

**FACTORS AFFECTING MENU DEVELOPMENT AND THE EFFECTIVENESS AND ETHICAL
CONSIDERATIONS OF “NUDGE” TECHNIQUES DESIGNED TO ENCOURAGE MEATLESS EATING
IN RURAL RESTAURANTS**

by
Danielle M. Edwards

A dissertation submitted to Johns Hopkins University in conformity with the requirements for
the degree of Doctor of Philosophy

Baltimore, Maryland
September 2022

© 2022 Danielle Edwards
All Rights Reserved

ABSTRACT

This paper discusses public health issues associated with both excessive meat consumption and large-scale meat production and contemplates restaurants as a place for interventions designed to discourage meat consumption. Aim 1 was a qualitative study using 20 in-depth interviews with rural restaurant stakeholders (owners, managers, chefs, and servers), wherein respondents demonstrated little understanding of any adverse health or environmental impacts of meat production or consumption, described having very few meatless options on their menus, believed that local customers would not order meatless items, and reported discomfort with the prospect of suggesting meatless items to customers. It was also discovered that restaurants offered daily specials, which sometimes tested new menu items, and respondents thought adding meatless specials might encourage customers to order less meat. Based on the findings, five steps were proposed to encourage restaurants to nudge customers away from meat. Aim 2 was a quantitative study that was developed pursuant to the findings of aim 1. Specifically, aim 2 investigated the relationship between the percentage of meatless items offered on a restaurant's specials menu and the likelihood that an item ordered was meatless. For main dishes, the results indicated that the percentage of meatless specials offered predicted the likelihood of an item purchased being meatless, $B = .00169$, $p < .001$. For example, if a menu has five total main dish specials, one of which is meatless, changing the menu to two meatless main dishes (and thus increasing the total percentage points of meatless main dishes from 20% to 40%) would increase the likelihood that a single main dish ordered is meatless by about 3.38%. Similar results, however, were not obtained for the analysis focusing specifically on side dishes, $B = .00012$, $p > .05$. Finally, aim 3 was an ethical analysis of various

possible interventions – such as education, nudging, incentives, and restrictions – designed to encourage meatless ordering in restaurants. Each type of intervention was deemed to be ethically acceptable, but when compared, nudging – specifically nudging by increasing the percentage of meatless items offered – was determined to be the most ethically acceptable option.

Advisor: Jeffrey Kahn, PhD, MPH
Department of Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

Readers: Mario Macis, PhD
Johns Hopkins Carey Business School

Roni Neff, PhD, ScM
Department of Environmental Health Sciences
Johns Hopkins Bloomberg School of Public Health

Anne Barnhill, PhD
Department of Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

Alternates: Stephanie Morain, PhD, MPH
Department of Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

Joanna Cohen, PhD, MHSc
Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health

TABLE OF CONTENTS

ABSTRACT	ii
TABLE OF CONTENTS.....	iv
LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
INTRODUCTION	1
BACKGROUND	17
MANUSCRIPT 1 - A Qualitative Analysis of Factors Affecting Menu Development and Restaurant Stakeholder Attitudes and Beliefs Regarding Meatless Menu Offerings in Independently Owned Restaurants in Rural Pennsylvania.....	27
ABSTRACT	27
INTRODUCTION	28
METHODS	29
RESULTS.....	36
DISCUSSION	66
MANUSCRIPT 2 - A Quantitative Analysis of the Relationship Between the Percentage of Meatless Items Offered on a Specials Menu and Meatless Purchases	86
ABSTRACT	86
INTRODUCTION	86
METHODS	88
DATA ANALYSIS	93
RESULTS.....	94
DISCUSSION	95
MANUSCRIPT 3 - An Ethical Analysis of Meat Reduction Approaches in Restaurants.....	102
ABSTRACT	102
INTRODUCTION	102
ETHICAL AND POLITICAL CONCEPTS	108
ETHICAL AND POLITICAL ANALYSIS	121
CHOOSING AMONG ACCEPTABLE ALTERNATIVES	151
CONCLUSION	154
TABLES.....	156
FIGURES.....	159
REFERENCES	160

LIST OF TABLES

Table 1.1 Demographics of stakeholders and restaurants.	156
Table 2.1 Percentage of meatless items offered on the regular and specials menus.	157
Table 2.2 Number of meal services, tickets, and items analyzed.	157
Table 2.3 Items categorized as “side items” and items categorized as “garnishes.”	157
Table 2.4 Relationship between percentage of meatless main dishes offered and the likelihood that a main dish ordered is meatless.	158
Table 2.5 Relationship between percentage of meatless side dishes offered and the likelihood that a side dish ordered is meatless.	158

LIST OF FIGURES

Figure 2.1 Examples of specials menus (Tuesday night and Thursday night).	159
---	-----

INTRODUCTION

I. Meat production and consumption and public health

There has been increased awareness in recent years about the negative effects of meat production and consumption on public health. Overconsumption of meat, especially red and processed meat, can lead to numerous health conditions. Furthermore, the large-scale production of meat has negative public health implications, ranging from infectious diseases, to occupational hazards, to climate change.¹

A. Excessive meat consumption

The U.S. Department of Agriculture (USDA) recommends that adults on a 2000 calorie diet consume approximately 5.5 total oz of protein per day, including meat and other animal protein, as well as vegetable protein from foods such as beans, peas, and nuts (U.S. Department of Agriculture, 2020). Despite these recommendations, it is estimated that Americans actually consume between 6.2 and 7.6 oz of protein per day, including 4.4 to 5.9 oz from meat (Fehrenbach et al., 2015). There are several important consequences of excessive meat consumption, which are highlighted below.

1. Health conditions

Excessive meat consumption can lead to various health conditions. Moderate consumption of meat provides certain important nutrients and leaves room in the diet for a variety of other plant-based foods. Too much meat, however, especially red and processed

¹ Large-scale meat production also has important animal welfare concerns. Current industrialized animal production methods cause serious mental and physical suffering to the animals. While such issues are important and should be considered in their own right, they are beyond the scope of this research paper which focuses on public health consequences of animal production and consumption.

meat, may lead to chronic conditions such as cardiovascular disease (Mozaffarian, 2016), diabetes (Mozaffarian, 2016), and certain cancers (Bouvard et al., 2015). Furthermore, eating more meat might mean eating fewer plant-based foods, such as fruits, vegetables, and grains (Neff et al., 2018; Orlich et al., 2014). Plant-based foods tend to be lower in calories than meat, and they provide important vitamins and minerals as well as antioxidants and fiber, all of which are important in maintaining health and preventing diseases. (Davey et al., 2003; Turner-McGrievy et al., 2021; Van Horn, 1997). Vegetarians and near vegetarians tend to live longer and have fewer chronic diseases than regular meat eaters (Appleby & Key, 2016; Caprara, 2018; Fraser, 2009; Kahleova et al., 2017; Orlich et al., 2014; Singh et al., 2003).

Another reason that meat causes chronic illness is that most meat produced today comes from animals raised in concentrated animal feeding operations (CAFOs), and the quality of such meat is fundamentally different from traditionally raised meat. Unlike traditional farm animals, that are free to move around and graze on pastures, scratch for insects, and forage for treats, animals in CAFOs are fed an unnatural diet of corn and soy specifically designed to make them gain weight faster, and in cattle to increase fat or marbling of the muscle. CAFOs also tend to prevent any significant movement, further making animals fat. Studies have shown that pasture-raised cattle have less intramuscular fat and higher levels of healthy omega-3 fatty acids than their grain-fed counterparts (Engle & Spears, 2004; Imhoff, 2010; Mandell et al., 1998; Mozaffarian, 2016).

a. Red and processed meat

Multiple studies have shown links between high consumption of red and processed meats and chronic health conditions such as cardiovascular disease (Mozaffarian, 2016),

diabetes (Mozaffarian, 2016), and certain cancers (Bouvard et al., 2015). In late 2015, the World Health Organization's International Agency for Research on Cancer determined that red meat is "probably carcinogenic to humans" and processed meat is "carcinogenic to humans" (International Agency for Research on Cancer, 2015).

b. Poultry

Studies examining a link between non-processed (e.g., not sodium preserved) poultry and chronic diseases have produced mixed results, so no definitive conclusions have yet been reached. For example, some studies examining the association between poultry and cardiovascular disease (adjusting for intake of other foods such as red and processed meat) showed no benefit, while others showed a modestly lower risk of cardiovascular disease, however, the observed benefits were lower than the benefits of fish, nuts, or legumes. Similarly, the results of studies evaluating the relationship between poultry and diabetes mellitus have ranged from finding an increased risk, to no risk, to a lower risk (Mozaffarian, 2016).

Furthermore, there is some evidence that arsenic-based poultry drugs and synthetic estrogen in poultry feed may result in elevated arsenic blood levels (Lasky et al., 2004; Nigra et al., 2017) and earlier age of menarche (Moslehi et al., 2021; Wu et al., 2021), respectively.

c. Fish and other seafood

Between 2000 and 2008, global fish consumption increased from 95.8 million tons to 115.1 million tons (Pahlow et al., 2015). To keep up with demand, about half of all fish consumed globally come from aquaculture or fish farms (Food and Agriculture Organization of the United Nations, 2014). Fish farmers often use commercially available fish feed, which

traditionally contained fishmeal as the source of protein and fish oil as the source of fat.

However, many manufacturers are now replacing fishmeal with animal byproducts such as poultry byproduct meal or vegetable protein such as soybean meal and replacing fish oil with rendered animal fats and vegetable oils (Fry et al., 2016; Hasan et al., 2007).

Fish given vegetable-based oils tend to have lower overall amounts of omega-3 fatty acids and/or higher ratios of omega-6 to omega-3 fatty acids than their counterparts fed fish oil or eating a wild diet (Al-Asheeri et al., 2020; Fry et al., 2016; Turchini et al., 2009). Western diets already have high omega-6 to omega-3 ratios, and some studies indicate that such diets are less healthy (Fry et al., 2016; Simopoulos, 2002; Wijendran & Hayes, 2004; Williams et al., 2011). Therefore, fish that are fed vegetable-based oils may not produce significant amounts of beneficial omega-3 fatty acids (Fry et al., 2016; Saini & Keum, 2018), and there is a theoretical possibility that increasing consumption of such fish in place of wild-caught fish may lead to increased cardiovascular and neurodevelopment problems (Fry et al., 2016).

Water pollution also affects the quality of fish and seafood. Consumption of fish and seafood from affected waters may lead to an accumulation of heavy metals (Ali & Khan, 2018), polychlorinated biphenyls (PCBs) (Megson et al., 2022), and microplastics (Li et al., 2021; Smith et al., 2018; Vital et al., 2021) and associated negative health outcomes for consumers. One study found a 74% increased risk of myeloid leukemia among participants with the highest levels of fish consumption, which the authors hypothesize may be attributed to one or more of these contaminants (Sergentanis et al., 2019).

Since fish and seafood have nutritional benefits, the consensus is still that they are safe to eat in moderation, but it is worth considering alternatives due to the risks, especially among high-risk individuals such as children and pregnant women (Thomsen et al., 2021).

B. Large-scale meat production

Terrestrial animal agriculture has been practiced for nearly 10,000 years. Historically, the key to successful animal farming was practicing good animal husbandry. Farmers went to great lengths to meet the physical and psychological needs of their animals, providing them with good food and water, protection, medical care, birthing assistance, etc. In return, the animals provided meat, eggs, and milk. It was crucial that farmers kept the animals happy and healthy, as this was the only way to keep them alive and producing (Goldberg & Rollin, 2015).

Much has changed over the past 75 years. With the advent of such things as synthetic hormones, vaccines, antibiotics, air handling systems, and mechanizations, “farmers” are now able to keep animals alive and producing without investing in the husbandry efforts needed in the past. In fact, animals may produce more under modern conditions (Goldberg & Rollin, 2015; Rollin, 2014) but will not enjoy living outdoors on farms where they can act out their natural instincts. Instead, the majority of such animals now live indoors in concrete buildings and are overseen by minimum wage workers who have little or no experience with animals, rather than by experienced farmers (Rollin, 2014). These changes to animal farming have resulted in numerous public health issues.

This new model is often appropriately called industrial farm animal production (IFAP) because the production of meat and animal products is mechanized, much like the production of goods in a typical industry. The assembly-line model allows large quantities of meat and

animal products to be produced at very low costs to the consumer, in part because the costs of many of the negative consequences of this system are not borne by the producers but are instead passed on to society in the form of pollution, lower property values near CAFOs, medical bills for chronic or infectious diseases resulting from meat-producing facilities, higher taxes to pay for abatement of CAFO contamination or medical care, etc. (Osterberg & Wallinga, 2004; Walker et al., 2005). CAFOs house exceedingly large numbers of one type of animal, usually indoors, and require the animals to be in very close proximity to each other. The animals are often fed an unnatural diet of corn, soy, and animal byproducts, are unable to exercise or perform normal animal activities, and produce large quantities of waste. This “new” model of animal production has resulted in a cascade of environmental and public health problems.

1. Infectious agents

By their design, CAFOs force large numbers of one type of animal into confined, usually indoor, spaces. This fosters the spread of pathogens and infectious diseases, the mutation and proliferation of novel viruses, and the widespread dissemination of foodborne illnesses. Workers in contact with sick animals or animal carcasses can be infected or colonized with pathogens and then spread those pathogens to others (Hollenbeck, 2016; Moore et al., 2021).

2. Antibiotic resistance

To prevent diseases, the animals are often administered “nontherapeutic” doses of antibiotics. This means that healthy animals are regularly given antibiotics, not to cure illnesses, but to prevent illnesses from occurring in the first place. The wide-spread use of these antibiotics results in the proliferation of anti-microbial resistant infections, leading to higher

morbidity and mortality and longer and more expensive hospital stays and follow-up visits (Centers for Disease Control and Prevention, 2019).

3. Occupational risks

Industrial farm workers are often exposed to toxic dust and gases, which can lead to illness or even death (Donham & Gustafson, 1982). Toxic dust can lead to acute and chronic bronchitis, nonallergic asthma-like symptoms, mucous membrane irritation, and noninfectious sinusitis (Donham et al., 1989; Donham & Gustafson, 1982). Many industrial farm workers experience organic dust toxic syndrome, believed to be caused by inhaled endotoxins produced from animal manure (Donham et al., 1990; Rylander, 1986). In addition, decomposing animal urine and feces can produce toxic gases such as ammonia, hydrogen sulfide, methane, and carbon monoxide, among others. When manure slurry is agitated, hydrogen sulfide levels can soar quickly, and both animals and workers have become seriously ill or died from hydrogen sulfide emanating from manure pits under buildings (Donham & Gustafson, 1982; Donham et al., 1982; Donham & Pependorf, 1985; Donham et al., 1995; Donham et al., 1988). Injury rates for workers in meat processing facilities greatly exceed the U.S. workforce average. Workers who are cut, burned, or scraped may be at increased risk of developing an antibiotic-resistant infection (Mulders et al., 2010).

4. Community health issues

Simply living near an industrial farm increases a person's risk of multiple health conditions, including methicillin-resistant *Staphylococcus aureus* (MRSA), Q fever, respiratory outcomes, and stress/mood disorders (Casey et al., 2015). Communities situated near or downstream from industrial farms may be exposed to nitrates, bacterial and viral pathogens,

veterinary pharmaceuticals, heavy metals, and hormones. Nitrate ingestion can lead to reproductive harms, diabetes, thyroid conditions, and methemoglobinemia (blue baby syndrome), and algae from nutrient runoff can produce toxins that cause neurological impairments, liver damage, stomach illness, and skin lesions (Burkholder et al., 2007; Casey et al., 2013; Kim, Horrigan, et al., 2015). Odors from industrial farms have also been associated with physiological and psychological effects, such as high blood pressure, depression, anxiety, and sleep disturbances (Avery et al., 2004; Schiffman et al., 1995; Schiffman et al., 2000).

5. Environmental concerns and public health

Large-scale meat production also leads to considerable environmental concerns. Animal agriculture produces large quantities of greenhouse gases that contribute to climate change and associated flooding, droughts, and other weather events (Godfray et al., 2018; Parry et al., 2007). In the U.S., the production, processing, distribution, and retailing of animal products is responsible for approximately 9% of total greenhouse gas emissions (U.S. Environmental Protection Agency, 2016) and nearly 15% of emissions worldwide, which is more than the entire transportation sector (Gerber et al., 2013). For example, the production of 1 kg of beef is responsible for 27 kg of greenhouse gas emissions, while 1 kg of pork, farmed salmon, and chicken are responsible for 12.1, 11.9, and 6.9 kg of greenhouse gas emissions, respectively. However, the production of 1 kg of tofu is responsible for 2 kg of greenhouse gas emissions, and 1 kg of lentils is responsible for less than 1 kg of greenhouse gas emissions (Culinary Institute of America, 2019). According to the World Health Organization, climate change may have caused over 150,000 deaths in the year 2000 alone (Nature Conservancy, 2016a),

including deaths from heat waves, heat-related illnesses, and infectious diseases that are transmitted in warmer climates (Nature Conservancy, 2016b).

Waste from industrial farms pollutes waterways, contributes to “dead zones” that are inhospitable to aquatic life, and manure spills from swine operations have led to outbreaks of toxic microorganisms that killed massive amounts of fish (Mallin & Cahoon, 2003).

Water is becoming a scarce resource, and approximately 27% of the water used worldwide is devoted to meat and dairy production (Hoekstra & Mekonnen, 2012). It takes far more water to produce a pound of meat than it does to produce a pound of produce, in part because growing animal feed is water intensive. A serving of beef, pork, or poultry requires 320.3, 123.8, and 38.6 gallons of water, respectively, while a serving of lentils, broccoli, tofu, or tomatoes requires 44.5, 19.5, 14.6, or 7.6 gallons, respectively. Water shortages can also increase the concentration of pollutants in water and cause stagnation and high sediment loads that can clog filtration systems. Drying of surface water can prevent the replenishment of fresh water in aquifers, which allows saltwater to enter wells. Inadequate water can also decrease crop yields and shorten the growing season (Centers for Disease Control and Prevention et al., 2010).

Fish and seafood are also subject to mass production and farming. While most fish and seafood were once simply caught in the wild, to keep up with global demand, about half of it is now raised in fish farms or aquaculture (Food and Agriculture Organization of the United Nations, 2014). Like its land-based counterparts, fish farming has serious environmental costs. Approximately one-third of the world’s mangrove forests (protective wetlands) have been lost, in large part from aquaculture (Alongi, 2002). Seagrass meadows are disappearing at a similar

rate, due in part to fish farming (Ruiz et al., 2001; Waycott et al., 2009; Williams, 2007).

Aquaculture also introduces pollution in the form of pesticides, prophylactic drugs, and waste (Azad et al., 2009; Biao & Kaijin, 2007). Close confinement leads to parasites and diseases, which not only affect the farmed fish, but can also spread to wild fish. Similarly, farmed fish can escape from their enclosures and compete with wild fish (Cottee & Petersan, 2009; Krkošek et al., 2006).

II. Public health guidance and meat consumption

In light of the concerns mentioned above, public health experts as well as the International Panel of Climate Change encourage people in high-income countries to reduce their consumption of meat and other animal products both for climate and human health (Edenhofer et al., 2011; Shukla et al., 2019). The World Cancer Research Fund International recommends limiting red meat to no more than 350 - 500 g per week and eating little or no processed meat (Clinton et al., 2020). Public health experts also advocate for a reduction in meat consumption to prevent the escalation of climate change and there is speculation that the 2° goal set by the Paris Convention will be impossible to meet without a reduction in animal production (Harvey, 2016; Hertwich, 2010; Kim, Neff, et al., 2015; Wollenberg et al., 2016).

III. Rural communities

Meat consumption may be particularly tied to rural communities. Indeed, rural consumers eat more pork and beef² than urban and suburban consumers. According to the USDA, rural dwellers consume approximately 60 pounds of pork per capita, while urban

² Data for poultry and other meats were not available.

dwellers consume less than 50 pounds and suburban consumers eat about 48 pounds.

Furthermore, rural consumers eat about 38 pounds of processed pork per capita compared with less than 30 pounds for urbanites and approximately 31 pounds for suburbanites (Davis & Lin, 2005b). Finally, rural consumers eat over 75 pounds of beef per capita compared to just over 66 pounds for urban and just under 63 pounds for suburban consumers (Davis & Lin, 2005a).

According to the 2010 census, approximately 60 million people, or nearly 20% of the US population, live in rural areas (Ratcliffe et al., 2016). Furthermore, while obesity and its related conditions have reached epidemic proportions throughout the United States, the prevalence of obesity among both children and adults is significantly higher in rural areas compared with urban areas (Johnson III & Johnson, 2015; Liu et al., 2012; Lutfiyya et al., 2007). A review of the literature, however, indicates that most programs geared toward addressing obesity target urban areas and largely ignore rural areas and most research on obesity focuses on urban areas and urban inhabitants, resulting in little knowledge about the unique characteristics of rural areas and obesity.

