year                      | 2        | 20.0%        |
| 1-2.99 years                          | 1        | 10.0%        |
| 3-4.99 years                          | 1        | 10.0%        |
| 5-6.99 years                          | 0        | 0.0%         |
| 7-8.99 years                          | <b>3</b> | <b>30.0%</b> |
| Over 9 years                          | <b>3</b> | <b>30.0%</b> |
| Educational/Culinary Background       |          |              |
| Culinary school degree                | 2        | 20.0%        |
| Culinary school degree + other degree | 1        | 10.0%        |
| 2-year college degree                 | 1        | 10.0%        |
| 4-year college degree                 | 2        | 20.0%        |
| No degree, self-taught                | <b>4</b> | <b>40.0%</b> |
| Environmentally Friendly Restaurants  |          |              |
| 0                                     | <b>4</b> | <b>40.0%</b> |
| 1                                     | 2        | 20.0%        |
| 2                                     | 2        | 20.0%        |
| 3                                     | 1        | 10.0%        |
| 4                                     | 0        | 0.0%         |
| 5+                                    | 1        | 10.0%        |
| Biggest Potential for Reduction       |          |              |
| Plan and Prep                         | <b>6</b> | <b>60.0%</b> |
| Food Storage                          | 0        | 0.0%         |
| Separate and Measure                  | 0        | 0.0%         |
| Communication/Training                | 1        | 10.0%        |
| Guest Education                       | 0        | 0.0%         |
| Donation or Disposal                  | 2        | 20.0%        |
| Other: All of the above               | 1        | 10.0%        |

Table 2 consists of specific information regarding the restaurant where the chefs work at and the experience of the chefs. 40% of the participants work at fine dining establishments. 50% of the participants are executive chefs and 30% are owners and chefs. Most of the participants have been employed at the restaurant for more than 6 years, with the majority of them (40%) having no degree and never having worked at an environmentally friendly restaurant. When asked to choose what the biggest potential for food waste reduction was, 60% of the chefs chose Plan and Prep, 20% chose Donation or Disposal, and 10% chose Communication/Training.

## **CHAPTER 4**

### **Findings**

#### **Results and Discussion**

Chapter 3 discussed the specific methodologies used in the execution of the present research. Data was analyzed through qualitative methods, using thematic coding. This chapter presents and contextualizes the results of the analyses, using the research questions as parameters. Table 3 describes the interview questions that served to answer each research question. Table 4 describes the information the researcher hoped to obtain from each interview protocol section and how it related to each interview question. After the interviews were all completed, the researcher created research memos concerning concepts that appeared important to each interviewee and emerging themes. In this chapter, all participants were given gender neutral names as not to reveal the chefs' identity or workplace.

The purpose of this study was to examine chefs' perceptions and practices relative to current and potentially future efforts to decrease food waste.

Table 3

*Interview Protocol Questions and Research Questions*

| <b>Research Question</b>   | <b>Interview Protocol Questions</b>  |
|--|--|
| To what degree are chefs in Northwest Arkansas tracking food waste?  | <ol style="list-style-type: none"> <li>1. How do you track and measure food waste in your restaurant?</li> <li>2. What kind of food waste policy is in place at your restaurant?</li> </ol>  |
| How important do chefs in Northwest Arkansas perceive zero waste cooking and what are their practices utilized to reduce food waste? | <ol style="list-style-type: none"> <li>1. How is food typically disposed of in your restaurant?</li> <li>2. Is there menu engineering in your restaurant? If so, how is food waste used in this process?</li> <li>3. Do you donate excess food? Why or why not?</li> <li>4. Food Waste Reduction Practices (Section 4)</li> <li>5. What do you think of food waste?</li> <li>6. Do you think zero waste cooking is possible in restaurants? Why or why not?</li> <li>7. What practices would be the easiest to implement to reduce food waste in your restaurant?</li> </ol> |
| How do chefs in Northwest Arkansas train employees to reduce food waste?   | <ol style="list-style-type: none"> <li>1. How do you train your staff of the importance of reducing food waste?</li> <li>2. In what ways do you and your staff communicate with your guests what you are doing, in terms of reducing food waste?</li> </ol>  |
| What do chefs in Northwest Arkansas identify as the biggest challenges in reducing food waste?                                       | <ol style="list-style-type: none"> <li>1. What are the biggest obstacles when it comes to reducing food waste?</li> </ol>  |

Table 4

*Interview Protocol: Outcomes*

| Interview Section              | Outcomes  | Interview Questions   |
|--------------------------------|---|---|
| Food Waste Policy and Tracking | <ul style="list-style-type: none"> <li>a. How they are tracking food waste</li> <li>b. How food is disposed of</li> <li>c. What kind of food waste policy they have</li> </ul>  | <ul style="list-style-type: none"> <li>1. How is food typically disposed of in your restaurant?</li> <li>2. How do you track and measure food waste?</li> <li>3. Is there menu engineering in your business and how is food waste used in this process?</li> <li>4. What kind of food waste policy is in place at your restaurant?</li> </ul>   |
| Training and Communication     | <ul style="list-style-type: none"> <li>a. How chefs are training employees to reduce food waste</li> </ul>  | <ul style="list-style-type: none"> <li>1. How do you train your staff on the importance of reducing food waste?</li> <li>2. In what ways do you and your staff communicate with your guests what you are doing, in terms of reducing food waste?</li> </ul>   |
| Donation                       | <ul style="list-style-type: none"> <li>a. If they donate excess food. Why or why not?</li> <li>b. What they know about the Bill Emerson Act</li> </ul>  | <ul style="list-style-type: none"> <li>1. What do you know about the Bill Emerson Good Samaritan Act of 1996?</li> <li>2. Do you donate excess food? Why or why not?</li> </ul>   |
| Food Waste Reduction Practices | <ul style="list-style-type: none"> <li>a. What practices they actively are implementing to reduce food waste</li> </ul>   | <ul style="list-style-type: none"> <li>1. Identify the practices you implement in your restaurant...</li> </ul>   |
| Perceptions of Food Waste      | <ul style="list-style-type: none"> <li>a. If they believe that food waste is a problem in their restaurant. Why or why not.</li> <li>b. Why they think zero waste cooking is or isn't possible in restaurants</li> <li>c. The biggest obstacles to reducing food waste</li> </ul> | <ul style="list-style-type: none"> <li>1. Here is what we know about food waste. What do you think of it?</li> <li>2. Do you believe food waste is a problem in your restaurant? Explain.</li> <li>3. [Definition stated] Do you think zero waste cooking is possible in restaurants? Why or why not.</li> <li>4. What are the biggest obstacles when it comes to reducing food waste?</li> <li>5. What practices would be the easiest practices to implement to reduce food waste in your restaurant?</li> </ul> |

## Research Questions

### **Research Question 1: To what degree are chefs in Northwest Arkansas tracking food waste?**

For the category of food waste tracking, 60% of the participants (Alex, Taylor, Sam, Pat, Casey, and Lane) stated that they did not have a formal way of tracking food waste. One of those participants (Lane) said that they did not have any waste to track. Two (Alex and Casey) of those participants stated that their method of “tracking” food was noticing when things were disappearing too fast. Twenty percent of participants (Sam and Casey) specifically stated that they only tracked the high dollar items, like meats. Sam spoke of the current process of tracking meat:

We break down beef tenderloin, we'll take the full weight of fat, and then we'll trim it, and take the weight of that, and then convert it into percentages at the end of the day. We'll take the weight of the trimmed one and then take the weight of the other and that's kind of how we track the amount of food waste. And we do that with stuff like short rib, filet, tenderloin, stuff like that.

Both participants said that they needed to track these high dollar items for economic reasons and that they put more focus on tracking meats than they did with produce.

Forty percent of the participants mentioned some form of food waste tracking. Jamie added how they had a system of food waste auditing every month:

We keep track during the week, or during the month, sometimes on a daily basis. So, if something goes bad, or something is about to go bad, we'll know...we have to figure out what to do with it...and then every month we do a food inventory and we match that versus sales and find out what our cost percentage is. And then we can see how significant of a problem that waste played into whether we have a high cost or a low cost. A lot of the times, you can see if you have been wasting a lot per month.

Participants Devin, Kelly, and Riley worked through a company who measured the food waste for them and gave them a number of how many tons of food they diverted from a landfill. This

measurement of food waste could be explained by the chefs' choice to compost. Pat described how the composting company worked in their restaurant and why they did not track any food waste electronically:

They give us the weight-the weigh it-how much they are picking up. But in terms of percentages, like food we served and food that gets composted, we don't track that. We've looked at software to be able to do that but the reality of what type of restaurant that we are, we aren't a chain concept that has one menu that never changes. We are constantly evolving, cooking from scratch; so, it would be a data entering nightmare to keep up with one more thing.

For the category of food waste reduction practices, the following themes emerged: composting, repurposing ingredients, designing menus, and donating.

*Composting.* Of the ten participants, 50% were actively composting (Sam, Pat, Devin, Kelly, and Riley); 30% were in the process of shifting to composting (Alex, Jamie, and Casey); and 20% were not actively composting. The five chefs that actively composted all said that composting had not been a difficult practice to implement, with most saying that it was the easiest practice to implement. Four of the five participants worked with composting programs, who provided the bins and bags, and came and picked up the compost at the restaurants. Riley described the ease of composting:

They take care of everything. They pick it up, they put in a new bag...And we just about fill it every week, so they come pick it up like once a week and it's just really seamless. It's a great way to make sure that we are being responsible.

Riley stated how the company provided visual handouts to be placed beside the composting bins, to decrease confusion on the basics of composting. This chef also utilized compostable products throughout their restaurant, hoping to educate the guests on making conscious decisions. Pat added that the company was also responsible for picking up their glass as well.

Alex, Jamie, and Casey were currently in the process of working with the composting company. Alex had not started composting because the company was still researching how they would execute it at the restaurant because seafood was the main dishes sold. This chef said that once the company could figure out a solution, they would quickly begin the process. Jamie (quoted below) and Casey said that they planned on switching over within the next few months, and that everybody would have to be on board for it to be executed properly:

All of the ideas that they have seem cool, but we just need to execute them properly. It's not going to be of any good if we can't get everybody to buy into this with our staff members and having somebody responsible for making sure it's done. I will argue realistically and ask if we are really going to do this or are we just talking about it. If we are going to do this, then fine. I want to support that. But I also don't want to get all set up and then next week, it is already not being used.

None of the participants were against composting; the two chefs that did not compost had other reasons for not composting. Taylor partially blamed the contract foodservice business, stating that there was no "incentive" to reduce food waste. However, they had worked at other restaurants where they initiated the implementation of composting, and this chef even stated that he composted in their personal life. Lane simply stated that he did not have the waste to compost.

*Repurposing Ingredients.* Of the 10 participants, 90% of the chefs said repurposing ingredients was an important practice in their restaurant. From utilizing one ingredient in multiple dishes or creating daily specials, most chefs made an effort not to waste. Alex described their process:

How do we not waste things? And for us, it's figuring out how do we reuse things in the kitchen? Celery for example. A head of celery...a stalk of celery, we don't use the very end of the celery; we cut it off. If we throw it in the trash, I mean, that's wasteful; that's food waste. What we do is we take...we have a bin and we put those things in there, and then we use those things to boil seafood. We make stocks. So those are just little bitty things that I do at my little restaurant to go farther. We get bread every day and when we cut the sandwiches, the ends of the breads off, we throw those into the bin and make bread pudding out of that. If I didn't save all of those little pieces, then each time I make

bread pudding, I would have to use a new piece of bread each time. We try not to have a lot of waste, but if we do, just put it in the bin.

They also bought one ingredient, for the purpose of using it in multiple ways:

I use a boneless, skinless, 10 oz. chicken breast, always fresh, never frozen. Because...I use it in my gumbo, I strip it up for my chicken strips, I use it for my jambalaya, and I use it for the center of a plate, and I use it for my Po'boy. So, I have five uses for that one product and it goes a long way for me.

Sam stated how they tried to repurpose ingredients; however, there still needed to be thought and pride in the dish:

We aren't just going to take a bunch of scraps and make a risotto out of it. We have to be more thoughtful than that. Again, my job as a chef is to be very creative and low waste as possible.

*Designing menus.* As part of the interview protocol, the researcher asked the participants if they considered food waste when designing menus. Seventy percent of the participants mentioned how food waste was considered, with most elaborating on the repurposing of ingredients. Economics and food cost were sub-themes when analyzing this theme. Forty percent of the participants mentioned how they considered food waste because it negatively affected food cost if they did not. Casey stated:

I try to, and I think every chef does. Just because it affects your food cost if you don't. So, you try to get the most out of every product you possibly can and use it in different ways. Um, a lot of us have a thing where we don't like to use the same thing twice or three or four times on a menu, so we try to use it or hide it in other things. So, like it will add flavor to this dish and a very mild component, whereas, on another dish, it will be very potent and forward. So, we try to blend it in that way.

Devin added:

Mainly what we are trying to do is make more money, so squeezing your penny out of everything is important...but it also just happens to be good for the environment and we can coincide with that, which is pretty cool.