IV. Restaurants and meat consumption

Americans eat much of their food away from home. The USDA estimates that Americans consume over a third of their calories away from home (Saksena et al., 2018) and adults eat nearly a quarter of their calories specifically in restaurants (Lin & Mentzer Morrison, 2012). Given the relatively large proportion of calories consumed out of the home, restaurants could be an important contributor to helping people reduce their meat consumption. To make that a reality, it is important to understand why most restaurants currently offer few meatless

options, what menu decision-makers consider to be barriers to offering more meatless options, and what types of research findings they would deem relevant in making decisions about future offerings. It is similarly important to determine which possible interventions are effective in reducing meat consumption.

A. Menu development

A 2007 qualitative study of 40 senior menu development and marketing executives at top U.S. restaurant chains examined the factors that go into menu development. The majority of the executives said growing sales and increasing profits were the most important issues and other factors cited were meeting customer demand and health and nutrition. Social responsibility was mentioned, but only by three individuals. Similarly, when considering a menu change, the most important considerations were whether the change would attract new customers or maintain the current customer base and how the change would affect sales and profits. Many additionally noted that they would not add items too complex for kitchen staff to prepare efficiently (Glanz et al., 2007).

While the study did not ask about meatless options, it did look at healthy food choices. Twenty-two restaurants offered healthier menus because they believed there was sufficient demand to make it worthwhile. They also feared the “veto vote” where one health-conscious diner might influence the choice of the entire group. However, many respondents felt that most diners preferred to indulge when dining out and did not see a large-scale demand for healthy foods. When asked about marketing the healthy options, one noted that they market them aggressively using words such as “fresh,” “flavorful”, or “in season,” but avoid the word “healthy” because it scares customers away (Glanz et al., 2007).

Other barriers focused on fruits and vegetables, specifically the short shelf life, supply issues, high cost, and storage space requirements. Executives were concerned about low sales leading to food waste and lost profits (Glanz et al., 2007).

The executives also noted that trade groups, industry associations, and public health agencies could be helpful in facilitating healthier menus by providing information to the restaurants and to the public. Many wanted new ideas for preparing healthier dishes and creative options for serving fruits and vegetables, along with clear evidence of the potential for increased sales and profits. One noted that organizations that research diners' wishes or eating trends should share the information with restaurants (Glanz et al., 2007).

1. Menu development process

Menu development can be broken down into three general stages: (1) menu planning, where restaurants determine which items to offer on the menu; (2) menu pricing, where restaurants decide how much to charge for each item; and (3) menu design, where restaurants determine the layout and presentation of the menu (Seyitoğlu, 2016).

a. Menu planning

Menu planning or item selection is often determined based on three broad groups of considerations. The first group of considerations relates to the restaurant, such as the type of restaurant and serving style, available kitchen tools and storage, experience level of the chef, cost factors, serving sizes, and quality standards (Kwong, 2005; Morrison, 1997; Ozdemir, 2012; Seyitoğlu, 2016). As noted above, profitability is one of the top considerations of menu developers, so items that are not profitable will not be on the menu and items that frequently pull customers away from the most profitable items may also be excluded (Glanz et al., 2007;

Kivela, 2004). The second group relates to the customers, such as their ages, religions, economic situations, cultural identities, and eating habits (Seyitoğlu, 2016). Finally, the third group considers external factors, such as competition with other restaurants, availability of ingredients, and food trends (Seyitoğlu, 2016). According to Ezra Eichelberger, an instructor at the Culinary Institute of America, a balanced menu consists of ten appetizers, ten entrees, six desserts, and should include at least one vegetarian appetizer and entrée (Gentile, 2014).

b. Menu pricing

Menu pricing also has many variables. One general guideline is that the cost of the raw ingredients should be about 25 - 30% of the menu price, however, this is not an absolute (Kelly et al., 1994; López-Alt, 2016). Restaurants may factor in other things, such as the time or effort needed to prepare the dish (Seyitoğlu, 2016). Customer perception is also an important part of menu pricing and prices are often crafted in a way that is acceptable to customers, even if it results in some items being more or less profitable than others (López-Alt, 2016; Seyitoğlu, 2016). To prevent certain items from being perceived as unreasonably expensive, restaurants will sometimes accept a lower profit margin on dishes made with the most expensive ingredients, so that a particular item does not seem out of line with the others (López-Alt, 2016). Conversely, restaurants sometimes include high-priced “decoy” items on their menus to serve as a reference price. These are items that the restaurant does not expect customers to order, but that make the other items, regardless of how expensive, seem reasonably priced by comparison (Ozdemir, 2012; Rapp, 2009; Seyitoğlu, 2016; Shomaker, 1993).

To some extent, pricing may be manipulated to send a certain message. Restaurants that want to send a message of “quality” often use whole number pricing, while those that

want to send a message of “value” use “odd pricing” (often prices that end in .99) (Gromfin, 2014; Naipaul & Parsa, 2001; Schindler et al., 2011).

One noted “problem” with vegetarian items is that customers expect to pay significantly less for vegetarian items than for meat items, yet it is not always realistic for restaurants to price them significantly lower. Vegetables are often expensive, especially organic vegetables or specialty foods like wild mushrooms, and the preparation (washing, trimming, chopping) can be much more labor-intensive than preparing a cut of meat. Furthermore, the menu price of an item necessarily includes restaurant overhead, which is the same regardless of the meal ordered (López-Alt, 2016).

c. Menu design

Menu design, which is also known as menu engineering, is strategically manipulating the presentation of the items with the goal of guiding customers to the items the restaurant wants to sell – usually the most profitable items (Gromfin, 2014; Ozdemir & Caliskan, 2015). There are four main factors that can be adjusted: (1) the position of menu items; (2) the description of menu items; (3) the labels of menu items; and (4) visual menu characteristics (Ozdemir & Caliskan, 2015; Seyitoğlu, 2016).

Menu designers consider position to be an important way to guide customers to the items they want to sell. Based on a theory of primacy and recency, which predicts that customers will disproportionately order the first and last items they see, combined with eye scan studies, many menu designers suggest that certain menu positions are better than others (Ozdemir & Caliskan, 2015; Rapp, 2009). While studies have produced mixed results (Bowen & Morris, 1995; Kincaid & Corsun, 2003; Reynolds et al., 2005; Sobol & Barry, 1980), a 2011 study

did show a 20% increase in popularity when an item was placed at the beginning or end of a category (such as appetizers, entrees, desserts, soft drinks, etc.) (Dayan & Bar-Hillel, 2011).

Menu item descriptions can also have an impact on what customers order as well as perceived quality and price expectations. Simply increasing the detail and complexity of existing menu items³ can increase the popularity of the item and the willingness of customers to pay more for it (McCall & Lynn, 2008; Shoemaker et al., 2005).

Similarly, menu item labels have the potential to impact popularity and perceived quality. Studies have shown that using evocative or descriptive labels⁴ instead of common terms increases popularity, perceptions of expected quality, and even post-meal satisfaction. (Lockyer, 2006; Wansink et al., 2001; Wansink et al., 2005).

Finally, visual menu characteristics are used to highlight certain menu items and direct customers' attention either toward or away from certain items. Popular examples include the use of boxes, photos, and differing fonts, typefaces, sizes, or colors to make an item stand out and increase sales (Choi et al., 2010; Gromfin, 2014; Guéguen et al., 2012; Hensdill, 1998; Rapp, 2009; Seyitoğlu, 2016). The manner in which prices are displayed also has an impact on sales. People will spend more if their attention is not drawn to the prices, so experts suggest eliminating dollar signs, printing prices in the same or smaller typeface as the description, and eliminating leader lines (the dots between descriptions and prices that allow customers to

³ As an example, McCall and Lynn (2008) considered the following two descriptions of filet mignon to be "low complexity" and "high complexity." Low complexity: "10 oz. grilled, mushroom sauce, and served with a choice of potato or vegetable." High complexity: "10 oz. grilled tenderloin served with a sweet garlic and thyme crust, sliced vine ripe marinated tomato, and smoked mozzarella cheese with a sherry vinegar demi glace."

⁴ As an example, Wansink, et al. (2001) considered "Red Beans with Rice" and "Zucchini Cookies" to be regular labels and "Traditional Cajun Red Beans with Rice" and "Grandma's Zucchini Cookies" to be descriptive.

easily compare prices) (Gromfin, 2014; Rapp, 2009). In one study, customers spent more when the price was written as a whole number without a dollar sign (“20” compared with “\$20.00” or “twenty dollars”) (Yang et al., 2009).

BACKGROUND

For the reasons explained above, it would be beneficial to public health if people decreased their consumption of meat. While the harms of red and processed meat are well-established, there are also potential concerns with poultry and seafood, indicating that reduction of those types of protein may be beneficial as well. Interventions with this goal can target many points along the supply chain from the farm to the consumer. They can also take many forms ranging from outright restrictions on the number of animals on a farm to educational campaigns making consumers aware of the public health issues. One important place to implement an intervention is at the restaurant level where, for example, an intervention could nudge people toward less meat consumption.

I. Target of intervention

Restaurants are a good place to target for several reasons. As noted earlier, American adults consume nearly a quarter of their calories in restaurants (Lin & Mentzer Morrison, 2012). Consumers may be more willing or able to make a change at a restaurant than at home because they can do so in a restaurant without learning new recipes, without changing their grocery purchases, and without worrying that their families will object. Furthermore, skilled chefs may be better able to prepare meatless dishes than a home cook less accustomed to preparing meatless meals. According to the president of the Culinary Institute of America, chefs are in the

best position to make healthy and sustainable food desirable, since they shape taste preferences and food trends (Cobe, 2013).

Restaurants are also a good choice because as long as they prepare food that people are willing to buy, they can make money regardless of whether that food is meat or meatless. Thus, restaurants may be willing to voluntarily implement certain changes, provided those changes do not significantly decrease profits. By contrast, animal farmers, for example, would likely lose money by growing fewer animals, so many interventions aimed at the farm level would require legislation that would likely be very difficult to pass. Faced with losing money, the meatpacking industry and agriculture conglomerates would likely object and oppose such legislation. The meat industry objected heavily (and successfully) to the USDA's recommendations to encourage less meat in the 2016 nutritional guidelines (Lappé, 2016) and even to minor government interventions such as Meatless Monday Campaigns in one House of Representatives cafeteria (Rogers, 2013) and the USDA headquarters cafeteria (National Public Radio, 2012; U.S. Department of Agriculture, 2012).

II. Types of interventions

There are several ways for restaurants to encourage less meat consumption. They could attempt to education consumers on the benefits of a more plant-based diet, they could offer various incentives/disincentives, or they could limit the choices they offer. Furthermore, restaurants could more subtly encourage people to order less meat through various menu changes. Two possible interventions – nudging and meat reduction programs – are explored below.

A. Nudging

Nudges are interventions designed to make people voluntarily change their behavior without the use of overt incentives or disincentives and often without their realizing that their behavior is being changed. Nudging uses concepts from behavioral economics to arrange or manipulate the environment in subtle ways that will result in people choosing the desired behavior (Thaler & Sunstein, 2008). Many argue that nudging is the best type of intervention because it achieves the desired results without restricting choice (Thaler & Sunstein, 2008). There are two particularly relevant aspects of behavioral economics - the "status quo bias" (including the "default preference") and the "present-biased preference" (Downs et al., 2009; Just & Wansink, 2009).

The status quo bias means that people have a strong tendency to conform to the current state of affairs or to purposefully make the same choices as others (Thaler & Sunstein, 2008). Adding additional healthy meals to a menu has been shown to increase the number of those meals ordered, possibly because those types of meals become normalized and are not perceived as "healthy" (Khazan, 2014). Adding several meatless dishes and not labeling them "vegetarian" may encourage people to order them because they will be normalized and not perceived as "vegetarian" or "different." A subset of the status quo bias is the default preference, which causes people to choose the default option, even when better options are available (Downs et al., 2009). Thus, if a restaurant presents a certain menu item as the "default option," customers tend to order it whether or not it is the best choice for them (Downs et al., 2009). For example, several restaurants have reported success encouraging children to order healthier sides and drinks by replacing fries and soda with fruit and milk or juice (Anzman-

Frasca et al., 2015; Peters et al., 2015). Restaurants could similarly encourage meatless eating by replacing default meat options with default nonmeat options. For example, eggs could come with pancakes instead of bacon and pasta could be served with mushrooms instead of meatballs, making the meatless choices seem normal and most acceptable.

Importantly, default preferences can also lead people to order the most *easily accessible* item. Past research shows that customers tended to order featured sandwiches appearing on the front of a menu, instead of sandwiches inside the menu that took more effort to find (Wisdom et al., 2010). Similarly, manipulating the order of seven food choices on a breakfast buffet at a health conference demonstrated that over 75% of attendees selected the first food on the line and the first three foods on the line accounted for 66% of their plate content (Wansink & Hanks, 2013). Another experiment in a college found that moving candy to a less convenient location resulted in fewer candy purchases and increased purchases of more conveniently located desserts, fruits, and accessory foods (Meiselman et al., 1994). Other studies have demonstrated that closing the lid to an ice cream freezer reduced ice cream purchases from 30% to 14% and similar results were observed by moving vending machines farther from the cafeteria (Just & Wansink, 2009). A series of experiments at the salad bar at the University of Pennsylvania Health System cafeteria demonstrated that consumption can be significantly affected by the location of foods on the salad bar and the types of serving utensils provided to serve the food (Rozin et al., 2011). A somewhat similar study conducted in Israel found that customers were more likely to order an item if it appeared as the first, second, penultimate, or last choice in a category list as opposed to appearing in the middle of the list (Dayan & Bar-Hillel, 2011). Similarly, a Minnesota school noticed that students tended to

purchase unhealthy items that were displayed along the checkout line. Rather than remove them and lose the income generated from impulse purchases, the school replaced the unhealthy items with an array of fruits. Fruit sales increased, snack food sales decreased, and total revenue did not significantly decrease (Just & Wansink, 2009). Taken together, restaurants could encourage less meat consumption by featuring meatless items on the specials board, at the top of the menu, or in bold print, making them the easiest options to order.

Present-biased preference means that people place disproportionate weight on immediate outcomes and give less consideration to future outcomes (Downs et al., 2009). Such a bias may lead people to choose the immediate gratification of a meat meal over the future health benefits of ordering a meatless meal (Downs et al., 2009). For example, nutrition labeling in university dining halls – which dampens present-biased preferences by reminding students of the downstream consequences of their actions – resulted in a 7% calorie reduction (Cioffi et al., 2015). In a similar experiment in a sandwich shop, customers were told they could choose a sandwich as remuneration for taking a survey on an unrelated topic. Participants were given a menu that had five "featured" sandwiches on the first page and five additional sandwiches listed elsewhere. All customers had the same 10 sandwich options, but those who received menus with low-calorie "featured" sandwiches on the first page were more likely to order a low-calorie sandwich (Wisdom et al., 2010).

In addition to evidence that nudging can be effective at encouraging people to eat less food, somewhat different food, or even healthier food, there are a number of studies that indicate that people can be nudged toward meatless ordering when dining out.

One study in a U.S. university presented undergraduates with a default menu containing all meatless items, though a regular menu with meat items was also available. The study found that providing the meatless default menu increased meatless ordering (Campbell-Arvai et al., 2014).

Another study conducted in university restaurants in Sweden offered one vegetarian and two meat options for lunch. The study that found that moving the vegetarian option to the top of the menu and prominently displaying the dish increased the percentage of vegetarian dishes sold (Kurz, 2018).

In a self-serve café-style living lab (a restaurant set up specifically to test subjects) in France, customers were more likely to choose the vegetarian option if it was noted as the “dish of the day.” In this experiment, customers were only given the choice of two or three main dish options (Saulais et al., 2019). However, similar studies in Denmark schools and senior centers (where subjects were between 13 and 17 years old and between 65 and 89 years old, respectively) found that subjects were not more likely to choose the vegetarian dish of the day (dos Santos et al., 2018). Likewise, a similar study of seniors (ages 65 years old and older) in various settings in Denmark, France, Italy, and the United Kingdom also found that the labeling the vegetarian choice as the “dish of day” did not result in increased ordering of that dish (Zhou et al., 2019).

Simply increasing the number of vegetarian meals offered in three University of Cambridge cafeterias increased the number ordered. This held true for both observational studies using the meals already chosen by the cafeteria, as well as an experimental study where

the vegetarian choices were doubled (increased from one offering to two offerings) (Garnett et al., 2019).

An online restaurant simulation study of adults in the United Kingdom examined three types of menu variations. The control menu contained six meat dishes and two vegetarian dishes, with the vegetarian options noted only with a (v) next to the name of the dish. The first variation enhanced the name of the first vegetarian dish, the second enclosed it in a box labeled “Chef’s recommendation,” and the third moved both vegetarian dishes to a separate “vegetarian” section. The first two variations increased the likelihood that “infrequent vegetarian eaters” would order a vegetarian dish, but paradoxically, it reduced the likelihood for more frequent vegetarian eaters. The first variation also weakened the frequent vegetarian eaters’ intentions to eat vegetarian in the future. The third variation had no effect on infrequent vegetarian eaters, but had a negative impact on frequent vegetarian eaters, making them less likely to order a vegetarian option (Bacon & Krpan, 2018).

Most of these studies were conducted in university dining halls so the results may not be generalizable to the overall population. Furthermore, most of them occurred outside the United States, where the acceptability of meatless eating might differ. Finally, the particular interventions might not be suitable to restaurants. For example, it is very unlikely that a restaurant would only offer a meat-free menu and require customers to ask for meat options. Restaurants may be unwilling to make health claims about meat for fear of making the dining experience less pleasant for meat-eaters. Diners at a restaurant may have different expectations than students in a dining hall and most restaurants offer more than two or three options.

While these findings are promising, research shows that people have very strong feelings associated with meat consumption (Piazza et al., 2015). Most Americans eat meat daily, and it is usually the centerpiece of the meal (Kearney, 2010). Many Americans do not believe that a meal is complete without meat, and some believe that meat is necessary for adequate nutrition (Piazza et al., 2015). Other factors that may inhibit nudging people away from meat include cultural attachments to meat and the association between meat and masculinity (Kearney, 2010; Rozin et al., 2012).

B. Meat reduction programs

A few programs that specifically seek to encourage people to consume less meat have been implemented. While these programs are more overt than traditional “nudge” techniques, they are intended to encourage people to eat less meat without significantly restricting choices, if at all. For example, “Meatless Monday” is a campaign that began in 2003 to encourage individuals to reduce their meat consumption by forgoing meat one day each week and variations now operate in over 45 countries (Fehrenbach et al., 2015). Meatless Monday has been implemented in schools, hospitals, restaurants, offices, and communities throughout the world. Similar campaigns include Reducetarian (Reducitarian Foundation, 2022) and Part-Time Carnivore (Grassian, 2020).

“Balanced Menus” is a program developed by the San Francisco Physicians for Social Responsibility, which seeks to reduce meat purchases among participating hospitals to improve nutrition and help the environment. Among other things, Balanced Menus encourages hospitals to alter recipes to reduce the overall quantity of meat served, to substitute sustainably produced meat, and to increase the number of meat-free options available. In 2009, the

program was launched nationally by Health Care Without Harm and at least 32 hospitals have taken the "Balanced Menus Challenge." A pilot evaluation of five hospitals showed that the program was successful, exceeding the 20% meat reduction goal and yielding substantial savings in costs and greenhouse gas emissions (Lagasse & Neff, 2010).

Relatedly, the Physicians Committee for Responsible Medicine has launched the National School Lunch Reform and encourages schools to offer more healthy foods like fruits, vegetables, beans, and whole grains and avoid offering processed meat and dairy products. Among other things, the Committee offers plant-based recipes, resources, and marketing materials and encourages schools to offer a plant-based entrée as an option for all children each day (Physicians Committee for Responsible Medicine, 2022).

In addition to the health facilities listed above, some restaurants are beginning to find ways to encourage less meat consumption. Menus of Change: The Business of Healthy, Sustainable, Delicious Food Choices, is an initiative developed by The Culinary Institute of America (CIA) in collaboration with Harvard T.H. Chan School of Public Health to "create a long-term, practical vision for the integration of optimal nutrition and public health, environmental stewardship and restoration, and social responsibility concerns within the foodservice sector and beyond." Menus of Change assists chefs and foodservice leaders with creating menus and recipes that are healthy and sustainable and helps with business strategies that integrate both environmental and nutrition science concerns. Resources include sustainability principles of healthy sustainable menus, recipes, toolkits, and white papers and research findings (Culinary Institute of America, 2016). Despite a few restaurants taking the initiative, a survey conducted in January 2015 polled foodservice operators across the U.S. and found that most felt that a

shift toward more plant-forward menus is important but nearly all felt that doing so presented a major challenge (Culinary Institute of America, 2015). Understanding what they perceive to be the challenges could help with implementation of successful programs.

III. Purpose

The purpose of aim 1 was to collect empirical data to understand the decision-making processes of stakeholders, to inform the development of the intervention of aim 2, and to hypothesize on further interventions to reduce meat consumption in rural restaurants. The purpose of aim 2 was to test the intervention that was identified in aim 1 as most appropriate and acceptable to restaurants. The purpose of aim 3 was to conduct an ethical analysis of various interventions to reduce meat consumption that could be implemented in restaurants and identify the most acceptable option.

MANUSCRIPT 1 - A Qualitative Analysis of Factors Affecting Menu Development and Restaurant Stakeholder Attitudes and Beliefs Regarding Meatless Menu Offerings in Independently Owned Restaurants in Rural Pennsylvania

ABSTRACT

The study explored how rural restaurant stakeholders structure customer choices and their attitudes and beliefs regarding meatless menu offerings. Twenty in-depth interviews were conducted with owners, managers, chefs, and servers representing 14 independently owned restaurants in a rural area of Pennsylvania. Specifically, the interviews explored the respondents' current practices and beliefs regarding menu development and offerings, their attitudes toward meat consumption, their knowledge of adverse health and environmental consequence associated with meat production and consumption, and their opinions on facilitating or encouraging customers to eat less meat. The study also sought to understand what, if any, interventions aimed at reducing meat consumption would be accepted in these restaurants. It was reported that owners were generally responsible for menu content and design, though most reported that the process was somewhat random. Respondents had little understanding of any adverse health or environmental impacts of meat production or consumption. They reported having very few meatless options on their menus, believed that the local customers would not order meatless items, and reported that they would not be comfortable suggesting meatless items to customers. Restaurants offered daily specials, which sometimes tested new menu items, and respondents thought adding meatless specials might encourage customers to order less meat. Meatless items, while scarce, were reported to be the most profitable. Based on the information obtained from the interviews, five steps are suggested to encourage restaurants to nudge customers away from meat. The steps include:

(1) demonstrating the problems associated with meat consumption and production; (2) discussing with owners the benefits of discouraging customers from ordering a lot of meat; (3) developing appropriate interventions; (4) enabling owners and staff to implement the interventions; and (5) incentivizing owners and staff to implement the interventions.

INTRODUCTION

As described in the main introduction, excessive meat consumption and large-scale meat production contribute to public health problems and experts have advised decreasing such consumption and production. Furthermore, as described in the main introduction, restaurants are a potentially good place to implement interventions designed to encourage a more plant-based diet.

Restaurant stakeholders (owners, managers, chefs, and servers) greatly influence what customers consume. Owners, managers, and/or chefs decide what items to offer (both on a regular basis and as specials), how to prepare them, and what substitutions are permissible at either no or an additional cost. Owners and/or managers likely decide how to present those options to customers. For regular menu items, decisions include the location on the menu to list each item, categorizations, whether they will be highlighted (for example, with bold print, a picture, or a “featured item” icon), and the descriptive words to define them. Similarly, for daily specials, decisions include the location on the specials board, the description, and the categorization. Such stakeholders may also promote various menu items via special events (such as “wing night” or half-price burger night), coupons (such as buy one pizza get one free), and price fixe menus (such as a three-course meal for a fixed price). Servers influence

customers' ordering by their descriptions of certain items or by making suggestions, either based on their own personal preference or based on instructions to "push" certain items.

Before attempting to influence stakeholders, it is important to understand how each of these decisions is made. While it seems logical that restaurants base these decisions strictly on profitability or customers' preferences, that might not always be the case (or the stakeholder might be incorrect regarding what is profitable or what customers want). Understanding the stakeholders' rationales behind menu development, their attitudes and beliefs associated with eating and/or offering meat and meatless dishes, and their willingness to make some changes is an important step toward developing potential interventions that restaurants could and would implement.

METHODS

The study utilized qualitative research methods, in particular in-depth interviews. Specifically, the research drew on a grounded theory approach, using data collected through 20 in-depth interviews to construct a theory regarding how rural restaurant stakeholders (including owners, managers, chefs, and servers) determine how to structure customer choices and what might be done to encourage stakeholders to nudge customers toward meatless offerings. A "grounded theory" is one that is "grounded" in the actual data, meaning that the theory is inductively developed during the course of a study and is in continual interaction with the study's data, as opposed to a theory that is conceptually developed first and then tested against empirical data (Charmaz, 2014; Maxwell, 2012). Since the purpose of this formative research was to understand the decision-making processes of stakeholders regarding food offerings and their views on meat and meatless offerings, a grounded theory approach was a

well-suited method (Charmaz, 2014; Maxwell, 2012). The research was an iterative process, with key themes emerging throughout the data collection and analysis. The research was formative because the findings were intended to be used to develop interventions designed to encourage less meat consumption in rural restaurants.

I. Sampling and data collection

Information from the in-depth interviews was intended to be used to construct an intervention that would be feasible and acceptable, particularly to stakeholders in rural restaurants in the particular cluster of small towns in rural Pennsylvania where the interviews occurred. These restaurants, spanning five zip-codes, were geographically and culturally similar. Furthermore, only “independent” restaurants from this specific geographic area were included. Chain and franchise restaurants were excluded due to a lack of decision-making authority over the food offerings or presentations and because such restaurants are generally designed to appeal to a large, diverse population (such as the entire U.S.). Thus, such stakeholders may not have understood or appreciated local preferences to the same degree as stakeholders from independent restaurants.

A. Sampling strategy

The study employed a combination of sampling strategies. First, all restaurants in two target zip codes were contacted (30 total). Eleven restaurants from these two zip codes agreed to participate in the study. Respondents were asked to recommend other restaurants that might be interested in participating. Three additional restaurants that were recommended by participants were also included in the sample. These restaurants were outside the original two zip codes but were in close geographic proximity and shared the same rural attributes as the

original two zip codes. Due to this snowball sampling, the area of the sample was expanded to include three restaurants in three other zip codes. However, not all restaurants in these additional three zip codes were contacted.

B. Participants

A combination of owners, managers, chefs, and servers were interviewed, as each likely have different roles in the restaurants, different levels of decision-making authority, different types and degrees of customer interaction, and may have different perspectives on a variety of important factors. Interviews were conducted until data saturation was reached. Twenty respondents representing 14 restaurants were ultimately interviewed.

C. Recruitment

To determine willingness to participate, owners of all qualified restaurants were contacted via letter. If I had a connection to the owner of the restaurant, then I asked the connection to deliver the letter. Otherwise, the letters were mailed. The letters briefly explained the research and invited the owners to participate in the study. They also asked the owners to reply indicating whether they were interested in participating and noted that they would be contacted again if they did not respond. No restaurants contacted me to indicate that they were not interested. Several restaurants did not respond at all, and those restaurants were contacted again either in person by me, via phone by me, or via phone by a mutual contact. If the owner indicated that they were not interested or did not respond to the second invitation, they were not contacted again. If the owner indicated an interest in participating, then the study was explained further, including the specific people sought to be interviewed. It was explained that all participants should be willing participants and that no pressure should be

applied to any employees. If the owner agreed to proceed, then interviews were scheduled at times and locations that were convenient for the owner and his or her staff. Respondents were provided a \$25 gift certificate to a local restaurant supply supermarket that is also open to the public, making it useful to both owners and staff.

D. Interviews

1. Pilot testing

A preliminary semi-structured interview guide was developed and tested prior to the fieldwork. Two owners, one chef, and one server, none of whom were part of the study, were interviewed with consent to test interview questions and techniques, to identify potentially biased wording, to elicit feedback on the questions, and to identify further themes to include. Based on the results of the pilot testing, the interview guide was revised to add content and clarify potentially confusing language.

2. Field interviews

The interviews were conducted between May 2017 and August 2017. Prior to commencing the interviews, respondents were read an informed consent script, asked if they consented to the interview, and were provided with a copy of the informed consent script. Verbal consent was obtained before each interview.

A semi-structured interview guide was utilized to guide the interviews and assure that certain key questions were addressed. The interview guide contained a series of questions that were asked to all respondents, as well as sections that were targeted to respondents based on their role in the restaurant. Although an interview guide was utilized, subjects were encouraged to express thoughts and concerns not covered in the interview guide and additional questions

not in the interview guide were sometimes asked in response to respondents' answers.

Interviews typically lasted between 20 and 50 minutes. Interviews were recorded with consent via two digital recording devices (an electronic recorder and an iPhone) and later transcribed.

Handwritten notes were also taken during and after the interviews to document non-verbal cues and any other relevant information that the recording did not capture. At the end of each interview, subjects were asked for permission to be recontacted if there were any additional questions. All respondents agreed, but none were recontacted.

Data collection and preliminary data analysis were performed during the same time period and iteratively, although transcripts were created after all of the interviews were complete. Throughout the analysis, spreadsheets were developed to keep track of relevant information such as file names, length of interviews, the status of transcription and analysis, and key themes.

II. Data management

All documents and recordings were stored on a password-protected computer and backed up to an encrypted external hard drive. Transcripts and other documents were named using a systematic filing system.

Audio recordings were uploaded to the password-protected computer, and the files on the digital recorder and iPhone were erased. The recordings were transcribed by a transcription service. All identifying information was removed from the transcripts. Recordings and transcripts were then uploaded into MAXQDA for coding and analysis.

III. Data analysis

An initial codebook was developed based on the preliminary interview guide. The codebook was revised throughout the interview process as the interview guide was revised. Once data analysis started, the codebook was further revised to account for themes that arose during the interviews that were not captured by the interview questions. The final codebook included 13 first level codes that aligned closely with the general topics of the interview guide, plus three additional themes that emerged during the interviews. Most of the first level codes were further broken down into second level codes that covered more specific sub-themes. A few second level codes were broken down even further into third level codes with very specific sub-themes. I conducted all interviews and completed all coding. This allowed the coding to be more nuanced and intuitive and permitted revisions to the codes throughout the coding process as deemed appropriate.

The final codebook and transcripts were uploaded into the qualitative data analysis software MAXQDA. Each transcript was read, and relevant segments were coded with one or more first level codes. Each transcript was then read a second time and relevant segments were further coded with second and sometimes third level codes. When all transcripts were coded, reports were created for each code, which included all text that was marked for that particular code.

Demographic information was tabulated from the reports as well. Furthermore, the reports were analyzed to identify common answers among respondents, recurring themes among interviews, as well as areas of significant disagreement. This information was then used to develop a summary of the results.

IV. Minimizing threats to validity

A. Researcher bias/subjectivity

Throughout the interview process and data analysis, attempts were made to identify potential research bias and minimize its impact on the study. I continuously endeavored to understand how my background, values, and expectations may have been influencing how I conducted the interviews, how I interpreted and assessed the data, and which data I viewed as most relevant (Maxwell, 2012). This was especially important with questions regarding meat consumption, and I took great care to prevent my own beliefs from impacting how I asked related questions and how I interpreted the responses.

B. Reactivity/reflexivity

It is inevitable that my personal characteristics will influence the respondents' answers to a certain degree. While this cannot be eliminated completely, I did my best to minimize the effects by avoiding leading questions, responding to answers with as much neutrality as possible, and allowing the interviewee to guide as much of the discussion as practical. For example, I often reminded the respondents that there were no "right" or "wrong" answers and that I was looking for a wide range of thoughts and opinions. To manage the inevitable effects of reactivity, I endeavored to understand, through self-reflection, how I was influencing what informants said and how this affected the inferences I drew from the interviews (Maxwell, 2012).

C. Use of "rich" data

Verbatim transcripts of the interviews provided "rich" data about respondents' perspectives and minimized the potential impact of researcher bias. Furthermore, subjects

were encouraged to explain in detail how they decided to offer and present certain items, as well as their feelings about meat consumption, sustainability, health, and a variety of other related issues that arose during the interviews. Such open-ended questions exposed not only the objective reasons why respondents made certain decisions (such as profitability and customer request) but also subjective reasons that the respondent may not have realized had influence (such as respecting others' autonomy and perceived customers' desires).

RESULTS

I. Demographics of stakeholders and restaurants

A total of twenty stakeholders were interviewed. The subjects ranged in age from 24 to 69 years old, though most respondents were in their forties and fifties. Thirteen of those interviewed were female while seven were male.

Of those interviewed, 11 self-identified as owners or co-owners, including one who self-identified as "owner and chef." Three individuals identified themselves as managers, including one who identified as "president and general manager." Four were considered servers, including one who described her position as "bus girl" but had many of the same duties as a server. Two identified as "chef" or "cook," including the individual who self-identified as "owner and chef." One was unable to give a specific job title due to a myriad of duties that did not lend themselves to one specific job title (*see Table 1.1*). Despite these titles, it was clear that most jobs were very fluid and encompassed many tasks beyond the job title. This was true for all positions, from servers to owners.

“Food preparation for serving, and then serving, and then sometimes cleaning up. Sometimes cooking if we have to. In a smaller place, you do a bunch of things, myriad of things. We even bring people out. Whatever’s necessary.”
- Server

Fourteen restaurants were represented. All were privately owned and not part of a chain or franchise. The restaurants had been open between 2.5 years and 83 years, and under current ownership between 2.5 years and 40 years. Eight restaurants served American food, including three diners, and a food truck. Four restaurants served Italian food. One restaurant identified as a French restaurant and one restaurant identified as a seafood restaurant.

Two restaurants served all three meals, five restaurants served only breakfast and lunch, three served only lunch and dinner, one served only breakfast and dinner, and two restaurants only served dinner. One restaurant served all three meals on Sundays but only lunch and dinner the other six days of the week.

Ten restaurants were open seven days a week, year-round. Three restaurants were season-dependent: one opened seven days a week in summer but only six days in winter; another opened six days in summer but only five days in winter; and another opened five days in summer but only four days in winter. In each of these restaurants, the days that they were closed were always weekdays. In addition to the 13 brick-and-mortar restaurants, the food truck opened from Tuesdays through Saturdays but was dependent on the weather and season.

II. View of their restaurant

Most of the respondents were very proud of their restaurant and described it as unique or special, in part because of their longstanding relationships with the customers and the friendly and welcoming environment it provided. Two owners compared their restaurant to the fictional bar, Cheers. Family, in particular, was a recurring theme throughout the interviews.

Many respondents noted that they thought of their customers as family, and some gave examples of serving multiple generations and watching children grow up.

“They’re almost like family. It’s weird because through the years you see them come and ... then you come back and you’re older, then you have kids. So it’s like you were a kid. And now you bring your kids back and that’s almost like -- it’s hard not to get emotional over that. It’s warm. It’s like oh God, you’re bringing your kids back. ... So that’s nice to see. So most of them are like family. It’s a tradition. It’s what they do. Whether they’re out of towners or locals, this is what they do. Pizza Friday night. Pizza on Wednesday night whatever. It’s like it’s home for them because that’s what they grew up with. So that’s nice.”

- Manager

III. Locals and tourists

The geographic area chosen for the study is in the Pocono Mountains, near many lakes and vacation areas. Respondents reported a mix of locals and tourists, but the ratio depended heavily on the season. Some restaurants reported almost all locals in the winter with an equal mix of locals and tourists in the summer, while others reported a mix throughout the year, especially on weekends, but with a higher proportion of locals in the winter and a higher proportion of tourists in the summer.

“It’s a combination of both [locals and tourists] during the summer because of [the] Lake. Mostly locals [in the winter]. We have a very strong base of regular customers.”

- Server

IV. Menu development

A. Content

In nearly all restaurants in study, the owners decided the content of the menu. The only exception was the French restaurant, where the chef chose the menu. When the owners determined the content, they usually did so without input from others, however, in a few restaurants, the owners decided jointly with the chefs, and in some cases, they elicited input from staff as well.

"[The owner] does. I mean, [the staff] test things out and we give him our opinions, but he gets the final say."

- Various roles

B. Design and layout

Similarly, the design and layout of the menu was usually decided by the owner, but in some cases, the decision was left to the manager. It was not uncommon for a relative of the owner to design the menu or at least help with the design. A few restaurants received some help from a professional design company or food service software. Specifically, many of the restaurants utilized a free design program offered by Sysco. In some restaurants, they utilized a combination of resources.

"The font and all of that, that would be [the owner] and I [the owner's sister and manager] would make that decision and [the owner's] wife []. She's in on that too. ... And there is actually a design company that we are referred to from one of our vendors ... and then they put the colors together. They talk to [the owner]. They ask him what he's looking for."

- Manager

While a few respondents indicated that the order of the menu was completely random, most reported that foods were grouped into sections, and followed the order that a customer would eat a meal. For example, most dinner menus started with a section for appetizers and ended with a section for entrées. Within each section, most restaurants listed the options in order of complexity, starting with the simplest option and ending with the most involved or complex.

"...under pasta it's like basic pasta, so your basics spaghetti, linguine, ziti ... and then you can get that like A, B, C or D with this sauce, like plain, meatball, sausage, meat sauce, whatever. ... And then as it goes on then you have your cavatelli and broccoli and your fettuccine alfredo and your baked ziti and your stuffed shells. That's how the menu reads. And then under parmesan you have your basics, like your chicken and your veal and then it goes to eggplant rollatini, and shrimp, like things more [complex]. So I think it starts off on a low end and goes to a high end. ... Under the hoagies ... first there's cold hoagies, then there's the grilled hoagies, and then there's the parmesan hoagies."

- Manager

Three restaurants attempted to structure the menu in a manner designed to encourage certain customer choices. The owner of the first restaurant learned about designing menus to guide customers from a menu design program offered by the food vendor, Sysco. She learned about color suggestions, using blocks of text instead of just lines, and relating to the bottom corners the items the restaurant does not want to encourage customers to order. The manager of the second restaurant simply observed that customers tended to preferentially order whatever was listed as the third item on their menu, so they would list whatever they most wanted to sell in that position. The owner of the third restaurant applied techniques she learned from her own research on menu design, including menu placements, call-out boxes, and staggering prices.

“Actually I researched and read books about menu design ... most people tend to ... buy the first one or the last one. So your items that you want to sell the most of ... you want them in the first position or the last position. If you really want something to sell, you do a callout box. ... You don't want to have everything and all the prices lined up, because then people are price-shopping.”
- Owner

C. Menu revisions

There was a bit of variability in how often restaurants changed their menus. Most reported changing it every one to three years, with one changing it four times each year in order to have a seasonal menu, and a few that never changed it. Most respondents reported that the menu should be changed more frequently than they were changing it. Several respondents noted that menus should be changed every six months, but very few restaurants met that goal.

Most menu changes were to increase prices. Other changes were to add or drop items. Items were usually added if they did well as a special or were requested by customers. Items

were usually dropped if they were unpopular, difficult or time-consuming to make, unprofitable, or no longer available from the supplier. Some respondents reported making changes just to keep the menu fresh and interesting or to keep up with food trends.

“Just keep it fresh, keep customers interested and that kind of thing, so they don’t get bored. ... If things weren’t selling or if, say, if we’re running a special one night and it really went over well, then we’ll put that on a list of things to focus on and when we change the menu we’d go to things that were, you know, through experience, the things that sold best.”

- Owner

V. Specials

All restaurants offered rotating specials. With the exception of the food truck, which offered monthly specials, all of the restaurants changed their specials daily.

A. Decision making

In about half of the restaurants, the owner chose the specials. In about a third of the restaurants, the owner and chef jointly decided on the specials, and in one restaurant, the decision was left solely to the chef. Two restaurants had a recurring special on each day of the week, in addition to the changing specials.

“For dinner, there's usually a standard dinner special every night. ... Every Wednesday is [one particular dish]. Every Monday is [another particular dish].”

- Various roles

There was wide variation in how specials were chosen. Most restaurants considered a combination of factors. Some ways specials were chosen revolved around shopping for ingredients, such as freshness, seasonality, appealing appearance at the market, low prices or sales, and different or high-end ingredients. Other factors included ease of preparation, surplus ingredients (either intentional or unintentional), alliteration (something similar to “Spaghetti

Sunday”), the whim of the chef, adequate inventory (making sure they do not run out), day of the week, what customers like, new item a sales representative suggested, and food trends.

“Certain days I have certain customers; I know what they like. Like tomorrow, I have a group of ladies that are in here every Wednesday. I’ll put certain things on that I know they enjoy. ... Come the weekends, I might pick up sundried tomatoes or, you know, I might pick up, you know, blueberries, even if they’re a little bit more expensive, because on the weekends you can raise your prices a little bit on your specials, and offer things that way. My specials, what I try to do on the weekend, is something that basically you can’t get any other time here. You know it has that one special ingredient in it that isn’t a standard that I carry.”

- Owner

B. Content

In most restaurants, the specials were items that were not on the regular menu. In a few restaurants, the specials were regular menu items at a lower cost or regular menu items prepared slightly differently. Some restaurants would include both regular menu items at a reduced price as well as items that were not on the regular menu.

C. Presentation

All of the restaurants presented their specials using one or more of the following: a specials board, a paper handout or table tent, or verbally. Some always presented them verbally and some only did so upon request. The specials board was usually a chalkboard or a dry erase board with handwritten specials, but sometimes was an electronic board with typed specials. A small number of restaurants would also post their specials online (either on their website or Facebook page), however, most of these independently owned restaurants did not have an online presence. At least one restaurant would also fax the specials to local businesses.