Jamie also mentioned how it was more of an economical reason to minimize waste than an environmental or social motivation:

You have to...Economically, you can't just throw away food. Because your profit comes from the last steaks, not the first steaks. You're paying rent, you're paying for the meat, and the last 3 of them on that is actually what you make for that day.

Others found joy in being creative while designing their menus with a goal of minimizing waste.

Sam stated:

So, something that I do for that is, I try to have a list of ingredients that are in season and then I try not to stray away from those ingredients. So, basically, I try to use the same seven ingredients in all dishes in different ways. So, that's not really thinking about it in terms of cutting out waste, but that's what it's doing...we aren't going to order butternut squash for one dish and if we don't sell it, it's going to be thrown away. You order butternut squash for four different dishes that's utilized in four different ways. So, it kind of helps with creativity and it helps with food waste because it's not just sitting there; it's not just being used if that dish is not that popular. So, that's kind of how I think about it. I don't necessarily think, how can I not waste things, I think of it more as, how can I use everything. Which I guess is the same thing but.

Through analyzing the data, it was apparent that most chefs took measures to reduce food waste while cooking. It also emerged that not all food was able to be sold, due to the inability to know exactly how many guests were going to be dining in a restaurant each shift. This proposed a new problem: food that was edible but could no longer be sold in restaurants. Chefs could choose to throw any extra food away, compost extra food, or donate extra food.

*Donating.* Fifty percent of the participants (Alex, Jamie, Devin, Lane, and Kelly) stated that they consistently donated leftover food when possible, with three of those participants being motivated by seeing less fortunate people around them. Alex stated:

When I drive from my house to the restaurant, I drive past the homeless shelter and every day, every morning, I see 50-60 people standing with their backpacks and their sleeping bags. And I pass by there and I'm really aware of it and it hurts. It really does hurt my soul that they went to bed without food. And as a restaurant chef, I love to feed people. So, I know there are people every morning in a 3-mile area, who have a food insecurity. Food insecurity is right here. We don't need to send our food to a third world country. We have students – I know! – at the university, that suffer with food insecurity...And that's why I'm really connected to the pantry too. Every year, we take things from our pantry and donate it to that pantry. Because we can restock. So, food security is really near and dear to me...

Two major themes emerged when asking the participants why they chose not to donate. Two of the participants stated how their restaurant was newer, so they were more focused on building their business and clientele; however, both chefs said that they would not be opposed to donating once their businesses had grown.

However, only one chef mentioned how liability was the reason why they chose not to donate:

I think the health department would have a problem with us, you know reheating and reheating. I would be concerned with like...once something leaves our space, the variables to control it is very challenging and I don't want somebody to get sick and there to be a liability issue. So, it is unfortunate that, you know, that's the case, but that being said, I think the food being donated is being donated for an event or those types of things as opposed to going to local homeless shelters. With state regulations on HACCP plans on how to handle food and it's kind of a layer that is outside our control.

When asked if they were familiar with the Bill Emerson Good Samaritan Act of 1996, the chef was unaware of the specifics of it. Another chef, Jamie, who did actively donate, shared how an act like this one, would not change the possibility of a food-borne illness:

Regardless of the act, I would have a personal problem with delivering something to somebody that I didn't feel safe. You know what I mean? So, there is...whatever act they provide...that they pass or whatever, doesn't change the possibility of a food-borne illness. If for instance, the food was held longer than the allotted time or wasn't held at the proper temp or wasn't handled properly. So, as long as everything goes right, and I know...and I mean. You know, as a chef, you should know if it is able to be served or not.

This participant shared their support of donating food and explained his close relationship with somebody at a homeless shelter, choosing to take pride in whatever was being donated. He stated:

You should have pride in what you are cooking no matter what delivery you are putting it into. So, whether the people are homeless or the people out there [in dining room]. You still need to have pride in what you are serving.

Out of the ten participants, only one of them stated that they were not and will not donate any excess food, whereas five participants were actively donating. One chef, Taylor, stated how their work supposedly had people pick up their leftover food but admitted that they had never actually seen anyone come and pick it up.

Along with the major themes of composting, repurposing ingredients, menu designing, and donating, other food waste reduction methods were discussed in the interview protocol. Based on the literature review, the researcher identified the most popular food waste reduction practices utilized in restaurants and asked the chefs to identify which ones that they were actively utilizing in their restaurants. Table 5 illustrates the practices utilized by each chef interviewed.

Table 5  
*Food Waste Reduction Practices by Each Chef*

|                                  | Alex        | Taylor         | Jamie       | Sam       | Pat | Casey       | Devin | Lane | Kelly          | Riley |
|----------------------------------|-------------|----------------|-------------|-----------|-----|-------------|-------|------|----------------|-------|
| Proactively offering to-go boxes | ✓           |                | ✓           |           | ✓   | ✓           | ✓     | ✓    |                | ✓     |
| Daily specials to sell overstock |             |                |             | ✓         | ✓   | ✓           | ✓     | ✓    | Not applicable | ✓     |
| Front of house staff training    | ✓           |                |             |           | ✓   |             | ✓     | ✓    | ✓              | ✓     |
| Back-of-house training           | ✓           |                | ✓           | ✓         | ✓   | ✓           | ✓     | ✓    | ✓              | ✓     |
| Portion size control             |             | Not applicable | ✓           | ✓         | ✓   | ✓           | ✓     |      | ✓              | ✓     |
| Repurposing ingredients          | ✓           |                | ✓           | ✓         | ✓   | ✓           | ✓     | ✓    | ✓              | ✓     |
| Composting                       | In Progress |                | In Progress | ✓         | ✓   | In Progress | ✓     |      | ✓              | ✓     |
| Recycling                        | Not asked   | ✓              | ✓           | Not asked | ✓   | ✓           | ✓     |      | ✓              | ✓     |
| Food Waste Auditing              |             |                | ✓           |           |     | ✓           |       |      | Not applicable |       |
| Donation                         | ✓           |                | ✓           |           |     |             | ✓     | ✓    | ✓              |       |

## **Research Question #2: How do chefs in Northwest Arkansas train employees to reduce food waste?**

Table 5 illustrates the restaurants that were actively training their employees on the importance of food waste reduction. Only one chef admitted that there was no front-of-house or back-of-house training pertaining to food waste reduction. During the interview protocol, the researcher asked how front-of-house and back-of-house employees were trained on the importance of reducing food waste. The main themes that emerged were *verbal training* and *mentoring*, resulting in a sense of food waste awareness from employees.