“Well, they are told to them when they sit at the table. We also have electronic menu boards which I just love. ... We fax the specials to specific businesses at the beginning of the week who have said can you fax us. ... They go to a couple of different offices locally.”

- Manager

D. Encouragement

Restaurants were mixed regarding whether servers were instructed to encourage or “push” the specials. Most respondents said that specials were simply to be offered, but not pushed, but some indicated that specials were to be actively encouraged. A few reported that servers were supposed to encourage customers to order the specials, but that servers generally did not. One restaurant instituted a little competition among servers to see who sells the most of whatever item the chef wants to sell.

“So then, it's like a little competition, like, ‘I sold three branzinos,’ and ‘You're fired. You didn't sell one branzino tonight.’ You know, it's all in good jest.”

- Manager

VI. Promotions

Respondents were asked about promotions or other ways they attract customers. Most restaurants offered some sort of promotions, but advertising was not a big part of any of their business models. Most of the promotions were unique to the restaurant, but there were a few that were practiced by more than one restaurant. Text messaging was a common way to attract customers by announcing special offerings or sending coupons to customers’ phones. Many restaurants offered discounts to certain groups of people, such as veterans and police officers. Several noted that they donated to local causes, such as youth sports teams or volunteer firefighters events. Recurring weekly specials was another way to attract customers. For example, every Monday would be a particular special, every Tuesday would be another particular special, etc., so customers knew what day to come if they wanted a certain special.

VII. Continuing education/trends

Respondents were asked if they (or the owners) did anything to continue their education in the restaurant business or keep up with food trends. While a number of people responded that they did nothing at all, most indicated a minor attempt. The most common way that restaurants kept up to date was through a variety of magazines geared toward the restaurant business. While some owners paid for subscriptions, many simply subscribed to free magazines. A few people indicated that they go to food shows and a few others mentioned getting ideas online or through social media.

"I look at Facebook ... If we see something that looks great 'let's try this.' ... There are some special websites on Facebook that do just for catering and for food."

- Owner

VIII. Customers' decision making

For local customers, who were of primary interest to this research, cost appeared to be one of the biggest factors influencing their choices. Several respondents reported that local customers tended to order the least expensive menu items, often gravitating to the low-cost specials.

"... a lot of them are older so they will go for what's cheaper like the specials because you could eat a whole meal, drink, everything and tip for under six dollars which is great."

- Cook

Customers also reportedly tend to be creatures of habit and not adventurous. It was reported that many customers know what they want when they arrive and do not even look at the menu. Respondents felt that many customers order standard items and do not want to try something new. Many gave the impression that they wished customers were more

adventurous and willing to try new things, but they felt that unfamiliar menu items simply would not sell.

“I feel like they all -- how do I want to say this? No one really orders out of the ordinary. Eggs, bacon, home fries, toast. That's it. They just -- they're -- it's very simple orders. Anything crazy, like avocado - if we put avocado on anything, they would get berserk. It's just very -- it's very country food. That's really it.”
- Server

Many are influenced, however, by what other customers are eating or what they see servers carrying to other tables.

“Yes. I mean, sometimes we'll do 25 dinners at the bar, and people, you know, the server will walk down with the food, and they'll be like, ‘Oh, what's that? What's that? What's that?’ Or they'll sit right next to somebody. It's amazing how many times people will order something because of what they've just seen.”
- Owner

Some respondents felt that servers played a significant role in customers’ decision making. Others, however, thought the role was minimal, or only important if a customer sought out the information. It was generally reported that servers played more of a role in the decision making of new customers who were unfamiliar with the menu than with regular customers who knew the menu and had their favorites. Upon closer questioning, it appeared that owners or managers thought that servers could play a more significant role if they tried. However, it was also reported that many servers were not motivated to steer customers.

“Well, a good server will help you. In my opinion, a good server can talk you into anything. Because I know myself personally, when I’m serving, you can talk about a special, make it sound fabulous.”
- Owner

When asked how servers (or other employees who sometimes served) decide what to suggest, many reported that they start by asking a customer how hungry they are feeling and then suggest something based on their answer. Many also reported that they would suggest what they themselves liked while others would suggest the most popular items.

“We have four items on each menu that we kind of say these are our biggest sellers and they usually end up getting one of the four. ... So I'll say, ‘oh, we have those four - they're our biggest sellers.’ People usually just end up getting that. They won't veer off from what we tell them.”
- Server

IX. Profitability of meat vs. meatless items

Early in the interviews, respondents were asked to identify their most and least profitable items. Later in the interviews, respondents were asked more specifically about the profitability of meat dishes compared to meatless dishes. Even before they were asked specifically about the profitability of meat versus meatless options, non-meat dishes tended to be offered as the most profitable items. These included breakfast items such as pancakes, eggs, potatoes, and French toast, along with soup, pasta, pizza, and a daily vegetarian special. Meat and seafood-centric items such as cold cut sandwiches, prime rib, and beef dishes were reported to be some of the least profitable items.

“Okay. Well, I know that one for sure. I would say pancakes are probably our most profitable. And I know that either our club sandwiches or our hot open-faced sandwiches because that price needs to go up because of turkey and roast beef going up, like lunch meat, sandwich meat they go up tremendously. And you can't keep changing the menu every time they go up. So they're our least profitable.”
- Owner

One exception to this was one report that chicken dishes were very profitable, but this came from a restaurant that served mostly seafood, so this could have simply been a relative comparison.

When respondents were later asked more specifically about the profitability of their meatless offerings compared to their meat offerings, the respondents overwhelmingly reported that meatless dishes were more profitable and meat dishes were less profitable. The most common reason given was that meat ingredients cost more than non-meat ingredients, but

that the menu prices for meat items and non-meat items were the same or similar. In some cases, restaurants would charge more for vegetarian items.

“I can make more money on a veggie wrap than I would make on a cheeseburger wrap ... I definitely make more money on my vegetarian options. ... And I also find that if it is vegetarian, and people have that mindset, they’re willing to pay more.”

- Owner

One notable exception to this is cheese. Respondents tended to struggle when comparing the profitability of meat items to cheese items, noting that cheese was an expensive meatless ingredient. Furthermore, one owner indicated that profitability of meat and meatless dishes were comparable because he applied the same mark-up to meatless items that he applied to those with meat, and another owner indicated that meatless dishes might be less profitable, because they would have to adjust the price of a regular menu item if they removed the meat. In this case, however, the owner was contemplating a customer special ordering a meat menu item without the meat and expecting a discount.

X. Meat and meatless

A. Definitions

There is no universal definition of “meatless.” Even in the literature, there are various definitions, and researchers tend to define it very differently. Before explaining to respondents how they should define meat for the purpose of the interview, they were asked how they personally would define it. Answers varied considerably and many respondents had a difficult time thinking about it and would change their answer as they talked about it. Overall, about half of the respondents defined “meat” as including red meat and poultry and excluding fish, while slightly under half included red meat, poultry, and fish as meat. Only one respondent excluded poultry from the meat category and considered both poultry and fish to be meatless,

however, this respondent acknowledged that poultry was a grey area and was not completely confident in that determination. One respondent considered red meat, poultry, fish and eggs to be meat.

Respondents' thought processes and rationales were interesting and varied – factors they considered included whether it was alive, if it would bleed, if it walked or flew, the color of its flesh (red or white), if it would be found in a grocery store meat case, and what their vegetarian acquaintances would eat. They would also often go back and forth on their determination as they worked through their answer.

“[Poultry is] the grey area ... I mean, to me it's like, well, red meat is [meat] -- but some people who don't eat meat eat poultry and chicken and ... So to me, I'm thinking 'meatless' -- but I don't know. It's a tough question. ... I guess I'm thinking more along the lines of -- I'm thinking you could eat chicken and poultry and seafood. ... That you could eat [chicken], I guess, because it's poultry. I don't know.”

- Owner

B. Meatless menu items

After the respondents explained their personal definitions of meat and meatless, they were instructed how to think about meat and meatless for the rest of the interview. They were told to define meat as including any type of animal flesh, including fish, seafood, poultry, pork, and beef but not including animal products such as eggs or milk. Respondents were then asked to describe the meatless options on their menus. Many admitted that their menus lacked a significant number of meatless options, but felt that their customer base did not demand it.

“My vegetarian menu is very limited. ... But I don't, my clientele, I don't have the need for it.”

- Owner

Breakfast menus tended to offer the greatest number of meatless options. Commonly mentioned items included eggs and omelets, various forms of potatoes, pancakes, and French

toast. Other items mentioned included breakfast sandwiches, toast, waffles, oatmeal, and yogurt. Among the more common meatless options mentioned for lunch and dinner were salads, grilled cheese sandwiches, and pastas such as spaghetti, manicotti, and ravioli. Others included veggie wraps, black bean or veggie burgers, egg salad sandwiches, pizza, veggie paninis, cold platters featuring coleslaw, potato salad, or macaroni salad, and certain soups including gazpacho and noodle soups. Respondents also noted a number of appetizers and sides, such as fries, onion rings, mozzarella sticks, breaded cauliflower, and quesadillas.

Some Italian restaurants mentioned their eggplant or other pasta dishes but noted that they come with a sauce made with bones or meat. One respondent stated that most customers did not mind that the sauce was made with bones provided it did not contain “loose meat.” Subjects from another restaurant noted that the sauce could be swapped out with a meatless sauce upon request.

“Dinner-wise, you got eggplant, you got stuffed eggplant, you got plain old spaghetti. Now, we have meat in our sauce, but if they were strictly no meat at all, we could always suggest the [meatless] pizza sauce...”
- Various roles

One restaurant with a limited high-end menu simply lists “vegetarian/vegan entrée of the day,” which the chef changes based on availability and can be somewhat customized to the customer’s preference. This is presented as one of the specials. Another restaurant that specializes in seafood does not have any meatless entrées on the menu but the menu notes that the chef can accommodate gluten-free diets, vegetarian diets, or allergies, and the chef will customize a meal for the customer. In addition to standard meatless menu options, a few restaurants occasionally offered meatless specials, which they reported did well. Nearly all

respondents noted that they would accommodate requests for meatless options upon request.

A few even mentioned that they enjoy the challenge of creating off-menu dishes.

“Oh, but it’s fun. It’s fun though when people come. I don’t mind doing special stuff. ... Actually it’s kind of fun to do something. ... A vegetarian comes in, you just walk in the guard -- go in the -- walking inside, throwing stuff together. It’s wonderful. It’s a great way to make a salad for myself too.”

- Owner

C. Demand for meatless items

Respondents were asked to estimate the percentage of items ordered that were meatless. Most respondents struggled with this question. A few outright said they had no idea and could not even guess. The Italian restaurants that served a lot of pizza had the highest estimated percentage of vegetarian items ordered due to the quantity of pizza sold. Those estimates ranged from 25% up to 70%. With only a few exceptions, the rest of the restaurants generally reported that 10% or less of the items ordered were vegetarian.

Respondents were also asked whether customers were ordering more or less meat than in the past. The majority of respondents indicated that people were ordering the same amount of meat as in the past, however, several people did report an increase in meatless ordering.

“I’m seeing more [meatless ordering] ... I don’t know if it’s for moral issues or dietary issues or whatever, but just I think people are trying to eat healthier.”

- Owner

D. Decision making regarding meatless options

Respondents were asked about the decision making involved in the meatless offerings, such as how the restaurant decided on the number of meatless items, what those meatless items would be, and where they would be placed on the menu. Reportedly, not much thought went into any of those things, and the meatless items that made it to the menu did so *despite*

being meatless (not *because* they were meatless). Respondents generally pointed out that there were few meatless items on the menu and that they were just mixed in with the other items and not put in a separate section or even noted as being meatless. When asked if the meatless items were targeting vegetarians or just the general population, most respondents said they were not targeting vegetarians and that they were items that they thought anyone would order. Many respondents reiterated that their customers are generally not vegetarian.

Next, respondents were asked if they ever suggest meatless options to customers who do not specifically request them. Most indicated that they did not suggest meatless items, although there were a few exceptions. For example, some servers would recommend certain items that they personally liked that happened to be meatless, and one server reported that she would make meatless suggestions during Lent.

“I suggest the Mediterranean Salad, which is meatless, because it's my favorite, and it's a beautiful salad.”

- Server

E. Meat reduction campaigns

Questions were asked to ascertain how much respondents knew about efforts to reduce meat consumption and the benefits of eating less meat. Respondents were asked if they had heard of any campaigns to reduce meat consumption. The majority of respondents answered without hesitation that they had not heard of any such campaigns or measures. A few people indicated that they had heard something about the benefit of eating less meat, but most were not able to articulate with much certainty why it was beneficial. Only one person mentioned Meatless Monday unprompted.

"But 99% of people that I talk to are trying to do, like, a Meatless Monday ... people, I think, for either environmental or health reasons, are trying to cut down, and encouraging people to do, like, that option. I see it a lot on, like, different recipes and things like that, you know, to encourage people to try it and to find something."

- Server

When prompted with the specific names "Meatless Monday" and "Reducitarian," one additional person indicated that she had heard of Meatless Monday, but not Reducitarian.

Several people joked that it would take a long time for such campaigns to make it to the rural area where they are located.

"No. I haven't heard of that. ... That is so funny Meatless Monday. Oh my goodness. ... It will get here in twenty years. <laughs>"

- Manager

A few people noted that they heard in general that people should reduce their meat consumption, but none of them seemed to take it very seriously or associate it with environmental impact, and one only heard about it as a potential way to save money.

"Just because I'm older I get information now that says you shouldn't eat so much red meat, blah, blah, blah but I don't think that's geared toward the restaurant, just towards me."

- Manager

F. Problems related to meat consumption or production

Respondents were asked if they were aware of any negative effects of meat consumption or production. Most respondents were not aware of any adverse effects. A few were somewhat aware that health experts advise against consuming certain meats, but most did not have a clear understanding of the actual health issues related to excessive meat consumption and did not take the warnings seriously. Even fewer people were aware of any adverse environmental impacts of meat production, and many seemed genuinely surprised that there were negative consequences.

1. Health problems

When asked if they had heard anything about the relationship between health and eating meat, most respondents initially simply said they had not. Several people, however, did mention possible health effects, especially concerning red meat. Most only had a vague understanding of the potential issues with red meat, though a few were able to identify some specific ailments associated with red meat.

“Higher rate of cancer and heart disease. ... Yeah. There's that documentary. I just watched that ... 'What the Health,' it's called. It's a new one on Netflix ... and they said that it's -- people who eat more meat have a higher risk of cancer, heart disease. Yeah. I mean, there's definitely a lot of benefits to kind of not eating meat.”

- Server

When specifically prompted about whether they had heard of a link between eating meat and specific health issues, such as cancer, heart disease, or obesity, some respondents then remembered hearing about some links, especially with red meat, though many were skeptical. Most respondents, however, were still unaware.

“I think every -- it's everywhere. It doesn't -- everybody thinks that eating meat, it's higher -- and plus, you're grilling. Like, we do everything on the grill, so you got the carcinogens from grilling, which is -- I don't know how factual that is or not, but yeah. ... If you read all the tabloid stuff that -- yeah. It's definitely a relationship between red meats and all that.”

- Owner

2. Environmental problems

While some respondents were aware of adverse health outcomes associated with consuming meat, very few were aware of negative environmental impacts of meat production. When asked, most respondents simply indicated that they had not heard of any negative associations. If the respondent indicated that they had not heard of any adverse environmental effects, they were prompted with examples such as greenhouse gas emissions, pollution, water,

land use, etc. The prompts did result in some respondents indicating that they were somewhat familiar with the environmental issues, though their understanding seemed to be vague.

“Things like that, I am sure I have read an article that was talking about like carbon footprints and about the meat industry and like you said, the greenhouse gases and things like that, how much, you know, it can damage the atmosphere with everything, the processing of the meat to take it from cattle to your table.”

- Server

Despite a few people responding to the prompts, most people still indicated that they had not heard about the relationships. While most people simply stated that they were unaware, a few seemed very surprised and interested that meat production had negative environmental impacts.

“You are kidding. ... Wow. ... No, I had never heard that.”

- Owner

One person indicated that they had heard of the relationship, but did not believe that it was actually a problem, and another admitted that they did not really understand the implications.

“I don't believe any of it. [I've heard] that it's bad for the environment that the cows are bad for the environment and I'm, 'Really? They were here before us and they'll be here after us.'”

- Manager

XI. Changing behaviors

A. Encouraging meatless ordering

Respondents were reminded about some of the negative effects of a high-meat diet, including adverse health conditions and environmental impacts. They were then asked if they would ever consider encouraging people to reduce meat consumption, either by making personal suggestions or altering their menu. The majority of respondents indicated that they would not.

Some respondents explained their reasons. Many believed that customers had a right to eat what they wanted or that it was not the respondent's place to guide them. Others indicated that people should make healthy choices at home but enjoy their time in a restaurant. Still others simply did not think the customers would be receptive to the message, and again noted the particular demographics of the area. A few respondents, however, indicated that they might be open to some minor and subtle changes, starting with their specials menu, and one respondent even contemplated Meatless Monday.

"Yeah, I'm just trying to think. I don't know if I would alter my menu. I might alter my specials but maybe not my menu. ... Maybe flip them out. Instead of doing -- I can tell you probably our special every day has meat in it. So do like a Meatless Monday or something. That sounds kind of interesting to me. I love interesting ideas like to catch people's eye and things. Meatless Monday would be a really neat idea. And then someone says something to me I could say, well, did you know, and maybe kind of spread that word around a little bit. I would really love to do that."
- Owner

One owner described how she sometimes did alter customers' orders based on certain health conditions.

"Actually I do have quite a few customers who do go for physical therapy and do have sugar, diabetes, that are having heart problems. I actually monitor their menu. ... I have one customer that loves desserts. I won't give them to her. She still comes here every day. ... Some people I've switched to decaf, that used to drink regular. ... I have another customer, his sugar was through the roof, so I cut out his carbs and started giving him western omelets with egg beaters. ... So that's the kind of relationship that I have with them. You know, some people I give them one slice of toast instead of two. I've actually had wives that have called me and said 'Larry's sugar was <pause> you know, he can't have any carbs.' ... that's the relationship that I have here."
- Owner

However, she indicated that she would not encourage people to reduce meat consumption unless they asked for assistance. This may be because she did not have a strong understanding of the correlation between meat and certain health conditions like she did with the correlation between certain foods and other health conditions (such as diabetes and sugar).

B. Obstacles

Throughout the interviews, respondents volunteered potential obstacles with trying to encourage customers to order less meat. Later in the interviews, respondents were specifically asked to identify potential obstacles that they thought a restaurant might encounter if it tried to nudge customers away from meat.

1. Demographics

The most common obstacle noted was "demographics." Many respondents used the phrase "meat and potatoes" to describe the food preference of the people in the area and reported that most customers believed that meat was a very important part of a meal.

"And again, it comes back to the demographics here. ... You know, we're a very much a meat and potato kind of society."
- Server

While most respondents just cited "demographics" in general as the major obstacle, several did discuss more specific segments of the population that they felt would be resistant. The most commonly discussed group was the elderly, and they were frequently described as "set in their ways" and not open to change. Other groups specifically mentioned as not likely willing to eat less meat were farmers, truck drivers, and men.

"... in the mornings here, it's all the guys going to work. They want bacon, they want sausage."
- Owner

Several respondents indicated that tourists would likely be more open to trying new items, including meatless items. This indicated that most respondents did not think people, in general, were averse to change but thought that the local customers specifically were reluctant.

2. Eating out is a treat

A few respondents noted that eating out is a treat and that customers want to indulge at a restaurant and not be restricted.

“Well, it’s always nice to, I think, to encourage healthy eating, but I think sometimes people go to restaurants eat healthier at home. Come to a restaurant, I want the butter, I want cake, I want crap. Like, I go to restaurants, so I say, ‘I want that.’ I would never eat it normally, but I say, ‘I really feel like eating a pile of wings and this,’ and I think sometimes people go to restaurants to change and, ‘I want to get -- treat myself.’”

- Owner

3. Logistics

A few respondents mentioned logistics as a potential obstacle to encouraging meatless ordering. Some discussed the logistics of procuring and storing meatless ingredients, such as produce and seasonal vegetables. Others noted logistics with actually preparing meatless dishes, such as longer prep times for preparing salads. However, it should be noted that another respondent suggested that salads are quick and easy to make.

4. Past experiences

Many respondents discussed past attempts to add healthy or trendy items to their menu. One respondent discussed a failed attempt at Heart Healthy Monday, using ingredients like low-fat chicken and olive oil. Another discussed a failed attempt at using unique products, which resulted in expensive items going to waste. Some restaurants reported that they had tried meatless items, such as veggie burgers, which were likewise not particularly successful. Several respondents discussed past attempts to add gluten-free items to their menus. Most reported that there was little demand for the products and that it would spoil before they could use it. One restaurant, however, did note success with gluten-free items and expanded gluten-free offerings over time.

5. None

Only one person indicated that they did not think there would be any obstacles with trying to encourage people to eat less meat.

"I don't think there'd be any obstacles ... people don't pay attention, so they probably wouldn't even realize I was doing it."
- Server

C. Ideas to encourage less meat

Respondents were asked if they could think of anything that might be done to encourage people to order less meat in a restaurant. Suggestions included adding more meatless items to the menu, instituting Meatless Monday, presenting meatless options in an appetizing manner, putting meatless items on special, suggesting meatless specials to customers, following trends, and focusing on breakfast since people reportedly eat lighter at breakfast and heavier at lunch and dinner. Some respondents suggested capitalizing on trends set by chain restaurants.

"Wendy's and McDonald's -- if they're not selling it, people are not going to buy it. Like, I think strawberries went all-time high, 'cause Wendy's came out with a strawberry pecan salad. You know, like, 'Oh!' All of a sudden everyone and their mothers are getting strawberry salad. ... Kale all of a sudden was an 'in' item. Brussels sprouts were all of a sudden 'in.'"
- Owner

D. Evidence

Respondents were asked if there was any evidence they would consider helpful in deciding whether to implement any procedures intended to encourage ordering less meat. For the most part, respondents were not able to come up with much on their own. One person indicated that evidence of tainted meat would be informative, such as that of a recall. One respondent noted that they would be interested in any evidence that there was a trend in such

items and noted that if they saw the evidence in print, it may impact their decision. A few respondents noted that they would essentially produce their own evidence by testing meatless items on their specials menu before adding them to their regular menu.

XII. Restaurant roles and ethics

While the first part of the interviews focused on more factual questions or perceptions, the second half focused on the personal opinions of the respondents regarding roles and ethics. Specifically, respondents were asked to opine on a restaurant's ability to change eating habits and were also asked for their opinions on whether restaurants have an ethical responsibility to at least offer foods to meet dietary preferences and whether they have an ethical responsibility to encourage customers to order healthier or environmentally sustainable foods.

A. Restaurants' ability to change eating habits

Respondents were asked whether they believed that restaurants or people working in restaurants had the ability to change customers' eating habits. The vast majority believed that customers' eating habits could be changed. The most common way reported was through personal suggestions. Several respondents noted that servers could have a lot of influence over what customers choose to eat, simply by making suggestions. Another common response was that restaurants could change eating habits by changing what they offer. Some respondents discussed altering their regular menu or adding additional items to the specials board. Some specifically noted that meatless items already do well when they are on special.

"...with the veggie burger, the only really time we sell it is if it's on our special board or out on our big sign out front. ... Or we do have one salad that has fruit and when that's out on that board, we sell a bunch of it. ... And it's not on our menu at all. So people normally don't order it, but if they see it out there, they're, like, 'Oh, I love that,' and they get it."

- Server

Many respondents discussed trends, including mainstream “healthy” restaurant chains as well as certain food trends. For example, one respondent mentioned Subway Restaurant and Panera Bread and explained that their marketing has made healthier eating trendy and desirable. Other respondents suggested offering trendy foods and discussed particular foods that have become trendy and are suddenly in high demand.

“I do because people, in America anyway, people eat out so often. So, if there is a trend that’s out there, even like -- this is just a silly example but I don’t know if you watch ‘Modern Family’ but there is this whole episode with this wedge salad or whatever and just the way the restaurant was featuring it or whatever. And I mean, everybody -- for a while there, everybody was talking about wedge salads and it’s like ... [just a piece of iceberg] ... But it’s because it was deemed trendy then everybody wanted a wedge salad. Now all of a sudden it was cool. It’s just a salad, which is kind of a healthy thing but it was kind of neat that they got a healthy choice out there as being trendy as well but ... yeah, I think that restaurants can definitely play a part in that.”
- Manager

Several respondents noted that simply doing something well or providing a good product or overall experience could influence customers. One respondent thought that presenting something as healthy, and offering it at a low price, would encourage customers to order it. Only a very small number believed that customers’ eating habits could not be changed, citing that people are set in their ways or only go to restaurants that serve what they like.

B. Accommodating food preferences

Respondents were asked whether they believed that restaurants should offer options to meet specific dietary preferences. It was explained to all respondents that the important words were “offer” and “options.” In some cases, examples of some dietary preferences were given, such as vegetarian, gluten-free, low-fat, and low-sugar diets. In some cases, it was further explained that the question was asking whether it was “the right thing to do” or whether a

restaurant should just be selling what they think most people want and what makes the most profit.

Almost all respondents indicated that restaurants should offer such items. Most indicated that it was simply good for business, and many reiterated their desire to cater to customers and make them happy. Many of the respondents discussed their ability to provide specialty items upon request. Gluten-free was the most common example given. Some respondents discussed the desire to be more accommodating but explained the difficulties with certain types of accommodations. Many feared they could not safely cater to individuals with celiac disease or peanut allergies due to risks of cross-contamination.

Only a few respondents indicated that they did not think that restaurants should accommodate food preferences, noting that people should go to a restaurant that serves the type of food they want to eat. One respondent noted that a restaurant should not offer something unless they were very confident that they could prepare it quickly and safely. Specifically, she discussed the difficulty with gluten-free items.

“So I don't think that you should offer it unless you could do it the right way ... so it's a busy night and this woman came in and she brings me a pound of gluten-free pasta and she wanted me to cook it for her ... So I had to get a different pot, cook it in a different part of the kitchen, I had to start with fresh cold water, so of course it took longer and then she was mad ... Somebody else does bring their own bread ... So the girls have to stop, change their gloves, make a sandwich on the foil and send it out. So I just see too many areas where that could go bad.”
- Manager

C. Encouraging food ideals

Respondents were then asked for their thoughts on whether restaurants should encourage people to eat certain foods that are either better for the environment or better for customers' health. Most people indicated that they did not feel that it was the place of the

restaurant to encourage people to eat certain things. Some respondents indicated that they did not think it would be profitable. Based on such responses, it appears that some of the respondents may have been thinking about simply removing “bad” menu items and replacing them with “good” menu items, rather than encouraging them in other ways.

“I just really feel that’s not our job. Because if we don’t offer it, they’ll go somewhere else. I mean because the guy next door, the guy down the street is going to have what they’re looking for. If it’s -- I think we have to take responsibility for ourselves and if you want to eat a steak six nights a week and then have ground chuck for lunch five days a week you’re going to suffer the consequences.”

- Owner

Many respondents explained that they thought it would offend customers. Based on these responses, it appeared that many of the respondents were only thinking about making personal suggestions to individual customers. One respondent discussed the importance of approaching the matter in the correct manner. She noted that telling all customers about new healthy menu options would be acceptable but suggesting specific healthy items to a customer would not be acceptable. A few people, however, did indicate that they thought restaurants should encourage people and offered some practical suggestions.

“Make those options available, really. I recommend them, say, ‘try them for yourself’ if you really enjoyed one. That really does help, if you recommend something to someone, especially if they’ve never been there before. That really does help.”

- Server

D. Priorities

Respondents were then asked what they believed should be a restaurant’s priorities. If respondents had difficulty answering, then some examples were given such as making money, making people happy, giving customers what they want, or making customers healthy. If respondents did not mention profitability, then they were specifically asked how profitability factored into their priorities. The overwhelming majority of respondents reported some

variation of making the customer happy. This included putting the customer first, giving the customer what they wanted, making the customer happy, and giving the customer a good experience. Many mentioned that happy customers would come back and stressed the importance of repeat customers. A few respondents mentioned that keeping staff happy was also a priority. Several respondents reported that service was a priority, and a few noted food quality. Only one respondent stated that profitability was the top priority. Several mentioned money or profitability as a secondary priority but noted that making the customer happy was more important. Some explained that a happy customer was the key to profitability.

“Oh, it's an all-around question. You know, you start with the customer and make sure the customer's comfortable, happy to come back. You want your staff to be happy, presentable. You know, you want them to stay on and do the best they can, you know? And most of all, you want to be successful. And to be successful you have to have repeat clientele.”

- Owner

XIII. Additional findings of interest

Throughout the course of conducting the interviews, a few unanticipated topics of interest arose, which were then further explored.

A. Lent

The area where the restaurants are located is home to a large Roman Catholic population. Many members of the Catholic Church abstain from eating meat on Fridays during Lent and on Good Friday (as well as on Ash Wednesday). It should be noted that fish and seafood are not prohibited during Lent, and those items are a common substitute for the proscribed “meat” on such days. Throughout the interviews, many of the respondents commented on Lent unprompted, in relation to a myriad of topics, ranging from their meatless offerings to menu design. Restaurants made considerable menu alterations during Lent to cater

to the local clientele and appeared to increase their meatless offerings considerably. Several respondents noted that they offered more meatless specials during Lent and many of the Italian restaurants would make a special sauce during Lent to transform some of their regular pasta dishes into meatless dishes.

“...there’s a very big Catholic population here and Christian population, so during Lent and stuff we have to definitely make sure that we have a lot of meatless options. They’ll do meatless lasagna, because normally our lasagna has meat in it, and they’ll try and gear some specials towards, you know, not having meat... They make special marinaras during Lent that are meatless so they don’t have to worry about it.”

- Server

B. Gluten

Gluten was also a recurring theme through the interviews. Nearly all respondents mentioned gluten at some point during the interview, usually completely unprompted, in response to a wide variety of questions unrelated to gluten. When asked about meatless options, many respondents automatically discussed their gluten-free options or their attempts at adding gluten-free items to their menus. Some discussed their willingness to accommodate special requests for gluten-free and meatless, and one person mentioned that people are often willing to pay more for gluten-free or meatless items. Overall, most respondents were very familiar with gluten-free trends and had attempted to accommodate them, though success varied considerably among restaurants, with some reporting great success, and others reporting a lot of food waste.

“...when everybody went gluten-free I bought all kinds of gluten-free stuff and I ended up throwing it all away because no one ordered it and no one wanted it. And it all went in the freezer. And then it all got freezer burnt and I just had to throw it all away. The gluten-free did not go over well here.”

- Owner

When asked whether restaurants should attempt to accommodate or encourage certain diets, most respondents discussed gluten. The majority thought that such diets should be

offered but not encouraged. While many people believed that accommodating gluten was difficult, most agreed that it was a good business decision and should be offered simply to keep or attract customers.

"I think there definitely should be options, for sure. I think -- yeah. I think gluten-free is a big trend and whether you are or whether you're not I think it's not a bad -- I think if you're an Italian restaurant and by now if you don't have gluten-free pasta in my mind you're an idiot. I'm just going to throw that one out there right now. But, yeah, I think you definitely need to have options for it. I think it just would help you."

- Owner

C. Chain restaurants

Chain restaurants were mentioned by several respondents throughout the interviews. The focus of this research was non-chain restaurants, so no questions were asked about chain restaurants and no chain restaurant employees were interviewed. However, it became clear that chain restaurants influence independent restaurants and shape customer expectations. One restaurant owner admitted to borrowing ideas from chain restaurants when designing their menu layout. Chain restaurants were also mentioned as shaping people's eating habits. When asked whether restaurants can change the way people eat, one respondent noted that Subway and Panera made eating healthier popular. The most common area where respondents discussed chain restaurants was in menu development. Many respondents explained that chain restaurants spend a lot of money researching what customers want as well as setting food trends and advertising, so the smaller, independently owned restaurants just follow the lead of the chain restaurants.

“But, you know, like I said, Panera. You know, all those fast food places, and ... mid-scale restaurants and above who have a lot of money in marketing. That Southwest salad that is doing very, very well at Wendy’s, they are hyping it up for commercials and this is a very much copycat league. It’s follow that trend. Just got to make it better, you know, or put your twist on it. So if Wendy’s is selling a Southwest salad, I’m not saying I’m going to do it at the same time, but it sells for them. They wouldn’t have it on the menu if it didn’t work. That’s my philosophy. ... And they’ve done the research. ... I’m kind of just using, <laughs> yeah, in a weird way, using them.”
- Owner

DISCUSSION

I. Purpose and overall observations

The purpose of this research was to understand various aspects of rural restaurants with the ultimate goal of developing strategies to reduce meat consumption. The interviews uncovered a wealth of information ranging from respondents’ knowledge and attitudes regarding meat, how menus are developed, logistics of running a restaurant, profitability considerations, and respondents’ perceptions of customers. The information gleaned from the interviews was used to develop a series of steps and suggestions for encouraging rural restaurant owners and staff to nudge customers away from meat, which are discussed in the next section.

Much of the information gleaned from the interviews was consistent with the literature, though there were some differences. For example, the interview respondents shared many, but not all, opinions with the menu development and marketing executives from the 2007 study (Glanz et al., 2007). Specifically, when discussing priorities, both groups noted the importance of customer satisfaction as well as profits. Social responsibility was not much of a concern to either group. When discussing menu changes, the executives noted that attracting new customers was important, though this was not mentioned by the interview respondents, who appeared to cater to a regular base of customers. Both groups noted the importance of not

adding items that would be too complex for kitchen staff to prepare. About half of the executives offered healthy menus, while the majority of interview respondents did not, often because of failed past attempts. Both groups noted that most diners prefer to indulge when dining out, resulting in a low demand for healthy food options. The executives, but not the interview respondents, mentioned a concern of veto votes (one person vetoing a restaurant choice) due to lack of healthy options (Glanz et al., 2007).

While the executives were not asked specifically about meatless options, they were asked about healthy options, enabling some comparisons between the two groups. When asked about barriers to offering such items, both groups mentioned low demand, food waste, and lost profits. The executives further described inventory-related obstacles, such as short shelf life of produce, supply issues, high cost, and lack of storage space (Glanz et al., 2007). These may not have been issues for the interview respondents since many of them shopped locally and frequently for much of their inventory and did not rely exclusively on restaurant suppliers.

The executives were interested in research on customer demands, while the interview respondents seemed confident that they knew what their customers wanted. The difference may be explained by the fact that the executives were associated with restaurant chains while the interview respondents were associated with independently owned restaurants in a rural area. Chain restaurants must appeal to a broad base of customers, while the independently owned restaurants generally cater to locals. Similarly, the executives expressed an interest in hearing from trade groups, industry associations, and public health agencies about evidence of increased sales and profits of healthier menu items, along with working with them on healthier

menus and new recipes (Glanz et al., 2007). The interview respondents, in general, did not express such an interest. One exception, however, was that many interview respondents noted that they look to chain restaurants to keep up with trends, including trends in healthier foods.

There were also both similarities and differences between the literature and practices reported by the interview respondents in the menu development process. Regarding menu planning, both the literature and interview respondents noted that they must factor in costs, customer demographics (in particular, ages, economic situations, and eating habits), and food trends (Gentile, 2014; Kwong, 2005; Morrison, 1997; Ozdemir, 2012; Seyitoğlu, 2016). However, unlike the literature, the interview respondents did not mention things like the type of restaurant, kitchen tools, or competition with other restaurants (Gentile, 2014; Kwong, 2005; Morrison, 1997; Ozdemir, 2012; Seyitoğlu, 2016). It is possible, however, that these things are in fact considered, but on a more instinctual level, and were therefore not mentioned during the interviews.

Regarding menu pricing, most interview respondents agreed with the literature that food prices should be about one-third of the total price, but that variations were necessary, in part to meet customer pricing expectations (Kelly et al., 1994; López-Alt, 2016; Seyitoğlu, 2016). Unlike the literature, the interview respondents did not seem to partake in “decoy pricing” (Ozdemir, 2012; Rapp, 2009; Seyitoğlu, 2016; Shomaker, 1993). This may be due to lack of desire to manipulate customers or simply lack of knowledge of that pricing practice. While a few interview respondents did mention sending a message with the type of pricing (whole numbers, leader lines, etc.), most did not (Gromfin, 2014; Naipaul & Parsa, 2001; Schindler et al., 2011). Many interview respondents agreed with the literature that customers expect to pay

less for vegetarian items, though the literature indicated that vegetarian dishes are not always cheaper to prepare (López-Alt, 2016), while the interview respondents overwhelmingly reported that they were less expensive to prepare. The difference may be due to the type of ingredients they had in mind, or perhaps they were only considering the one-third food costs and not the two-thirds of overhead costs that are static.

Menu design generally showed the biggest difference between the literature and information reported by the interview respondents. The literature discussed four factors of menu design used to guide customers to certain choices (positions, descriptions, labels, and visual of menu items) (Ozdemir & Caliskan, 2015; Seyitoğlu, 2016). While three interview respondents mentioned using such techniques, the vast majority reported that their design was generally random aside from following the order in which one would eat a meal (such as appetizers, followed by salads, followed by entrées) or order of complexity of a dish (such as plain pasta, followed by spaghetti with meatballs, followed by lasagna) or what they thought looked good or fit on the page.

II. Steps and suggestions

An important first step in implementing strategies to reduce meat consumption in restaurants is to educate owners and staff about the tradeoffs of meat production and consumption and the benefits of a more plant-based diet. The next step is to discuss with owners and staff the upsides of discouraging customers from ordering a lot of meat. The third step is to develop a variety of interventions that restaurants can implement. The fourth step is to enable restaurants to implement the interventions. The final step is to incentivize restaurants to implement the interventions.

A. Step 1: Demonstrating the problems caused by meat production and consumption

The first and most pivotal step toward working with rural restaurants to encourage customers to order less meat is to educate the owners and staff about the drawbacks of meat production and consumption as well as the benefits of a more plant-based diet. Without a genuine understanding of the issues, owners and employees would have little reason to want to encourage customers to change. Most respondents were unaware of any adverse effects of meat production or consumption. Some respondents indicated a vague knowledge that too much red meat was unhealthy, but even those respondents were not able to articulate with specificity the actual adverse consequences associated with a high-meat diet. Furthermore, many of them indicated that they did not believe what they heard or did not think it was relevant to them or their customers. Even fewer respondents were aware of any adverse environmental impacts of meat production. Therefore, a crucial first step is educating those in the restaurant business about the adverse health and environmental impacts of meat consumption and production.

Most restaurant owners reported that the primary way that they keep up with restaurant trends and business practices is through print or online magazines. Many reported that they only read the free magazines provided by places like Sysco or that they subscribed to at food shows. Such magazines would be a good place to start educating owners about the negative health and environmental effects of high meat consumption (along with practical ways that restaurants can decrease meat consumption). One respondent even seemed surprised that he had not seen any articles about meat reduction campaigns in the restaurant magazines that he reads. To make the greatest impact, it would be best to have a series of articles across

several magazines, especially those that are free to restaurateurs. This would increase the chances of an owner seeing an article and repeat messaging would likely be more effective than a single article. Furthermore, dedicating entire issues of magazines to the benefits of plant-based diets or at least featuring such articles would have the biggest impact.

Educating staff may be more difficult, as they were less likely to report any type of continuing education. However, one server mentioned that she heard of Meatless Monday on Facebook, and it can be assumed that most people use some type of social media. Therefore, restaurant employees could be targeted with social media messages about the drawbacks of high meat consumption and production and the benefits of plant-based diets. Again, repeated messaging would have the most significant effect, so advertising across platforms and repeating the messages would likely be the most effective.

Meat reduction campaigns, such as Meatless Monday and Reducetarian, were almost unheard of by the owners and staff interviewed. Campaigns of this type could make an effort to target rural restaurants, resulting in more education to both owners and staff about the drawbacks of meat production and consumption and the benefits of plant-based diets. These campaigns would also offer the added benefit of providing restaurants with meatless recipes and providing a simple ready-made starting point for encouraging less meat consumption among customers.

B. Step 2: Discussing with owners the benefits of discouraging customers from ordering a lot of meat

When asked during the interviews whether respondents would encourage customers to eat less meat, most indicated that they would not. Many reported that they did not feel it was

their place to tell people what to eat, some worried about offending customers, and others felt that people should enjoy a restaurant meal and save healthy eating for home. Indeed, many respondents also described a very caring relationship with their customers and indicated that the customers were like family members. For those respondents, simply understanding the deleterious health effects of a high-meat diet, through the education proposed in step 1, might be enough to convince them that they should encourage customers to order less meat.

Most respondents, however, seemed to think that encouraging customers to eat less meat translated into outright telling them they should order a salad instead of what they wanted to order. For those who felt it was not their place to tell customers what to eat, as well as those who were afraid of offending customers, a better understanding of subtle nudge techniques, and applying them to all customers equally, might help persuade them of the potential to implement these suggestions while preserving the ethical integrity of their relationship with their customers.

For those who thought that restaurants were a place to experience enjoyment and not eat healthfully, an introduction to various hearty and delicious meatless options might help. Many respondents had a very narrow view of meatless items and tended to think about little more than salads and veggie burgers. This was true even when there were other meatless items on their menus, such as various pastas and breakfast items. Reminding them about some of the other popular items that happen to be meatless, as well as introducing them to new meatless items, might make them view meatless options as enjoyable and worthy of the restaurant experience.