*Verbal Training.* Fifty percent of the chefs chose to teach their employees by orally communicating with them, instructing them how to do things that would reduce waste. One chef, Sam, explained that they wanted to teach their staff to build them up for when they become executive chefs. However, they also said that the initial verbal training eventually led to the employees becoming confident in reducing food waste, resulting in a decrease in verbal training:

They will be like, “hey, how...do you want me to just throw this away?” Like no, you don’t throw things away unless there’s nothing you can do with it. And if you aren’t sure, save it and I’ll come in tomorrow and check it out, you know. So, it’s more like having them think for themselves. I’m just trying to build them how I was built. When we talk about food waste and stuff like that, I kind of leave it up to them, as far as...don’t feel like you have to be told what to do because eventually, you become a chef, you’re going to be telling people what to do...It’s not really a rule but it makes them not want to waste. Just because, it’s not like if you don’t use this, you’re going to be in trouble, it’s more like figure something out to do with it, you know.

Sam understood that reducing waste does not stop at chefs and wanted others to continue being creativity in their cooking and creating meals with as little waste as possible. Back-of-house training mainly included informing employees not to throw away ingredients that were able to be used.

It is known in the restaurant business that once something hits the table of a guest, if the guest does not want it, it cannot be resold to another guest. This regulation led chefs to develop solutions to control the amount of food being brought out. Alex talked about their solutions to minimize waste on the front end:

We train the front-of-house to be aware of what they're throwing away. We don't assume a guest wants bread, we don't assume you want tartar sauce, or hot sauce. Don't just color the table with stuff that you may just throw in the trash.

This chef articulated that change must come from somewhere and solutions could be developed at the front-of-house level to ensure the least amount of food is turned into waste.

Devin stated how training was mostly verbal; however, there were some guidelines that were written down as part of a food waste policy. These included written tests for front-of-house staff, which gave them guidelines on what the restaurant was to do with excess food and waste. Along with providing written tests, they were adamant about sharing the information from the composting facility with them. Devin stated that this made the staff feel good about diverting things to a composting facility instead of a landfill. Devin was the only chef that mentioned this communication with employees about the amount of waste being diverted each time; however, more chefs may communicate in the same way.

*Mentoring.* Mentoring occurred more in the back-of-house area, where chefs physically showed and walked employees through the proper procedures that could reduce food waste. Riley said that everybody learned under them and continued to show them how to properly compost. Alex focused on mentoring their back-of-house employees:

I am really cognizant of the fact that each person needs a teacher. So, I try to get my guys on board, And I like teaching those people that have never really done anything. Because I can teach them how to do it and the way I like it. Rather than somebody coming in who's experienced and they already know how to make it; but they make it how they are used to making it. I like somebody who doesn't know much so I can teach them.

Teaching came easy for this chef and appreciated the ability to teach the inexperienced. Teaching was also natural for Kelly who taught their employees about food waste and composting:

You have to teach that all the time, absolutely. Because not everybody knows...They'll just throw it away. So, you have to be diligent for sure.

The experience of an employee was shown to be a factor in the method of training employees.

Casey had two different methods of training, depending on the experience level of the employees:

The majority of my staff is very experienced, so it's very easy to verbally train them or verbally communicate with them. I have one or two guys who are very inexperienced, so then it's more showing them, coaching them, showing them, coaching them. Continuous repetition until they get it. When you have an experienced person, it's very very easy because they have the ability to absorb it easier; whereas, an inexperienced person kind of needs to train their minds to focus on it so they have a reaction.

Chefs had a common goal of training employees how to reduce food waste, with more emphasis being put on actively training back-of-house employees.

**Research Question #3: How important do chefs in Northwest Arkansas perceive zero waste cooking and what are their practices utilized to reduce food waste?**

To answer the first part of this research question, chefs were asked two questions, one relating to food waste and one about zero waste cooking. After being provided with three known facts about food waste mentioned in Chapter 2, they were asked what they thought about food waste and the facts.

*Food Waste.* Common words that emerged were shocking, problem, crazy, out of control, and too high. None of the chefs admitted that food waste was not a problem; however, some chefs stated that food waste would never go away. Sam stated:

I mean I think it's definitely a problem and I think there are many ways to make it better, but I don't know if it will ever go away. I think, no matter how much you process

something, there's something that is not going to be used. You can do stock with whatever is left over, but then what are you doing with that was in that stock. You can't really repurpose that. So, I don't think that it will ever not be there, but I definitely think that "oh, I didn't eat half my sandwich, I'm just going to throw it away," happens far too often. So, I definitely think that there are ways, not just restaurants, that everybody in general cannot waste food. But at some point, there's only so much we can do. That's kind of how I feel. It is a bad thing and like some restaurants have a hamburger bun that is technically a day old and they *have* to throw it out. So, my thought, is that it is something that has to be thought about, but there's a point where, some of it, you can't control. You just can't do anything about it. But as long as you are making conscious decisions to prevent it. Food waste, to me, is something to work on, but it's always going to be there.

Sam stated how there were many factors that go into food waste and not all factors were able to be controlled. Lane found the facts crazy and shocking, and Devin was not at all surprised by the numbers. Devin found it crazy how restaurants were able to throw away so much food and recommended change:

I know, not here in the United States, but France, they've made that somewhat illegal. Like grocery stores can't throw away food that's still okay to eat, they have to donate it and stuff. I think it would be cool to have something like that here. Like restaurants and grocery stores could have an outlet for those things instead of just throwing it away. Even composting sometimes. Like you have hungry people everywhere They can eat it, instead of just going to the landfill. But yeah, those are some big numbers.

All chefs realized that food waste was a problem and found it important to implement food waste reduction practices in their restaurants; however, one chef, thought too much focus was put on chefs:

Everybody has to do their job along the line, but it seems like it's the chef who's kind of under the spotlight to make sure that they do the whole no waste thing.

This chef mentioned how guests had a role in food waste and that guests interpreted portion as value:

I've had guests that have had a dish come out to them and automatically say that that is not enough. And for instance, I would send them out a little more and they actually never ended up eating that part...they didn't finish the plate in front of them. Because they are looking at volume and they aren't actually thinking about the amount of calories I am

putting in my food. The dishes are so rich, you know what I mean? So, I think a lot of guests...typically, more is better. And yeah, there is a lot of waste coming back.

This developed a theme of guest education and whether that was an action they participated in.

*Guest Education.* Out of the ten participants, 70% of chefs interviewed stated that they did not educate their guests on food waste. Two chefs explained how chefs and restaurants had other jobs to do other than giving guests a formal education. Pat stated:

I think from a chef angle, I try to portray to the public food policies that are important to me but also from a guest perspective, we want to be proactive. And we have compostable straws, we are working to eliminate all plastic by 2021. But for me, I think I want those types of things to just be our brand. So, when you think of us, you are going to think of delicious food, really great hospitality, really great cocktails, and they take the necessary steps to be minimally impactful on the environment as possible. So, I think there are ways that we message it, but I don't want people thinking that they have to be 'in-the-know' or that I'm trying to educate them. Because, like how we build relationships with farmers, how we use local, all of that is absolutely there, but I would rather that be understood as our brand, then trying to educate the guests. You know, like you come in and you're starving and you just got off a flight, now I'm going to give you an education on what we do...you know, I don't...here you're tired, here's something good to eat.

Others had not thought about or had not felt like they had an opportunity, whereas others thought that they could start doing more. Devin, who did educate their guests via social media and through caterings, stated:

We do kind of add it to our social media a little bit...that we use compostable products all of our to-go stuff. A large percentage of our catering stuff are disposable, are compostable. We try...we've been trying to stay ahead of the curve on that just because we care...we care about the environment and we want...we want to still be here for a while. I think we could afford to maybe spend a little bit more time with our customers and to let them know what we are doing.

Riley was an example of a chef educating guests on food waste reduction practices:

We let everybody know that if they finish, it is a disposable item before leaving our shop. And also, anytime that we see something that...like one of our disposables...that somebody is very clearly finished with, we'll say, "oh, can I compost that for you?" So, that's a way that we communicate that with our guests...I think people need to be more aware of their trash and how much they create and produce. I would want to let guests know that we do compost and that if they do have trash, that we can take that trash for them...They're usually just very pleased by it. They're just thankful.

Overall, chefs realized the impact that the world and restaurants have on food waste and were shocked by the food waste facts. The ten chefs found reducing food waste as important and felt like it was their responsibility to reduce food waste. Out of the ten participants, two stated that they saw food waste being a problem in their restaurant; however, one chef stated that it would always be a problem until zero food was thrown away. Some chefs mentioned how it was only a small problem and more could always be done. Three chefs said with confidence that food waste was not at all a problem in their restaurant.

*Zero Waste Cooking.* Zero waste cooking, according to this study, was defined as “reducing the amount of food so that you are ideally only stocking ingredients that you will actually use and serving in quantities that will be consumed.” After chefs were given this definition, they were asked by the researcher whether they thought that zero waste cooking was possible in restaurants, based on this definition. Ninety percent of chefs believed that, based on this definition, zero waste cooking was possible; however, there was much gray area. Five participants (Taylor, Casey, Devin, Lane and Riley) stated that it could be done with more *effort*.

Lane said:

Absolutely, yeah, yeah...Somebody tells you for a million dollars, that you need to get your waste down to two percent, what's your motivation now? A million dollars. I'll make it happen! When I have that mindset, put a motivational factor into it, that will cut it down feel real fast!

Lane identified themselves as a chef that did not have any food waste and was confident that more effort could be made by chefs and it should be “common sense” to not want to waste food.

Devin felt that even with more effort, zero waste cooking would be hard and could only be done in a perfect world:

Yeah it is possible. The amount of work needed to get it to that point is hard. You spend a long time figuring out those numbers and then the very next day, it can be completely

different. If we knew 150 people were coming here every day, then we could do that no problem. If we knew how many people were coming every single day, then yes, 100 percent. Ideally, we could go to zero waste. That's not the case with any restaurant. I think there's factors in there that you...we need to feed the amount of people that we think we are going to have. And if there's more or less, that's kind of where that gray area is...But yeah, I think it would be feasible if we lived in a perfect world. I think it's very difficult to do that, but some of it could be having those outlets for composting and stuff like that.

Other chefs also believed that since the number of guests fluctuated every day, it was difficult to perfectly know how much food to prep and serve. One chef mentioned how unless a restaurant was reservation only, perfectly predicting the number of guests each shift and day was unpredictable. This balance of cooking just enough to run out of at the end of the day was attempted to be maintained; however, it was shown to be a difficult endeavor to achieve every day. This uncertainty showed to be a reason why chefs seemed unsure of obtaining a zero-waste lifestyle in restaurants.

Another common theme that occurred was confusion and misinterpretation of the definition. Sam initially said that zero waste cooking was possible after hearing the definition; however, his response after, did not:

I do. But then I go back to the...you're chopping garlic because you know you are going to use it but then you have those shells. I think that there is always going to be waste, just because there are inedible things, like a garlic clove, the skin on it. You aren't really going to use that; you're going to throw that away. Now is that considered food waste? I don't know because you can't really eat it and you can't do anything with it. But I don't think that there will ever be zero food waste. I just think that there are so many things that come off of edible items that aren't edible and if that's what's considered food waste, then I think there will always be food waste. But it could be 0.1 percent, instead of zero percent. But yeah, I definitely agree with that definition because...that's kind of what we are doing...we are stocking with that we know we are going to use...I definitely agree with that you're saying but I just don't think that there will ever be zero food waste.

Others mentioned how zero waste cooking included packaging and not just food; others, like Sam, identified inedible waste as food waste. There was one chef, Kelly, who told the

researcher that they did not agree with the definition provided. The researcher then asked what their definition would be:

Zero is zero. Zero means nothing. In that scenario, it's just trying to reduce it. Zero means zero. You get in a product and you sell all of it. That's the only zero waste that there is.

Jamie also agreed that zero means zero and it may be too extreme:

So, one, I don't think you are ever going to have zero anything and I think, so...I don't think extremes...I don't do well with extremes. In my field, of fine dining, it's not going to happen. So, can I have zero waste Monday through Wednesday and then waste some Thursday, Friday, Saturday, and Sunday. I mean, I could do that. It would be very difficult to eliminate every amount of waste...When you walk into my kitchen, there will be a whole fish on a table. Well, I can't just give a guest a whole fish. You have to trim it, you have to take the gills out, you take the fish head, and there's scales and the skin and what not, and that goes in the trash and that's technically food waste. So, there's going to be waste. It doesn't already come portioned. So, every little step that there is an error...that there can be an error...there's going to be some here and there.

The interviews discovered that these chefs were implementing multiple food waste reduction practices, initially believed that zero waste cooking was possible, but the researcher identified that some chefs had a different concept and definition of what zero waste cooking was, which supported the literature.

#### **Research Question #4: What do chefs in Northwest Arkansas identify as the biggest challenges in reducing food waste?**

Regarding the biggest challenges in reducing food waste, there were several different answers, the most frequent being cooperation and knowledge.