C. Step 3: Developing appropriate interventions

The interviews revealed a considerable amount of information useful in developing interventions that would be appropriate and acceptable to this demographic. There are many interventions that could be implemented, either alone or in combination, that should be acceptable to this population. Options include adding meatless items to the daily specials, implementing a weekly theme featuring a meatless item, capitalizing on trendy foods that are meatless, implementing a variety of menu revisions, suggestive selling, and experimenting with meatless items during Lent.

1. Daily specials

Daily specials are very important to restaurants and a great place to start with an intervention. All of the brick-and-mortar restaurants offered daily specials, and in many cases, they were showcased on giant display boards and acted as a focal point of the restaurant. Respondents reported that customers frequently ordered the daily specials, and there were even reports that meatless items from the regular menu sold with greater frequency when they were put on the specials menu. When asked about possible interventions, some respondents even suggested adding meatless items to the daily specials. This is also an intuitive place to intervene because many restaurants use daily specials to test new products before adding them to the regular menu. In some cases, this is done when the supplier offers a new product and in other cases, it is done simply to try a new recipe. Thus, adding some meatless options to the daily specials is a great way for a restaurant to encourage customers to order something meatless.

Adding meatless items to the daily specials might be the easiest intervention to implement since owners and cooks are comfortable changing their specials and are used to experimenting with new options on the specials menu. In addition, since the specials menu appears to be the gateway to the regular menu in most of the restaurants studied, any meatless items that do well might have a chance at making it to the regular menu. For these reasons, adding meatless items to the daily specials may be the intervention most acceptable to owners.

2. Weekly promotions

Similar to daily specials, some restaurants had either recurring alliterative weekly specials similar to “Spaghetti Sunday” or simply recurring theme nights like “Steak Night” on the same night each week. Additional recurring weekly specials could be created to promote meatless items. This particular geographic area has large Polish, Italian, and Irish communities, which would lend themselves to pierogi nights, pasta nights (serving meatless varieties of pasta dishes), and nights dedicated to various dishes featuring potatoes (such as potato cakes). Weekly specials or themes could be applied to breakfast and lunch as well as dinner. Alliterative themes such as “Waffle Wednesday” or “Spaghetti Sunday” might make the themes more fun and memorable.

In addition to steering people toward these specific meatless options, simply having these themes might encourage people to go to the restaurant when they otherwise would not. One of the respondents admitted that his wing night was not particularly profitable in and of itself since the wings were sold so inexpensively, but he reported that he made up for the loss by getting more people in the door who would order the more profitable items. Therefore, such

themes have the potential to increase overall business, giving owners another reason to agree to implement them.

3. Food trends

Several respondents mentioned food trends and the importance of keeping up with trends and offering trendy foods. Importantly, most of the trendy food items noted were meatless, such as tater tots, kale, Brussels sprouts, quinoa, sriracha, and wedge salads. These foods are often quite profitable, as noted by one respondent who laughed about adults wanting tater tots and calling them “a very profitable item.” To that end, restaurants could focus on the trendy meatless items, adding them to either the regular menu or the specials menu. These items are already widely accepted by customers, who would likely order them and not even think of them as meatless. Many of these items would make great starters and sides, but with some creativity, they could be adapted to main courses as well, especially in combination with each other or other meatless items.

Similarly, many respondents noted that chain restaurants set expectations and found it beneficial to follow their lead and offer products similar to those the chain restaurants have already researched and are advertising. In many cases, respondents noted that they do not offer the exact same product but something similar that is reminiscent of chain restaurants’ offerings. If a chain restaurant popularizes a particular dish, then an independent restaurant can make a meatless version and still capitalize on the research and advertising of the chain restaurants. For example, one respondent mentioned the popularity of Wendy’s Strawberry Fields Salad. Wendy’s version contains chicken, but an independent restaurant could offer a

similar but meatless version. Furthermore, showing owners meatless offerings from chain restaurants might make them more open to offering similar meatless items.

Finally, respondents also noted that customers were interested in gluten-free options as well as options that they perceived as healthy and fresh. Restaurants could capitalize on these trends by offering items that are both gluten-free and meatless to entice customers primarily looking for gluten-free items or offering items with healthy and fresh-sounding names that are also meatless.

4. Menu revisions

A few respondents reported that they designed their menu with the idea of attracting customers to certain items, either through their own research or through a menu design program they received from their food supplier, Sysco. The vast majority of respondents, however, did not design their menus this way. In addition, most respondents admitted that their menus were overdue for revisions but that they lacked the time or resources to make new menus.

There are many ways that the menus could be redesigned to encourage customers to order less meat. Some examples include positioning and highlighting, increasing quantity, enhancing the descriptions, lowering the prices, making meatless options defaults, and normalizing meatless options.

First, rearranging the menu to put the most popular meatless items in prime locations could encourage more people to order them. Indeed, studies have shown that customers tend to order the first one or two and last one or two items in each section of a menu (Dayan & Bar-Hillel, 2011; Kurz, 2018; Ozdemir & Caliskan, 2015; Rapp, 2009). Studies have also shown that

highlighting certain items increases the frequency with which they are ordered, so various forms of highlighting could be used on some of the meatless items (Choi et al., 2010; Gromfin, 2014; Guéguen et al., 2012; Hensdill, 1998; Rapp, 2009; Saulais et al., 2019; Seyitoğlu, 2016). Examples could include boxes around those items or calling them “chef’s choice” or “featured item.” Respondents overwhelmingly indicated that meatless items were more profitable than meat-based items, so this type of menu design should be acceptable to both owners who do not use any of these positioning and highlighting techniques, as well as owners who already do use some of these techniques to encourage customers to order more profitable items.

Second, most respondents reported that they have very few meatless options on their menu, and as a result, simply increasing the overall number of options could increase the chances of a customer ordering a meatless item. Having more options increases the chance that a customer will find something appealing. Just as importantly, having more meatless options would make the meatless items seem more normal, thereby making people more comfortable ordering one of the meatless options. Increasing the number of vegetarian meals offered in three University of Cambridge cafeterias increased the number of meatless meals ordered (Garnett et al., 2019). This finding is supported by the behavioral economics concept of “status quo bias,” which means that people have a strong tendency to stick with the current state of affairs or to purposefully make the same choices as others (Thaler & Sunstein, 2008). Thus, if meatless items are featured or highlighted, they should not be labeled as “meatless” or “vegetarian” but should instead be labeled as “seasonal favorite” or “chef’s choice” or something similar. Likewise, any enhanced titles or descriptions should avoid using “meatless” or “vegetarian” and instead focus on terms like “fresh” or “hearty” or “crispy.”

Third, adding a few adjectives to make new or existing meatless items more interesting or nostalgic or provide a more detailed flavor description could draw customers to the items. Indeed, past work shows that simply giving items more descriptive names (Lockyer, 2006; Wansink et al., 2001; Wansink et al., 2005) or more elaborate or appealing descriptions (McCall & Lynn, 2008; Shoemaker et al., 2005) encourages people to order them. For example, grilled cheese and tomato soup could be called “Grandma’s Old Fashioned Grilled Cheese and Tomato Soup” and be accompanied by a description such as “Thickly sliced sourdough bread filled with Vermont sharp cheddar cheese and grilled to a golden brown, served with a bowl of piping hot, creamy tomato soup.”

Fourth, several respondents reported that local customers were very cost-conscious, and thus, pricing the meatless items below the meat-based items might encourage many customers to order the inexpensive meatless options. One respondent noted that many local customers, especially elderly customers, gravitate to a very low-priced all-inclusive breakfast special. Restaurants could make specials like these meatless using common items like pancakes, waffles, oatmeal, or eggs. A similar approach could be taken with lunch or dinner specials. Respondents overwhelmingly reported that meatless items were less expensive to prepare than meat-based items, and those meatless items were more profitable, so restaurants should be able to price the meatless items lower than meat-based items without sacrificing profits.

Finally, because many of the defaults likely include meat, based on the assumption of what customers want, restaurants could change some of their meat defaults to meatless defaults in an attempt to encourage less meat consumption. This is supported by the behavioral economics concept of the default preference, which is a subset of the status quo bias.

According to the default preference, people tend to choose default options, even when better or more attractive options are available (Downs et al., 2009). Several restaurants have reported success encouraging children to order healthier sides and drinks by replacing fries and soda with fruit and milk or juice (Anzman-Frasca et al., 2015; Peters et al., 2015). Therefore, restaurants could change some of their defaults to be meatless while still offering meat options for no extra charge.

5. Suggestive selling

Most respondents believed that servers could have a significant influence over what customers order. There were mixed reports on whether servers actually tried to influence customers, but most respondents believed that servers could sway customers if they tried. Therefore, servers could be instructed to nudge customers toward meatless options. There are a variety of ways a server could do this. If a customer asked for a suggestion, a server could suggest a meatless option. If there are new meatless items on the menu, a server could tell returning customers that there are new menu items and direct their attention to them. When presenting meatless specials, a server could enthusiastically describe the meatless specials, making them sound extra appealing. A server could also tell customers that the chef recommends a particular special that happens to be meatless.

6. Lent

The interviews occurred in a cluster of small towns with a large Roman Catholic population that observes Lent. Many respondents mentioned Lent during the interviews since restaurants in this area usually have a special menu on Fridays during Lent. While fish and seafood dishes are often the featured Lenten specials, some respondents did mention that they

have a variety of meatless offerings, including options that are free of fish and seafood. Lent provides a unique and exceptional opportunity for restaurants in this cluster of small towns to introduce customers to meatless options at a time when they are receptive to a meatless meal. Restaurants could be encouraged to offer more completely meatless options, as opposed to mostly fish and seafood options. This would likely be more profitable and would offer a way to test new meatless dishes. If any of the meatless Lent options are particularly popular, restaurants could be encouraged to add them to their daily specials to see if their popularity continues beyond Lent.

D. Step 4: Enabling owners and staff to implement changes

Even if owners and staff want to encourage customers to order less meat and are willing to implement suitable interventions, they might not be equipped with the knowledge or skills to do so. Offering some practical training to both owners and staff could facilitate the implementation of meat reduction efforts.

For example, while not a commonly reported issue, it is possible that owners or kitchen staff simply do not know how to cook many meatless items or lack the knowledge to create meatless recipes - obstacles that could be overcome with some targeted training. Owners and chefs could be taught new recipes that have broad appeal and are not stereotypically “vegetarian.” Examples might include items such as mushroom risotto, stuffed shells, and three-bean chili. To aid in that training, recipes should focus on ingredients that the restaurant already stocks. Cooks would already be familiar with and comfortable working with such ingredients, and the owner would not have to invest in ingredients that may not sell. Furthermore, recipes should focus on shelf-stable ingredients, such as pastas, grains, and

beans, and minimize the use of highly perishable items, especially if such perishable are not already procured by the restaurant. This will reduce the risk of food spoilage and lost profits.

In addition to simply teaching discrete meatless recipes, the cooks could also be taught some basic techniques and food swaps. For example, they could be given some basic lessons on working with various meatless staples, such as grains and legumes as well as fresh fruits and vegetables. They could also be taught how to modify their current recipes to be meatless, with just a few substitutions. For example, meat fillings in ravioli could be replaced with cheese, spinach, or even sweet potato fillings. Similarly, the chicken or beef in tacos could be replaced with fajita vegetables and black beans. Again, much of this could utilize existing inventory, ensuring that the chefs are comfortable working with the ingredients. The use of familiar items may also encourage customers to try the new creations since they will not be completely unfamiliar.

E. Step 5: Incentivizing owners and staff to institute changes

Despite all the above steps, owners and staff may still be reluctant to institute changes. Owners might still be worried about losing money, servers may still fear alienating customers, and cooks might still be concerned about additional work involved in creating and preparing new recipes. Some may simply not want to invest the time or energy required to do something new. If the restaurant is doing well, owners may not see any reason to change anything, even if they understand the health and environmental impacts of a high-meat diet. Servers and cooks may not see any reason to add to their workload if they do not benefit personally. Implementing some small perks might give owners and staff enough incentive to coax them to

try some of the interventions. The present research points to several possibilities to incentivize owners and staff.

1. Friendly competitions among staff

Respondents believed that servers could be extremely influential when it comes to customers' orders, but that many simply chose not to try. One manager reported that when the chef wants a particular item to be sold, they institute a little competition among the wait staff to see who can sell the most of that item. They keep track of how many each server sold that night and they have a little fun in the process. The manager reported that this is successful, and usually results in the item being sold with greater frequency. Similar competitions could be implemented to encourage servers to sell meatless specials or any meatless items. There could be an actual tangible prize or simply bragging rights. There could be separate contests each night and/or a cumulative contest over time. Simply providing a little incentive and making it fun may encourage servers to participate and may even make their shifts more enjoyable.

A similar tactic could be employed with chefs. In restaurants with multiple chefs, each chef could be tasked with creating meatless dishes, and there could be contests to see which dishes are the most popular with customers or with other staff members. There could be multiple variations of the contests, such as using certain ingredients or creating the lowest cost dish. Again, there could be an actual prize or just bragging rights among staff. Alternatively, the winner could have their name featured on the menu as the creator of the dish.

2. Financial incentives for owners

First, most of the owners interviewed reported that they did not change their menu as often as they should, apparently due to a lack of time and resources, as new menus require

printing costs and possible design costs. Thus, offering to design and print new menus for free, in exchange for implementing some of the menu design strategies discussed in step 3, might be an attractive incentive for owners. Most owners did not place much importance on the design or layout of the menu, so they likely would not care if meatless items were moved to the first or final few spots on the menu or if meatless items were highlighted. Conversely, most owners were quite concerned that their menus had not been updated recently. Therefore, this trade could be an attractive option for some owners.

Second, most of the participating restaurants did not use much technology, and offering technical assistance could aid in their ability to offer meatless items. Indeed, very few had websites for their restaurants and most did not use a point-of-sale system for taking orders. Owners noted that websites were expensive to build and maintain because they require paying a web designer to build and update the site and require paying a monthly fee to host the site. Restaurants could be offered free website design and maintenance in exchange for implementing some of the interventions discussed in step 3. For example, the website could feature the daily specials and the weekly themes discussed previously, in exchange for the restaurant adding a certain number of meatless specials and the weekly meatless themes. Relatedly, many restaurants used paper tickets instead of point-of-sale systems. This made it impossible for most of the restaurants to track how many of each item they were selling and also made it more difficult and time-consuming to reconcile tickets at the end of the night. Modern point-of-sale systems require little more than an iPad and some software. Owners could be offered the infrastructure and training in exchange for implementing some of the

items in step 3, such as adding more meatless items to the regular menu or the specials menu. This would also enable owners to track whether the meatless items were selling and profitable.

Third, the biggest incentive for owners may be increased profits. Respondents overwhelmingly reported that meatless items were significantly more profitable than meat-based items, yet they did not have many meatless items on their menus. This is likely because they did not believe that meatless items would sell. Reminding owners that an increase in sales of meatless items would mean more profits (coupled with help implementing some of the techniques to sell more meatless items and track how many are sold) might convince owners to try some of the interventions.

Finally, offering some “insurance” against losses may be helpful. Many of the respondents noted prior attempts at offering gluten-free options and the corresponding loss of revenue when food spoiled. Purchasing the initial inventory of food for the restaurants or offering to reimburse for spoiled food, might incentivize owners to add meatless items.

III. Strengths and Limitations

The strengths of this research include its qualitative design intended to collect information that could not be obtained through quantitative research. Specifically, in-depth interviews offer the potential to understand aspects of menu development and personal attitudes and beliefs that could not be obtained from surveys or observations.

One limitation of the study is the lack of generalizability outside of the specific geographic region. However, the purpose of this formative research is in part to gain a thorough understanding of rural restaurant stakeholders in this particular geographic region and in part to design a study best suited to this particular geographic area. Therefore, while the

results may or may not be the same as they would be in a different location, that is not the objective of this study. Another limitation is the lack of reliability as a result of omitting a second coder. It was determined, however, that the benefits of single coding, including the ability to code on a deeper, more nuanced level, outweighed the potential drawbacks of single coding. Finally, there is the possibility that the results were influenced by my personal biases about excessive meat consumption.

IV. Conclusion

The purpose of this research was to understand various aspects of rural restaurants with the goal of developing strategies to reduce meat consumption. The interviews uncovered a wealth of useful information regarding knowledge and attitudes regarding meat, menu development, logistics of running a restaurant, profitability considerations, and perceptions of customers. Following these interviews, five steps and suggestions for encouraging rural restaurant owners and staff to nudge customers away from meat were developed. These steps included: (1) educating owners and staff about the tradeoffs of meat production and consumption and the benefits of a more plant-based diet; (2) discussing with owners and staff the upsides of discouraging customers from ordering a lot of meat; (3) developing a variety of interventions that restaurants can implement; (4) enabling restaurants to implement the interventions; and (5) incentivizing restaurants to implement the interventions.

MANUSCRIPT 2 - A Quantitative Analysis of the Relationship Between the Percentage of Meatless Items Offered on a Specials Menu and Meatless Purchases

ABSTRACT

The study investigated the relationship between the percentage of meatless items offered on a restaurant's specials menu and the likelihood that an item ordered was meatless. This was assessed via a hierarchical mixed linear regression model, where the percentage of meatless items offered was the independent variable, and the outcome was whether the item purchased was meatless. A level 2 random effect of "meal ticket" was also included in the analysis to account for the nested structure of groups of people ordering together. Analyses were conducted separately for main dishes and side dishes. For main dishes, the results indicated that the percentage of meatless specials offered predicted the likelihood of an individual purchasing a meatless food item, $B = .00169$, $p < .001$. For example, if a menu has five total main dish specials, one of which is meatless, changing the menu to two meatless main dishes (and thus increasing the total percentage points of meatless main dishes from 20% to 40%) would increase the likelihood that a single main dish ordered was meatless by about 3.38%. Similar results, however, were not obtained for the analysis focusing specifically on side dishes, $B = .00012$, $p > .05$.

INTRODUCTION

As described in the main introduction, excessive meat consumption and large-scale meat production contribute to public health problems and experts have advised decreasing such consumption and production. Furthermore, as described in the main introduction,

restaurants are a potentially good place to implement interventions designed to encourage a more plant-based diet.

While there are a variety of ways that restaurants could encourage customers to order more plant-based options and less meat, one simple way is to increase the percentage of meatless options on the specials menu. Providing more meatless options increases the chances that customers will find a satisfactory meatless option and it may also make meatless eating seem more normal and acceptable. Adding them to the specials menu may draw more attention to them and has the added benefit of allowing the restaurant to offer them without any long term commitment or the need for menu revisions.

Previous studies testing whether designating meatless items as the “dish of the day” have had mixed results. In a self-serve café-style living lab (a restaurant set up specifically to test subjects) in France, customers were more likely to choose the vegetarian option if it was noted as the “dish of the day” (Saulais et al., 2019). Similar studies, by contrast, in Denmark schools and senior centers (where subjects were between 13 and 17 years old and between 65 and 89 years old, respectively) found that subjects were not more likely to choose the vegetarian dish of the day (dos Santos et al., 2018). Likewise, a similar study of seniors (ages 65 years old and older) in various setting in Denmark, France, Italy, and the United Kingdom also found that labeling the vegetarian choice as the “dish of day” did not result in increased ordering of that dish (Zhou et al., 2019).

Studies in three University of Cambridge cafeterias showed that increasing the number of vegetarian meals offered increased the number of meatless meals ordered. This held true for both observational studies using the meals already chosen by the cafeteria, as well as an

experimental study where the vegetarian choices were doubled (increased from one offering to two offerings) (Garnett et al., 2019).

METHODS

Purpose

The purpose of aim 2 was to develop and test an intervention designed to encourage meatless eating by altering the choice architecture (menus) where customers choose their meals. The study design was shaped by the information gathered during 20 in-depth interviews conducted pursuant to aim 1. In this way, the intervention takes into consideration the needs and beliefs of restaurant owners and staff in this geographic area, making it more likely to be an intervention that restaurants may consider implementing in the longer term. While there are a variety of options for altering the choice architecture with the goal of reducing meat consumption, this particular study design was chosen due to the likelihood that it would be acceptable to restaurant owners whose cooperation is required for real-world implementation.

Restaurant setting

The study occurred at an independently owned bar/restaurant in a rural Pennsylvania town. The restaurant was chosen because it served a relatively large number of customers, offered an “American” menu similar to other restaurants in the area, and used a point-of-sale system for recording orders.

The restaurant served two “meal services” per day (lunch and dinner) and was open seven days a week in the summer and six days a week in the winter (closed Mondays). Typical cuisine included sandwiches, burgers, wings, pasta, seafood, prime rib, veal, and steaks. The owner reported that approximately 100 to 175 customers were served each day and customers

were mostly locals in the winter and a mix of locals and vacationers from New York in the summer. Since the focus of the study was rural restaurants and rural customers, the data were collected in the late winter and early spring to prevent large numbers of summer tourists from affecting the outcome.