*Cooperation.* Five chefs (Jamie, Casey, Devin, Lane, and Kelly) identified cooperation as the biggest challenge. Employees must be willing to cooperate and execute the methods of food waste reduction. Along with that, came training and communication. Devin stated:

I think it's kind of just getting our staff used to it...I could see how corporate restaurants would have a lot harder time getting those things done, especially with cost...and training

so many people to do it versus like 50 people you have to train versus having to train 50 thousand people.

Jamie also identified staff and staff training as an obstacle, stating that when somebody was being trained, they would make mistakes, potentially resulting in food waste.

*Lack of Knowledge.* Three participants identified a lack of knowledge being a big obstacle in reducing food waste. Taylor identified that a knowledgeable and motivating leader must be present or else nothing would be done to reduce food waste. Sam identified that lack of knowledge is not just from the chef but from everyone:

Lack of knowledge...I think by everyone. There's always things like, I don't know everything about food waste, but I've been in the industry long enough to where I know there's no reason to throw this scrap away if we can use it. Whereas some people, if they just got hired, this might be their first restaurant job, so they just don't know. So, I think lack of knowledge is really the hardest part in it all because if they don't know, it could be a problem, it could become a problem, so I think making people aware. And I think if you could go to your source of where you get your food, I think it would make people realize how real it is and it's not just a package that should be easily thrown away.

*Other Themes.* Cooperation and Lack of Knowledge were the two themes that emerged; however, other obstacles were identified by chefs. Two chefs discussed that portion size/value and guest satisfaction could be an obstacle. Pat stated:

We still need to make sure that guests feel like they are getting value. If there was a way to define value in a different way, maybe we can minimize food waste and all the people they were trying to entertain are happy and full and we didn't have 10 to 15 percent of the food that we cooked for them leftover [on the buffet].

Cost was mentioned once during the interview as being an obstacle because compostable products were more expensive than regular products.

## **Summary**

This chapter discussed the findings pertaining to the research questions and any additional findings. While analyzing the interview recordings, it was discovered that the most

common food waste reduction practices utilized by chefs in restaurants in Northwest Arkansas were repurposing ingredients and composting. Many of the chefs believed that food waste reduction practices utilized were for economic reasons; however, the implementation of composting, illustrated the importance of reducing food waste for environmental reasons. In terms of zero waste cooking, chefs' definitions and views differ; however, it was obvious that chefs believe that reducing food waste is important in the restaurant industry.

## CHAPTER 5

### Conclusions and Discussion

The purpose of this study was to examine chefs' perceptions and practices relative to current and potentially future efforts to decrease food waste. A qualitative approach was used in this study in order to develop an exploratory research design for the purpose of investigating chefs' perceptions of zero waste cooking in restaurants. An interview protocol was designed, and ten in-person interviews were conducted with chefs across Northwest Arkansas. The specific research questions used in this study, which served as the framework for the qualitative thematic analyses, were:

1. To what degree are chefs in Northwest Arkansas tracking food waste?
2. How do chefs in Northwest Arkansas train employees to reduce food waste?
3. How important do chefs in Northwest Arkansas perceive zero food waste cooking and what are their practices utilized to reduce food waste?
4. What do chefs in Northwest Arkansas identify as the biggest challenges in reducing food waste?

Food waste tracking is the act of "providing restaurants and food service providers with data on wasteful practices to inform behavioral and operational changes" (ReFED, 2020). In terms of tracking food waste, the findings showed that most of the chefs interviewed do track food waste either visually or mentally; however, food waste was not specifically measured in most restaurants. The chefs that worked with a composting company, however, were provided with a service that measured food waste and shared information regarding the tons of food the restaurant diverted from landfills.

The length of training employees about food waste varies from restaurant to restaurant; however, training is beneficial for: improved employee performance, improved employee satisfaction and morale, addressing weaknesses, consistency, increased productivity and adherence to quality standards, increased innovation in new strategies and products, reduced employee turnover, and enhanced company reputation and profile (20/20 Project Management, 2020). According to Navarra (2018), educating, demonstrating, and shadowing are the three best strategies to best train restaurant staff and it appeared through the interviews that almost all chefs were employing some method of training related to food waste.

The interview protocol asked chefs how they trained their staff on the importance of reducing food waste, including both front-of-house and back-of-house staff. Results indicated that there was more to control regarding food waste in the back-of-house and chefs either took a verbal route or a mentoring route to establish training methods. Chefs chose to either strictly tell staff that something must be done with extra products or mentored them by showing the correct way to do something that resulted in the least amount of waste. Not much discussion was had about front-of-house training pertaining to food waste reduction, and the researcher speculated this could be due to the fact that the chef had more interaction with back-of-house staff than front-of-house staff.

Zero waste cooking can be defined as “reducing the amount of food so that you are ideally only stocking ingredients that you will actually use and serving in quantities that will be consumed” (Auguste Escoffier School of Culinary Arts, 2019, para. 4).

After informing chefs of the definition of zero waste cooking, the interview protocol asked the chefs to explain if zero waste cooking was possible in restaurants. The goal was to find

out their knowledge and perceptions of zero waste cooking, along with discovering the food waste reduction practices implemented in restaurants in Northwest Arkansas.

Results indicated that chefs were implementing food waste reduction practices in their kitchens; with many using a composting company to divert their waste from landfills. However, chefs tended to be confused on what constituted as zero waste cooking. Some agreed with the definition and thought that was possible, while others discussed the opposition to the definition. The chefs in opposition stated that the definition would not equate to having absolutely zero waste, believing that zero waste cooking meant absolute zero. Chefs also believed that the definition could be hard to achieve since restaurants never know the exact number of guests every day; every day is different. Although there were varying opinions and thoughts about zero waste cooking, the chefs interviewed had one main commonality: they all believed that reducing food waste was important in restaurants; however, some favored economic reasons before environmental or social reasons. This could be because restaurants are businesses that must make a profit and many chefs discussed the importance of getting the most out of one ingredient so they could make the most profit without spending a large amount of money.

When asked their opinions on food waste, the chefs were given three facts that are known about food waste:

1. 365 million pounds of food is being wasted daily.
2. In restaurants alone, approximately 11.4 million tons of food is wasted annually.
3. Approximately 85% of food not used or consumed in restaurants is thrown away.

After hearing these facts, the results indicated that chefs were shocked by these numbers, but not necessarily surprised. Most believed that these numbers are high; however, many

believed that they were doing their part in trying to reduce those numbers. However, three chefs in particular mentioned how it was not only chefs at restaurants that needed to be focused on reducing food waste, but larger corporations could make a difference in these numbers, along with people at home. It can be speculated that everybody must do their part and sole responsibility should not be put on chefs to try to reduce food waste. The results indicated that all but one chef was implementing food waste reduction practices into their restaurant, and although no generalized conclusions can be made about all restaurants in Northwest Arkansas, it can be speculated that there are more chefs implementing these practices, along with using the composting company.

According to the literature review, there were many food waste reduction practices utilized in the world today; however, the researcher identified the most popular practices in their interview protocol. The researcher asked the chefs which practices they chose to implement, and any further discussion was had if needed. The following food waste reduction practices were identified: proactively offering to-go boxes, daily specials to sell overstock, front-of-house and back-of-house staff training, portion size control, repurposing ingredients, composting, recycling, food waste auditing, and donating. Table 5 illustrated the practices utilized by each chef.

The results indicated that the most popular practices implemented are repurposing ingredients, back-of-house training, portion size control, donating, and composting. Half of the chefs discussed their usage of a composting company/facility; however, three chefs were in progress of implementing composting in their restaurants. It could be concluded that composting could be a growing trend in Northwest Arkansas restaurants, with more restaurants implementing this concept within the next couple years.

All the chefs that implemented composting discussed the ease of it and how there were not many problems with the implementation. Some even regarded composting as the easiest practice to implement in their restaurant. The interview protocol also discussed the biggest challenges in reducing food waste.

The results indicated that cooperation and lack of knowledge were emerging themes. Along with cooperation and lack of knowledge, staff training was an identified trend that could contribute to zero food waste. Although the majority of the chefs discussed training back-of-house staff to reduce food waste, many chefs also discussed how this could be the hardest factor in reducing food waste. As previously discussed, there are many factors that contribute to food waste statistics, and chefs stated that reducing food waste could be much more effective if everybody worked together and had the same mindset. Leadership plays a role in implementing change, where the level of commitment a leader exhibits decides the level of success to follow (Pratap, 2018). Some chefs mentioned that having a leader/chef who cared about reducing food waste was crucial in gaining the following of their employees. A chef could take a conscious leadership approach, where they “inspire and bring out the best in those around them, foster transformation, and manage beyond conventional profits” (Chantiri, 2013, para. 3). Restaurants must have someone passionate enough to lead the staff on a zero-waste cooking journey and ensure it’s being conducted on a daily basis.

Although focus seemed to be more on training and educating staff members on the importance of reducing food waste, educating customers on zero food waste efforts could be beneficial to restaurants, by creating social responsibility and creating brand loyalty. Two chefs described their efforts of educating guests by stating that the to-go containers are compostable and that if they did not know what to do with them, they could return it to the restaurant for their

disposal. Not only does this educate the guest on composting, it can create a good market differentiation, by building a brand of sustainability.

## **Summary**

To conclude, chefs interviewed in this study started tracking food waste after implementing a composting system. If they have not implemented a composting system, chefs mainly tracked higher-end products visually or when taking inventory. Chefs perceived food waste reduction as important, with most of them implementing multiple practices in their restaurants. However, it can be speculated that chefs were confused on what constitutes as zero waste cooking and not just reducing food waste. The chefs interviewed mostly had great things to say about the ease and necessity of reducing food waste; however, the biggest challenges that emerged were cooperation and lack of knowledge.

## **Recommendations for Future Research**

Future research can be done by expanding the number of chefs interviewed, along with diversifying the types of restaurants. Future research can be done that compares the food waste reduction methods of chefs at independent restaurants versus corporate and chain restaurants. This study could have had an additional data collection method – kitchen observations. The addition of kitchen observations has an opportunity to increase the reliability and validity of the chefs' answers, eliminating one limitation of this study. Kitchen observations have the potential to see the action firsthand and could verify that the answers the chefs were giving were accurate. However, due to chefs' timely and busy schedules, an interview was the most appropriate method of data collecting.

Along with kitchen observations, this study also had the potential to go into a few restaurants and measure the waste coming back to their kitchens every day. This would take more planning and cooperation from the chefs and researchers; however, this future study could provide more insight on the specifics behind their food waste in their restaurants. For example, none of the chefs for this study could provide the researcher with the information of what foods were being wasted or composted the most. In a future study where researchers examined their trash and compost, the researchers could provide the chefs with these numbers. Chefs could then decided whether to redesign their menus, in an attempt to reducing as much food waste as possible.

Researchers should continue future research on the food waste reduction practices and the perceptions of zero waste cooking. The chefs interviewed discussed their easy implementation of composting; a follow-up study should be conducted in the future to evaluate if their opinions have changed on the matter and if more or less practices have been implemented. A follow-up study should also be conducted on the restaurants that are currently in progress with implementing a composting procedure, to see if they have implemented one or if they decided against it. More conclusions could be made on why they chose not to implement a composting procedure.

All the chefs interviewed were located in three cities in Northwest Arkansas: Fayetteville, Rogers, and Bentonville. Northwest Arkansas is known as a progressive community, being on the forefront of green acts, focused on becoming a “resource efficient community of livable neighborhoods that meet present needs without compromising future generations’ opportunities for health, well-being, and prosperity” (City of Fayetteville – Sustainability and Resilience,

2020). Future research could widen their demographic pool, by including different states, thus comparing the results to other states and cities.

Restaurants should continue to support food waste reduction methods and city governments should make it easy for people to reduce their carbon footprints. With further research, chefs and restaurant owners will have a stronger motivation to increase their food waste reduction practices, resulting in a decreased amount of food in landfills and a decreased annual carbon footprint.

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# APPENDICES

## APPENDIX A

### IRB Approval

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**To:** Josephine Mikaela Reardon  
BELL 4188

**From:** Douglas James Adams, Chair  
IRB Committee

**Date:** 01/28/2020

**Action:** **Exemption Granted**

**Action Date:** 01/28/2020

**Protocol #:** 1911234785

**Study Title:** Chef's Perceptions of Zero Waste Cooking in Restaurants

The above-referenced protocol has been determined to be exempt.

If you wish to make any modifications in the approved protocol that may affect the level of risk to your participants, you must seek approval prior to implementing those changes. All modifications must provide sufficient detail to assess the impact of the change.

If you have any questions or need any assistance from the IRB, please contact the IRB Coordinator at 109 MLKG Building, 5-2208, or [irb@uark.edu](mailto:irb@uark.edu).

cc: Kelly Ann Way, Investigator

## APPENDIX B

### Consent Form

You are invited to attend a face-to-face interview about: *Chef's Perceptions of Zero Waste Cooking in Restaurants* that further investigates the specific practices utilized daily in your kitchen.

Introduction/Description: As part of my thesis research, I am conducting a study to investigate Northwest Arkansas chef's perceptions and practices of food waste reduction. I would sincerely appreciate your time and participation in this study.