Menu structure

The food offerings were presented in two menus.

First, a static, 11-page “regular menu” that offered the same food items for each meal service. This menu offered approximately 150 items and was arranged into six broad categories, including appetizers, soups & salads, sandwiches & burgers, extras, kid’s meals, and dinner entrees, which were only available during the dinner service. As shown in Table 2.1, 13% of the items offered on the regular menu were meatless, including 10% of the main dishes and 23% of the side dishes.

Second, a changing, single-page “specials menu” that offered different food items for each daily meal service (e.g., Tuesday lunch, Friday dinner, etc.). The percentage of meatless items offered on the specials menu was the study’s key independent variable. As shown in Table 2.1, between 0 and 44.5% of the overall specials were meatless, with an average of 19.8%. Between 0 and 42.9% (average 9.7%) of the main dishes were meatless and between 0 and 80.0% (average 31.5%) of the side dishes were meatless. The lunch specials menu was generally arranged into three categories (soups, appetizers, and “sammies & such”) and the dinner specials menu was generally arranged into four categories (soups, appetizers, “sammies & such,” and entrées). Occasionally, the specials menus included an additional category for a salad special or a side special. Sample dinner specials menus are shown in Figure 2.1.

Furthermore, both the regular menu and the dinner specials menu also included a repeating weekly theme or “featured special” (e.g., Tuesday Steak Night), all of which were meat-based.

Data collection

As shown in Table 2.2, data from 134 meal services (including 64 daily lunch specials and 70 daily dinner specials) were collected from February 17, 2019 through May 23, 2019. A few meal services were missing when the owner forgot to save the specials sheets, though there is no reason to believe that the excluded meal services were meaningfully different from those that were included.

Customers’ orders were taken at their tables using an iPad which was part of a centralized point-of-sale system. The point-of-sale system created a “ticket” for each table containing all items that customers ordered. A technical glitch occurred in 14 tickets, making them impossible to access, so these data were removed from the study. In total, 8,671 food items purchased were analyzed from 3,102 meal tickets.

If a ticket was time-stamped after midnight, but before 8:00 am, the date was changed to the previous day so that it would count with the correct day’s service. Dinner service generally began at 5:00 pm, so tickets opened before 5:00 pm were designated as lunch tickets and those opened at or after 5:00 pm were designated as dinner tickets. Sometimes, however, dinner specials were offered earlier, so if the first dinner special was ordered before 5:00 pm, then all tickets from the time the first dinner special was ordered would be designated as dinner tickets.

Study variables

Percentage of meatless specials offered. The key independent variables were (a) the percentage of meatless main dishes and (b) the percentage of meatless side dishes offered on the daily specials menus for each meal service.

Defining meatless. Each item on the daily lunch and dinner specials menus was designated as either “meat” or “meatless.” There is no standard definition of “meat” or “meatless,” and the literature contains many different definitions. Some define “meat” as “red meat” while putting “poultry” and “fish and seafood” into separate categories (Stahler, 2015; Thomson Reuters & National Public Radio, 2012), others include “poultry” in the definition of “meat” but excluded “fish and seafood” (Satija et al., 2017), while others consider all three to be meat (Neff et al., 2018). Furthermore, respondents interviewed pursuant to aim 1 had similarly diverse understandings of “meat” and “meatless.”

For the purpose of aim 2, specials containing any flesh (including red meat, poultry, fish, or seafood) were generally designated as “meat” while specials containing no flesh were designated as “meatless.” Animal products such as dairy or eggs did not count as meat.

Additional classification considerations were as follows: First, toppings could turn an otherwise meatless dish into a meat dish. For example, adding bacon to a grilled cheese sandwich makes it a meat item. The only exception is fries with gravy, which were categorized as meatless. Second, if an individual menu item included a choice of two or more options, the two or more options were counted as separate items. For example, “French Bread Pizza – Choice of Sausage, Meatball, or Plain” was counted as three specials - two meat specials and one meatless special. Third, if a customer ordered an otherwise meatless dinner entree with a

meat-based soup, the meal would still count as a meatless meal. This is because soups and salads were only recorded if they were ordered a la carte, whereas soups and salads that came with an entrée were not recorded.⁵

Whether item ordered was meatless. The dependent variable was whether an item ordered was meat or meatless. The following rules were applied when determining which items were “recorded” as food items to be analyzed. First, drinks and desserts were not included. Second, condiments, toppings, and dressings, such as sour cream or cheese, were considered “garnishes” and were not included. By contrast, stand-alone items such as apple sauce and coleslaw were considered “side items” and included if ordered a la carte, but not if they came with a meal (see Table 2.3). For example, sandwiches from the regular menu did not come with fries, but many customers ordered fries to go with their sandwiches. In these cases, the fries were recorded as a separate (meatless) food item. However, sandwich specials generally came with fries (see Figure 2.1), so those fries were not recorded as a separate food item. Third, when a customer ordered a soup du jour, the ticket did not specify which soup du jour was ordered. Therefore, if both meat and meatless soups du jour were offered during the same meal service, all soups du jour ordered were designed as “unknown” instead of “meat” or “meatless” and ultimately dropped from the analysis.

Main dishes vs. side dishes. On both the regular and specials menus, all sandwiches and entrées (including kid’s meals) were designated as “main dishes” while all other items, such as

⁵ Since the overall goal is to *reduce* meat consumption, and not to banish meat altogether, the small amount of meat that may be present in a cup of soup would not, in my opinion, justify classifying an otherwise meatless meal as a meat meal. For example, if a customer ordered a vegetarian lasagna entrée and chose a cup of chicken noodle soup as the accompaniment, the few bits of chicken in the soup should not be considered significant enough to reclassify the otherwise meatless meal into a meat meal.

soups & salads, appetizers, and extras were designated as “side dishes.” Furthermore, all weekly “featured specials” were designated as “main dishes” except for Thursday’s clam special, which was designated as a “side dish,” since customers typically ordered the weekly clam special as an appetizer.

DATA ANALYSIS

The study hypothesis was that the larger the percentage of meatless items offered on the specials menu, the more likely an item ordered would be meatless. This hypothesis was investigated separately for main dishes and for side dishes, for three key reasons. First, it is most theoretically compelling to hypothesize that altering the offerings of side dishes would primarily affect side dishes, while altering the offerings of main dishes would primarily affect main dishes. Second, this would allow a cleaner analysis where only side (or main) dishes offered would be considered when analyzing side (or main) dishes ordered. Finally, if the results are substantially different between side items and main items, the separation will help restaurants decide where to focus menu alterations.

To test this hypothesis, a hierarchical mixed linear regression model was used, with estimates generated through a mixed-method maximum likelihood procedure. The outcome was whether the item purchased was meatless, and percentage of meatless items offered was the independent variable. A level 2 random effect of “meal ticket” was also included to account for the nested structure of groups of people ordering together. (There was no nesting of food items within individuals, because individual identifiers were not captured by the POS system.) The analysis was run separately for main dishes and for side dishes. Data analysis was completed using STATA.

RESULTS

For main dishes, the results indicated that the percentage of meatless specials offered predicted the likelihood of an individual purchasing a meatless food item, $B = .00169$ (see Table 2.4). This means that for every one percentage point increase in meatless main dish specials offered, the likelihood of a main dish ordered being meatless increased by .169%. From the perspective of the restaurant, suppose a menu had five total main dish specials, one of which was meatless. In this case, changing the menu to two meatless main dishes (and thus increasing the total percentage points of meatless main dishes from 20% to 40%) would increase the likelihood that a single main dish ordered was meatless by about 3.38%. Therefore, if a restaurant serves 200 meals per day, adding a single meatless main dish can theoretically switch 6.76 main dishes per day from meat to meatless, resulting in approximately 2467 fewer meat dishes per year. Similar results, however, were not obtained for the analysis focusing specifically on side dishes, $B = .00012$ (see Table 2.5).⁶

⁶ I also ran robustness tests. First, I ran similar regressions that utilized an independent variable representing whether one or more meatless options were offered on the menu (rather than the *percentage* of meatless options variable, used in the original regression). The results were similar to those of the original analysis. For main dishes, having at least one meatless main dish on the specials menu significantly increased the likelihood that a main dish ordered was meatless. For side dishes, having at least one meatless side dish on the specials menu did *not* significantly increase the likelihood that a side dish ordered was meatless.

Second, I ran an analysis that statistically controlled for the day of week. This model used Sunday as the reference group, and thus included five dummy variables to account for different days of the week (Tuesday, Wednesday, Thursday, Friday, and Saturday). A dummy variable for Monday was not included because the restaurant was closed on Mondays. This also yielded a similar analysis as the original, for both mains and sides. While controlling for these variables, there was a significant effect for mains but not for sides.

Third, I ran an analysis examining an outcome measure corresponding to the *percentage* of meatless items ordered on each *ticket* (rather than whether an individual *item* was meatless). So, for example, if a meal ticket contained ten main dishes, and three of those main dishes were meatless, then this variable would indicate that 30% of the main dishes on the ticket were meatless. Again, the results yielded similar findings to the original analysis. For main dishes, increasing the percentage of meatless main dishes offered on the specials menu increased the percentage of meatless main dishes ordered on a ticket. For side dishes, increasing the percentage of meatless side dishes offered on the specials menu did *not* increase the percentage of meatless side dishes ordered on a ticket.

DISCUSSION

Broadly speaking, the results indicate that increasing the percentage of meatless food items offered on specials menus may be an effective means for encouraging customers to purchase meatless items. However, using a specials menu to encourage meatless ordering may only be effective with main dishes and not side dishes.

The present results cannot conclusively determine why increasing the percentage of meatless main dishes is more effective than manipulating that of side dishes. However, there are several possible explanations.

First, it may be that cultural norms surrounding meatless sides overpowered any presentation effects. That is, with many main dishes, it is culturally normative to order a particular side dish, and usually these specific side dishes are meatless. For example, people who order a sandwich or hamburger normatively order a side of fries to go with it. Indeed, many popular side dishes are meatless, such as fries, mozzarella sticks, and salads. This may be due to the fact that meatless sides offer an inexpensive addition to a meal that is ornate and visually appealing, while serving as a cost-effective caloric filler. Thus, offering additional (or fewer) meatless side specials may not have sufficiently altered preferences for meat or meatless sides.

A second possible explanation for why the effect was seen among main dishes but not side dishes is that there were far more meatless side dishes than meatless main dishes on the regular menu. The proportion of meatless to meat *side* dishes was much greater than the proportion of meatless to meat *main* dishes on the regular menu, so more meatless dishes on the specials menu may have had a lesser impact for side dishes than for main dishes. In other

words, there were already so many meatless side dishes to choose from on the regular menu, that adding a few more on the specials menu did not increase the *overall* percentage of meatless side dishes much, yet there were so few meatless main dishes on the regular menu that adding a few more did increase the *overall* percentage of meatless main dishes considerably.

Finally, a third possible reason entails the particular research decisions that were made in classifying meat and meatless dishes - and these decisions may have impacted side dishes more than main dishes. For example, side dishes included soups, and on days when both meat and meatless soups du jour were offered, it was impossible to tell whether a customer ordered a meat soup du jour or a meatless soup du jour, so many of these food items were excluded from analysis. Furthermore, garnishes, the majority of which were meatless, were excluded from the analysis. If they had been included, they would have all been categorized as “side dishes” and increased the overall number of meatless side dishes ordered. Finally, items such as fries and vegetables were only included in the analysis if they were ordered a la carte, and not if they came with a meal. All sandwich specials came with fries so all of those (meatless) fries were excluded and all entrees came with a (meatless) starch and/or vegetable, all of which were excluded. If the fries and other sides had been included in the analysis, the overall number of meatless side dishes ordered would be higher. Thus, if different decisions had been made and different criteria implemented, it is possible that the relationship between X (percentage of meatless side dishes offered) and Y (whether a side dish ordered was meatless) would increase.

Implications of the study

While other studies have manipulated menus in an attempt to decrease meat consumption, this study only altered the specials menu, and did not require any changes to the regular menu. Changing the regular menu is a considerable undertaking for a restaurant, requiring significant time and money for design services and printing. On the contrary, specials menus are smaller, simpler, and change daily, so no additional time or expense is required to change the specials menus. Thus, while restaurants may be unwilling or unable to implement an intervention that requires changes to their regular menu, they may be willing and able to implement one that only changes the specials menu, thus enhancing the real-world practicality of the study.

Furthermore, this study took place in an actual restaurant and used the restaurant's menu and the customer's orders. Other studies utilized restaurant simulations, presenting online participants with hypothetical menus and asking them to imagine what they would order. In such studies, the attitude-behavior gap may prevent customers from accurately predicting what they would actually order. Participants may be influenced by demand characteristics, such as ordering what they think the researchers want them to order or what is healthier. In addition, participants who are not in an actual restaurant setting are not impacted by the myriad of other forces affecting their decision, such as hunger, the smell of food cooking, the choices of others, the suggestions of servers, the cost of the meal, etc. Finally, simulations often use an abbreviated menu, which may exclude the actual items that a customer would order if presented with a full menu. Other studies occurred in a restaurant-type setting, but they were often set in non-commercial food service establishments, such as university dining halls or senior centers, and the subjects were likewise university students or senior citizens.

Such non-commercial food establishments may differ in important ways from restaurants and the patrons may not order the same as restaurant customers. For these reasons, using actual restaurant data from non-university restaurants enhances the external validity of the findings.

Neither wait-staff nor customers were aware that the data from their orders would later be analyzed for a study. This prevents customers from being influenced by the Hawthorn effect and altering their orders and it also prevents wait-staff from either intentionally or unintentionally steering customers to a particular choice due to the study.

Another strength of the study is the relatively long data collection time frame. The data were collected over three and a half months, minimizing the likelihood that the results would be biased by a coincidental event, such as a food-born illness outbreak. Other studies occurring during a single meal service or over a few days may be affected by external events that alter people's ordering habits short-term.

The results of the study could be used on many levels to incentivize restaurants to encourage less meat consumption. Note that during the aim 1 interviews, owners and staff overwhelmingly reported that meatless items are generally more profitable than meat items. However, they also tended to believe that customers were not interested in ordering meatless items. The results of this study, therefore, could encourage restaurant owners to offer more meatless specials, especially if they are reminded that meatless dishes tend to be more profitable. Environmental or health organizations interested in reducing meat production and consumption could work with restaurants and use the results to show them that this simple intervention has been effective. They could also incentivize restaurants further, such as by providing the ingredients for the additional meatless specials for a period of time. Companies

with an interest in reducing their environmental impact, and that have an in-house restaurant, could require the restaurant to increase the percentage of meatless specials. Those that hire outside companies could put such a requirement in their institutional food service procurement contracts. Cities or towns could offer a variety of incentives to restaurants that implement the intervention. Examples might include tax incentives, food service or catering contracts, free advertising in city publications, etc. Finally, the results are also useful because they suggest that the focus should probably be on main dishes instead of side dishes, although further research to confirm this would be helpful.

Caveats and future directions

The present work is not without caveats. First, while the study was a quasi-experimental field study that looked at a real restaurant's data, there was no random assignment or control group. Therefore, even though there are few compelling theoretical reasons that could explain the relationship between the independent and dependent variables, it is nevertheless possible that some confounding variable is responsible for the relationship between the two variables. Future studies could build on the present work by administering a similar design in a true experimental format.

Second, the present research occurred in a rural Pennsylvanian restaurant, and so it is unclear to what extent these findings would replicate in other geographic or cultural regions. For example, it is uncertain if the results would be generalizable to restaurants in other rural areas, or to suburban and metropolitan areas, because it is not known for certain whether they have the same views on meatless eating. Based on the literature, it appears that meat is a central part of most American diets, however meat consumption is highest in rural areas.

Future research could compare the outcomes of similar interventions implemented in other rural areas as well as in suburban and urban restaurants. The specific menu offerings, however, may need to be tailored to meet the expectations of the local clientele. Similarly, the study occurred in a mid-size, American, casual, full-service restaurant, so it is unknown whether the results would be generalizable to other types of restaurants, such as smaller or larger restaurants, ethnic restaurants, fast-food or fast-casual restaurants, formal dining restaurants, or restaurants with different relationships with customers. Future research could compare the outcomes of similar interventions implemented across a broad spectrum of restaurants.

Third, the study did not differentiate among types of meat or compare the effects of offering different types of meat. For example, the study did not look at whether offering more poultry options would reduce the consumption of red and processed meat in favor of poultry, or whether offering more seafood options would reduce the consumption of terrestrial animals in favor of seafood. This may be an important distinction since red and processed meat is considered more of a health risk than other types of meat, and cattle have the largest environmental impact. Furthermore, seafood is generally considered a healthy protein alternative, and while it does have environmental concerns, they are generally less than those of terrestrial animals. Similarly, the study did not differentiate between plant-based meatless items and animal-product meatless options. For example, items containing eggs and dairy were considered meatless, even though they may have similar health and environmental concerns as meat-based items.

Finally, data were collected from mid-February until the day before Memorial Day weekend in 2019. Those dates were chosen with the intent of excluding tourists who frequent

the area in the summer, however, despite these attempts, non-rural visitors may have dined at the restaurant during the study period, leading to data from customers that are not rural inhabitants. Since the data were collected prior to the COVID-19 pandemic, there may have been shifts in impact during and after the outbreak. For example, people may have become more comfortable cooking at home during the pandemic and will not return to restaurants with pre-pandemic frequency. It is also possible that people began eating less meat during the pandemic due to an increased focus on health and mortality, fear of zoonotic diseases, or other reasons. Furthermore, rising food prices in 2022 could impact customer behavior, driving them to eat at home or order less expensive items, which may be meatless.

In summary, the present research indicates that increasing the percentage of meatless food items offered on specials menus has the potential to encourage customers to purchase meatless items. Granted, using a specials menu to encourage meatless ordering may only be effective with main dishes and not side dishes, though this is an avenue of potential future research.

MANUSCRIPT 3 - An Ethical Analysis of Meat Reduction Approaches in Restaurants

ABSTRACT

This paper discusses the public health issues associated with both excessive meat consumption and large-scale meat production and contemplates restaurants as a place for interventions designed to discourage meat consumption. It provides an overview of ethical and political concepts, such as liberty, the harm principle, and autonomous decision making, and applies them to various types of potential interventions – namely education, nudges, incentives, and restrictions. Each type of intervention is deemed ethically acceptable, though on comparison, nudging – and specifically nudging by increasing meatless menu options – is determined to be the most ethically acceptable intervention.

INTRODUCTION

This manuscript discusses the public health issues associated with both excessive meat consumption and large-scale meat production and contemplates restaurants as a place for interventions designed to discourage meat consumption. It considers the overall ethical implications of interventions designed to reduce meat consumption in restaurants, examines specific ethical issues associated with particular types of interventions, and compares the appropriateness of various possible interventions.

It is important to note that public health is concerned with the health of *populations* and therefore the ethical implications differ from those of medical or individual health ethics. When considering medical ethics, autonomy is often the focal point, since it is generally accepted that competent adults have the right to make their own informed decisions regarding their health and medical treatments. With public health, by contrast, the focus often shifts to societal

benefits and limits on liberty, which are frequently justified by the collective benefit to society of liberty-limiting public health interventions. A classic example is quarantine laws that restrict the liberty of a few for the benefit of the rest of society during an infectious disease outbreak. Another example is laws preventing people from driving under the influence of alcohol, because preventing the risk of injury or death to others outweighs an individual's freedom to drink and then drive.

During health emergencies, or when innocent people are put in clear and immediate risk, government interventions and their associated infringements on personal freedom are important, generally well-accepted, and legally grounded in the government's police powers to protect all members of society. The appropriateness of such interventions, however, is less clear and more controversial when there is no discrete or imminent health emergency such as a disease outbreak or when there is seemingly little direct risk to others.

Meat consumption/production and public health

As described in the main introduction, both excessive meat consumption as well as large-scale meat production can lead to negative public health outcomes. Overconsumption of meat, especially red and processed meat, can cause chronic and other health conditions while large-scale production of meat has negative public health implications ranging from infectious diseases, to occupational hazards, to climate change.⁷ While both meat consumption and meat production have serious public health ramifications, the specific type of health issues differ

⁷ Large-scale meat production also has important animal welfare concerns. Current industrialized animal production methods cause serious mental and physical suffering for the animals. While such issues are important and should be considered in their own right, they are beyond the scope of this research paper which focuses on public health consequences of animal production and consumption.

between the two. Furthermore, the ability of consumers to avoid the negative consequences differs significantly between the two sources.