Risks and Benefits: The benefit received from your participation in this study will assist society by increasing awareness of the impacts of food waste on the environment and potentially limit the amount of food waste amassed in landfills each year. There are no anticipated risks to participating in the study.

Voluntary participation: Your participation in the research is completely voluntary. If you choose to participate in this interview, you may choose to not answer all the questions. You may leave the interview at any time without consequence to you. The interview should take approximately thirty minutes to one hour to complete.

Confidentiality: All responses will be anonymous. All data collected will be kept confidential to the extent allowed by law and University policy. All data will be combined and only group summaries will be included in the survey reports. No data will be reported in a manner that would allow a reader to associate any responses to individual respondents. Results from this research will be reported as aggregate data. If you have any questions or concerns about this study, you may contact Josephine Reardon or Dr. Kelly Way through any of the means below. For questions or concerns about your rights as a research participant, please contact Ro Windwalker, the University's Compliance Coordinator, at (479) 575-2208 or by email at [iwindwal@uark.edu](mailto:iwindwal@uark.edu) or [irb@uark.edu](mailto:irb@uark.edu).

By completing the interview process, you are consenting to participate. You acknowledge that you read the description, including the purpose of the study, the procedures to be used, the potential risks and side effects, the anonymity of all responses, as well as the option to leave from the study at any time. The interview will take about 30 to 45 minutes of your time and will be recorded. Thank you in advance for taking the time to participate in this research. Please circle the agree button down below to indicate that you have read this information and that you give your consent to participate.

Principal Investigator: Josephine Reardon [jmreardo@uark.edu](mailto:jmreardo@uark.edu)

Faculty Advisor: Dr. Kelly Way [kway@uark.edu](mailto:kway@uark.edu)

- **Agree**
- **Disagree**

## **APPENDIX C**

### **Facebook Message Script**

I came across your page since we are both members of the NWA Chefs & Culinary Collaborative Facebook group. I am currently a master's student at University of Arkansas in the Hospitality Management department. I am currently working on my thesis called "Chefs' Perceptions of Zero Waste Cooking" and I am in need of chefs in NWA that would be willing to sit down with me for a 30-45 minute interview discussing food waste reduction practices and your perceptions of zero waste cooking in general. The interview would take place in the next week or so and I would be willing to come to you. If this is something that would interest you, feel free to contact me back on here or you can send me an email at [jmreardo@uark.edu](mailto:jmreardo@uark.edu) and we can discuss setting up a date and time that works for you! I look forward to hearing back from you.

## APPENDIX D

### Interview Protocol

#### SECTION 1

##### **Food Waste Policy and Tracking**

1. How is food typically disposed of in your restaurant?
2. How do you track and measure food waste in your restaurant?
3. Is there menu engineering in your restaurant? If so, how is food waste used in this process?
4. What kind of food waste policy is in place at your restaurant?

#### SECTION 2

##### **Training and Communication**

5. How do you train your staff on the importance of reducing food waste? (make sure to ask about both FOH and BOH)
6. In what ways do you and your staff communicate with your guests what you are doing, in terms of reducing food waste?

#### SECTION 3

##### **Donation**

7. What do you know about the Bill Emerson Good Samaritan Act of 1996?
8. Do you donate excess food? Why or why not?

#### SECTION 4

##### **Food Waste Reduction Practices**

9. Based on my literature review, I have identified the most popular food waste reduction practices. I am going to list them and I would like for you to state the ones you incorporate into your restaurant:
  - Proactively offering to-go boxes
  - Daily specials to sell overstock
  - Front of house staff training
  - Back of house staff training
  - Portion size control
  - Repurposing ingredients
  - Composting
  - Recycling
  - Food Waste Auditing
  - Donation
  - Other \_\_\_\_\_

- None of the above

## SECTION 5

### **Perceptions of Food Waste**

10. Here is what we know about food waste:

- a) 365 million pounds of food is being wasted daily
- b) In restaurants alone, approximately 11.4 million tons of food is wasted annually
- c) Approximately 85% of food not used or consumed in restaurants is thrown away

What do you think of it?

11. Do you believe that food waste is a problem in your restaurant? Explain.

12. For this study, we defined zero waste cooking as: “reducing the amount of food so that you are ideally only stocking ingredients that you will actually use and serving in quantities that will be consumed. Based on this definition, do you think that zero waste cooking is possible in restaurants? Why or why not?”

13. What are the biggest obstacles when it comes to reducing food waste?

14. What practices would be the easiest to implement to reduce food waste in your restaurant?

## SECTION 6

### Demographics

1. To which gender identity do you most identify?
  - a. Male
  - b. Female
  - c. Prefer Not to Answer
  - d. Other \_\_\_\_\_
2. What is your age?
  - a. 18-24
  - b. 25-39
  - c. 40-59
  - d. 60+
3. What best describes your ethnicity?
  - a. Hispanic or Latino or Spanish origin
  - b. Not Hispanic or Latino or Spanish origin
4. What best describes your race?
  - a. American Indian or Alaska Native
  - b. Asian
  - c. Black or African American
  - d. Native Hawaiian or Other Pacific Islander
  - e. White
  - f. Other \_\_\_\_\_
5. What best describes the restaurant where you are currently the chef?
  - a. Fine Dining
  - b. Casual Dining
  - c. Family Style
  - d. Fast Casual
  - e. Fast Food
  - f. Café
  - g. Buffet
  - h. Other \_\_\_\_\_
6. What is your exact position title? \_\_\_\_\_
7. What is your length of employment with the restaurant that you are currently working at?
  - a. Less than one year
  - b. 1-2.99 years
  - c. 3-4.99 years
  - d. 5-6.99 years
  - e. 7-8.99 years
  - f. Over 9 years
8. What is your educational/culinary background?
  - a. Culinary school degree

- b. Culinary school degree + other college degree
  - c. 2 year college degree
  - d. 4 year college degree
  - e. No degree, self-taught
9. How many environmentally friendly restaurants have you worked at as a chef?
- a. 0
  - b. 1
  - c. 2
  - d. 3
  - e. 4
  - f. 5+
10. Are you a recipient of any culinary awards/distinctions? If so, list them:
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11. In what area do you generally see the biggest potential for food waste reduction in restaurants? Choose one.
- a. Plan and Prep
  - b. Food Storage
  - c. Separate and Measure
  - d. Communication/Training
  - e. Guest Education
  - f. Donation or Disposal
  - g. Other \_\_\_\_\_

12. Valid and reliable research is heavily influenced by the number of participants. Do you know of any chefs in Northwest Arkansas that would be willing to participate in this study? If yes, please leave their name, contact information (if readily known), and the restaurant that they work at in the space below.

Once again, thank you so much for your time and willingness to participate! Have a great rest of your day!