Meat consumption – health effects

As described in detail in the main introduction, overconsumption of meat, especially red and processed meat, can lead to numerous chronic health conditions such as cardiovascular disease (Mozaffarian, 2016), diabetes (Mozaffarian, 2016), and certain cancers (Bouvard et al., 2015; International Agency for Research on Cancer, 2015). While less problematic, even poultry and fish may carry certain risks. Studies are mixed on whether excessive poultry consumption increases the risk chronic diseases such as cardiovascular disease and diabetes (Mozaffarian, 2016), and there is some evidence that arsenic-based poultry drugs and synthetic estrogen in poultry feed may result in elevated arsenic blood levels (Lasky et al., 2004; Nigra et al., 2017) and earlier age of menarche (Moslehi et al., 2021; Wu et al., 2021), respectively. Fish, while generally considered beneficial, is often contaminated with heavy metals (Ali & Khan, 2018), polychlorinated biphenyls (PCBs) (Megson et al., 2022), and microplastics (Li et al., 2021; Smith et al., 2018; Vital et al., 2021). One study found a 74% increased risk of myeloid leukemia among participants with the highest levels of fish consumption, which the authors hypothesize may be attributed to one or more of these contaminants (Sergentanis et al., 2019). Finally, individuals following a plant-based diet are at reduced risk for certain health conditions, such as ischemic heart disease, type 2 diabetes, hypertension, certain types of cancer, and obesity (Melina et al., 2016).

The U.S. Department of Agriculture recommends that adults on a 2000 calorie diet consume approximately 5.5 total oz of protein per day, including meats, other animal proteins,

and vegetable proteins (U.S. Department of Agriculture, 2020). It is estimated, however, that Americans actually consume between 6.2 and 7.6 oz of protein per day, including 4.4 to 5.9 oz from meat (Fehrenbach et al., 2015).

Meat consumption – decision making and societal impact

Meat consumption is largely a personal decision and the direct physical effects on the body are only realized by the person consuming it. Most adults decide for themselves whether and how much meat to consume and the chronic conditions associated with excessive meat consumption affect the health of the individual and no one else. Thus, without a more nuanced analysis, it appears that meat consumption has little or no societal impact.

Upon closer analysis, however, there are some caveats that should be considered. First, decisions about food choice may not be as straightforward as they seem, as there are numerous internal and external influences affecting decisions. These range from advertising to placement to the sheer availability (or lack thereof) of food choices. Second, while the most obvious negative effects of meat consumption are to the health of the individual consuming it, similar to other “lifestyle” diseases, there are impacts on society such as an overburdened healthcare system, increased taxes (to pay for Medicaid, Medicare, disability benefits, etc.), increased insurance premiums, and absences from work.

Meat production – health effects

As described in detail in the main introduction, large-scale meat production contributes to public health problems. The replacement of traditional farms and wild fishing with CAFOs and aquaculture along with the replacement of traditional animal husbandry and fishing practices with mechanizations and drugs, has led to a myriad of public health issues. Examples

include the proliferation and spread of pathogens and infectious diseases, antibiotic resistance, occupational risks, community health issues, and environmental issues including pollution, habitat destruction, and climate change (which in turn leads to further public health issues).

Meat production – decision making and societal impact

While consuming meat has direct health effects only on the people who eat it, consumption-required production has significant additional health effects on both the people who consume meat as well as those who do not. Even individuals who choose to eat a completely vegan diet are negatively affected by meat production. Animal producers have made the decision to use hormones, vaccines, and antibiotics, to confine animals indoors, and to pollute the air and water, leading to the myriad of public health issues noted above. These decisions were not made by individual consumers, yet the far-reaching negative health effects of meat production affect nearly everyone to some degree, and certain people to a large degree. Everyone suffers from the proliferation of infectious diseases and antibiotic resistance and the long-term health consequences of climate change. Farm workers and their families fall victim to the dangerous and toxic conditions of the farms. Entire neighborhoods surrounding the operations are at an acute risk of both physical and mental conditions directly related to the operations.

Aside from the health consequences, society suffers in other ways. The costs of many of the negative effects of this mechanized system are not borne by the producers but are instead passed on to society in the form of pollution, lower property values near CAFOs, medical bills for chronic or infectious diseases, higher taxes to pay for abatement of CAFO contamination or medical care, etc. (Osterberg & Wallinga, 2004; Walker et al., 2005).

Role of restaurants

As discussed in the main intervention, interventions to reduce meat consumption (and ultimately the demand for meat production) can target many points along the supply chain from the farm to the consumer, but one particularly notable place to implement an intervention is at the restaurant level. Restaurants are a good place to target for several reasons. American adults consume about 23% of their calories in restaurants (Lin & Mentzer Morrison, 2012) and consumers may be more willing or able to make a change at a restaurant than they would be at home. An individual can try a new dish in a restaurant without learning new recipes, without changing their grocery purchases, and without worrying that their families will object, and skilled chefs may be better able to prepare meatless dishes than a less experienced home cook. Moreover, restaurants can profit from either meat or meatless dishes, so interventions at the restaurant level can be done without a loss of revenue to the restaurant. In fact, throughout the interviews conducted pursuant to aim 1, respondents generally reported that meatless items were more profitable than meat items. Finally, restaurants normalize food choices and are a good place for people to get used to meatless dishes and begin seeing them as normal and viable meals.

Interventions in restaurants may result in some degree of infringement on restaurant owners and their liberty to decide what to offer to their customers and how to offer it. That said, restaurants, like all businesses, have a certain degree of corporate responsibility and are already required to follow a number of regulations for the goal of public health, including safe food handling practices, providing nutritional information, and the prohibition on serving certain potentially infectious or toxic foods such as raw milk, undercooked meat, and pufferfish.

Furthermore, even before the national ban on trans fats, many jurisdictions prohibited their sale in restaurants due to the long-term risk of cardiovascular disease. In addition, some foods, such as beluga caviar, shark fins, and horse and dog meat are banned from restaurants strictly because of environmental or moral concerns, even though they pose little or no health risk. For these reasons, among others discussed later, it is appropriate to require restaurant owners to implement certain interventions for the benefit of public health, including interventions designed to reduce meat consumption. As the face of the food industry, I would argue that they have a moral obligation to teach consumers how to eat better and to enable them to do so.

ETHICAL AND POLITICAL CONCEPTS

Liberty

The primary consideration when contemplating public health interventions is their effect on *liberty*. Liberty – also known as personal freedom – is essentially the absence of legal coercion or the right of an individual to do as she pleases without restrictions or interference from a third party or the government. Liberty is considered one of the most important rights of a free society and people highly value the ability to freely do what they want to do. Liberty is a negative right, meaning it is a right of non-interference as opposed to a positive right or a right of positive provision.

In general, negative rights impose on others *only* the duty to not interfere with a person's ability to act as they wish. In other words, other people are not allowed to block the actor. Positive rights, by contrast, impose on others a duty to act in a certain way such as providing something to the actor. Liberty is a negative right in that it only imposes upon others

the duty not to block the actor in his pursuits – it does not impose on others a duty to actively help the actor achieve them.

In a liberal society, negative rights tend to be rights of noninterference by the government, such as the right to free speech, the right to bear arms, and the freedom of assembly. Citizens are free to speak, own guns, and assemble, without being blocked from doing so by the government. Positive rights, by contrast, are particular entitlements created by the government that obligate the government to provide something for citizens, such as rights created under the Americans with Disabilities Act that require public buildings to have accessible points of entry and elevators.

There is frequently a struggle between individual liberty and public health interventions since the interests of the health of groups, communities, and the public at large may come into conflict with individuals exercising their rights to act as they choose. While liberty is very important, so too is promoting the public's health, and a balance must be struck. The government can indeed limit individual liberty for the benefit of public health through states' "police powers" and the federal government's powers under the commerce clause, and enact coercive laws for the public good, including public health and safety. Well known examples include quarantine laws and mandatory vaccination laws (American Bar Association, 2021).

Political and legal philosopher Joel Feinberg identified ten liberty-limiting principles on which governments may rely to justify restrictions on liberty. Two of those principles – harm to others and harm to self – are of particular relevance to the analysis of this paper (Feinberg, 1984a).

I. Harm to others

One of the most widely accepted reasons for restricting liberty is the “harm principle,” under which liberty-limiting interventions are justified when the purpose is to prevent harm to others. The harm principle was first described by 19th century philosopher John Stuart Mill, who proffered that “the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others” (Mill, 2002). The harm principle has become a widely accepted basis for restricting individuals’ liberty, as people generally see that, on balance, it is more important to protect innocent individuals (“others”) from the dangerous behavior of people who are participating in potentially harm-producing activities (“actors”), than it is to protect the liberty of those actors to continue participating in the potentially harm-producing activity. In other words, people tend to give greater weight to the rights of “others” to be free from the risks posed by “actors,” than they do to the rights of those “actors” to be free to participate in behavior that may harm “others.”

Feinberg further identifies three categories of harm to others. The first involves actions that, if carried out, *will* produce direct and serious harm to individuals or groups. These include actions such as murder, assault, burglary, fraud, etc. Policies to limit such actions are rarely controversial and are in fact expected of governments by most citizens. The second involves actions that create an unreasonable *risk* of harm to other persons. These include actions such as reckless driving and reckless discharge of a weapon. While such actions are not intended to cause harm, and may not cause harm, the risk that a harm will occur is high enough to warrant a liberty-limiting policy against such actions. The third involves actions that may harm *society*. These are actions that rarely cause clear and substantial harm to any specific person or group,

but can harm entities like the public, the state, neighborhoods, the environment, etc. Such harms may be less obvious and are generally more distal than the clear and proximate harms or risks of harms of the first two categories. Examples include failure to pay taxes or any activity that creates negative externalities such as pollution, increased taxes, or a strain on shared resources (Feinberg, 1984b).

There are many examples of liberty-limitations in public health policy that are justified under the harm principle. Laws proscribing rape, murder, and battery are examples of liberty-limiting laws that prevent direct and serious harm to individuals. Prohibiting driving while under the influence of alcohol limits a driver's liberty to drink and drive to protect other people from the risk of harm posed by a drunk driver. Similarly, mandatory quarantine laws limit the freedom of certain sick or exposed individuals to interact with others as they please, to protect other people from the risk of infection. Furthermore, smoking bans limit the liberty of smokers to smoke in bars and restaurants to protect employees from the risks associated with second-hand smoke. There are also plenty of liberty-limiting policies that are justified by preventing harm to society. Individual health insurance mandates (no longer required at the federal level, but still required in some states) are justified by the harm to society of having a segment of the population uninsured, and the associated costs to taxpayers.

II. Harm to self

Preventing harm to self is a more controversial reason for limiting individual freedom. Harm to self occurs when the actions of the actor produce harm only to the actor instead of to others. This is a more difficult reason for justifying limiting liberty than harm to others, since only the actor is being protected, and to many people it seems like the choice of whether to risk

harm to self should be solely with the actor and not the government. Furthermore, it may be argued that the necessary harm that comes simply from restricting an actor's liberty would outweigh the actual harm that may come from the actor's actions (Feinberg, 1971). Enacting such liberty-limiting policies is called "legal paternalism" since the government is essentially acting as a parent figure, coercing the actor to do what the government believes is best for the actor (Feinberg, 1984b). In reality, most actions have some impact and effects on others, so harm to self is rarely the only justification required for limiting an actor's liberty.

While legal paternalism is much more difficult to justify than the harm principle, there are still a variety of justifications for it (Feinberg, 1973). The justifications depend on whether the legal paternalism qualifies as "hard paternalism" or "soft paternalism." Hard paternalism is an interference with dangerous behavior that is wholly voluntary, while soft paternalism is an interference with dangerous behavior only when that behavior is essentially nonvoluntary or uninformed (Barnhill, 2015). Soft paternalism and voluntariness will be discussed in more detail later as it relates to autonomy.

One justification for hard paternalism is that harms should be prevented, regardless of who might be harmed, and that the actor is just as worthy of protection as others (Feinberg, 1971). Another is that certain harms (such as death or serious bodily injury) are so harmful they should be prevented whenever possible. Soft paternalism is sometimes justified as not being paternalism at all, since the actor is not really acting of his own accord and therefore, his true desires are not being thwarted. Reasons for this lack of voluntariness might include coercion, mistake, and incapacity, which precludes the actor from making a truly autonomous decision.

A classic example of hard legal paternalism is mandatory helmet laws requiring motorcycle operators to wear a helmet, to prevent them from harming themselves in the event of a collision. Another is mandatory seat-belt laws requiring occupants of a vehicle to wear a seatbelt to prevent them from harming themselves in the event of a traffic accident. While such laws are largely to prevent harm to the actor, they are often also enacted to prevent harm to society or the risk of harm to others. Traffic injuries can result in an overburdened medical system, increased insurance rates, and higher taxes to pay for Medicare or Medicaid funded medical bills. Furthermore, unbelted drivers and passengers can injure others. Since unbelted occupants can essentially become projectiles in the event of a crash, belted drivers and passengers are more likely to die from an automobile accident if other occupants in the car are unbelted. Furthermore, drivers who are unbelted and in an accident are more likely to lose control of the vehicle, increasing the risk of injury or death to passengers, other motorists, and pedestrians (Cummings & Rivara, 2004; Ichikawa et al., 2002). Other examples of hard legal paternalism include laws against self-destructive actions such as suicide, indentured servitude, or voluntary imprisonment (Feinberg, 1971).

Examples of soft legal paternalism may include requirements for consumer cooling off periods as well as policies intended to nudge people in certain directions without removing choices. For example, some countries have made organ donation an opt-out choice rather than an opt-in choice and some cities have dictated that Happy Meals cannot include toys unless the accompanying food meets certain nutritional standards.

According to Feinberg, when paternalistic interventions are contemplated, several considerations must be taken into account to assure that there is a good justification for the

infringement on liberty. These include: (1) the likelihood that harm will occur; (2) the seriousness of that harm; (3) the likelihood that the intervention will be effective; (4) the importance of achieving the desired outcome; and (5) the necessity of the behavior in question and whether there are reasonable alternatives available (Feinberg, 1973). Using an example from above, seatbelt laws arguably meet these requirements. Serious bodily harm or death to unbelted drivers and passengers is likely in the case of an accident, mandatory seat belt laws are proven to be effective at increasing usage and reducing traffic fatalities, and there is little need to drive or ride in a car without wearing a seatbelt. The importance of reducing traffic related morbidity and mortality is largely a matter of opinion, but since we are talking about life and death, there is good reason to consider the outcome of reducing injuries and deaths as important.

In the context of food choices, people generally enjoy the liberty of eating whatever they choose without restrictions. There are, however, some liberty-restricting policies that hinder what people can consume, such as bans on trans fats, and licensing and inspection requirements for public food establishments.

The direct health impacts of consuming certain unhealthy or dangerous foods are generally limited to the actor, so most policies are legal paternalism intended to protect the consumer from harming himself. Many are simply hard legal paternalism intended to limit the liberty of a citizen for his own good, regardless of his wishes. Others may be considered soft paternalism, under the assumption that the consumer does not understand the risks associated with the behavior and would not choose those foods if he or she understood the risks. There are, in addition, a variety of negative societal impacts that come from having an unhealthy

population with an abundance of diet-related chronic diseases, such as an overburdened health care system, increased insurance premiums, and the need for the government to fund much of the burden through Medicare and Medicaid, so many policies are also justified under the harm principle as being harmful to society. Finally, in some circumstances, a first party is prevented from providing a certain unhealthy or dangerous food to a second party, so it could be argued that such policies limit the liberty of the first party under the harm principle rather than limit the liberty of the second party via legal paternalism.

As an illustration, most states prohibit the sale of unpasteurized (“raw”) milk, due to the high risk of serious illness from pathogens (and on a federal level, its sale across state lines is prohibited). This is obviously legal paternalism, as it is intended to protect consumers from what the government feels is an unreasonable risk. It may be considered hard paternalism if the consumer understands the risks involved and would still choose to consume the raw milk despite the risks, or it might be considered soft paternalism if the consumer does not truly understand the risks of drinking raw milk, overestimates the nutritional degradation of pasteurization, or simply does not pay enough attention to make an informed decision at all and buys the raw milk because of superior advertising or current trends. Furthermore, such regulations may also be justified under the harm principle. Foodborne outbreaks can affect society in a number of ways. An acute outbreak can overwhelm local hospitals, reduce a necessary workforce, and increase Medicare and Medicaid spending. Foodborne illnesses can also physically harm others. Some foodborne infections that can be transmitted by raw milk, such as *Cryptosporidium*, *Salmonella*, and *E. coli*, are contagious and have the potential to infect and sicken people who did not consume raw milk but came into contact with someone who did. In addition, the

restrictions on raw milk are almost always a restriction on the sale of such milk, and not the actual consumption. Many states forbid the sale of raw milk to others, but specify that cow owners (including cow-share owners) are permitted to obtain the milk of their own cows (Farm-To-Consumer Legal Defense Fund, 2010-2022; National Conference of State Legislatures, 2016), further strengthening the argument that the laws are consumer protection laws intended to prevent harm to others, and not legal paternalism intended to prevent harm to self.

Autonomy

Another important concept, briefly mentioned earlier, is the ethical principle of *autonomy*. Autonomy essentially means self-governance, directing one's own actions, or making decisions for oneself. To make a truly autonomous decision, a person must genuinely be directing his or her own actions, meaning he or she has accurate information necessary to make an educated decision, the mental capacity to understand the situation, and be free from controlling influences (which, according to some ethicists, can include outside influences as well as cognitive biases). In the context of food, an example of autonomous decision making is making an informed decision about what to eat based on accurate information about the health effects and without a controlling influence forcing a different decision. An infringement on autonomy would be when advertisers trick consumers into believing that an unhealthy snack is actually healthy, and the consumer chooses to eat it because they thought it was healthy or when a parent "forces" a child to eat their vegetables.

While autonomous decision making is generally discussed in the context of medical decision making, it also has a place in public health policy. Autonomous decision making requires three things. First, it requires the *information* necessary to make an informed decision.

In the traditional medical context, this would mean the patient must have information on the risks, benefits, and alternatives to the medical procedure they are contemplating. In a food-related public health context, this could mean that the person must have information on the potential health benefits, the potential harms, and alternatives to the food at issue. It may also mean that the person must have information on the negative environmental impact of producing that food. Second, autonomous decision making requires that the person not only have the information, but that she *understands* the information. In a medical context, this means that a doctor cannot simply tell the patient the risks, benefits, and alternatives, but that the doctor must also take steps to assure that the patient actually understands the information. In a food-related public health context, this might mean that providing calories or other information may not be sufficient if the consumer does not understand the implications of that information. Third, autonomous decision making requires that the subject be free from controlling influences. In a medical context, this would mean that the patient is not being influenced by the doctor, family members, or societal norms to make a decision contrary to what she really desires. In a food-related public health context, there are many potential influences that may sway a consumer's choice, ranging from pressure from others, to a variety of cognitive biases, to the presentation of food choices. These possibilities will be discussed in greater detail later in this paper.

As noted above, autonomy is an ethics principle that assures that a person is making an informed decision, based on their own values and desires. It may be described as "free will." Liberty, on the other hand, is a commitment in liberal political systems that assures that a person is not prevented from acting as they please. It is a legal or political concept and

expressed as freedom to act without interference from a third party. To illustrate the differences, let us consider two examples – one from the traditional medical context and one from a food-related public health context: (1) a terminally ill cancer patient whose chemotherapy treatments have thus far failed and (2) a consumer contemplating the purchase of raw milk.

Let us start with the cancer patient. To make an autonomous decision about future treatments, the patient should have all of the risk, benefits, and alternatives to continued chemotherapy treatment explained to her, the doctor should assure that she understands the information, and the decision on how to proceed should be left to the patient. For example, the patient can make the decision to continue chemotherapy, discontinue treatment, or possibly choose a different treatment option. This decision is the patient's decision to make.

Liberty allows the patient to act on that decision. If the patient chooses chemotherapy, she will be at liberty to proceed with chemotherapy. If the patient chooses to discontinue treatment, she will be at liberty to stop treatments. If the patient chooses to switch to another treatment suggested by the doctor, she will be at liberty to receive the other treatment.

It is sometimes the case, however, that a person may make a genuinely autonomous decision, but not be afforded the liberty to act upon it. Similarly, a person may have the liberty to act on a decision that was not autonomously made. To illustrate the former, the patient may decide, after considering all of the information, that she would like to proceed with assisted suicide. This would be her autonomous decision. The law, however, may prevent her from proceeding with her wishes. This would be an infringement on her liberty in the form of hard legal paternalism. In this case, she made an autonomous decision, but was unable to carry it

out due to a limitation on her freedom. To illustrate the latter, suppose the survival rates for chemotherapy and radiation were the same, but the doctor wanted her to proceed with chemotherapy, so he led her to believe the prognosis for chemotherapy was better than that of radiation. If the patient decides to continue with chemotherapy, then she is at liberty to continue with chemotherapy, but did not make an autonomous decision to do so, since her decision was based on misleading information from the doctor.

Now let us consider the raw milk customer. To make an autonomous decision about whether to consume raw milk, the consumer must be aware of the risks, benefits, and alternatives of consuming unpasteurized milk. Assuming the customer is aware of and understands the risks, benefits, and alternatives, if he decides to consume the milk, he has made an autonomous decision to do so. In a few states, the customer would enjoy the liberty of walking into a retail store and purchasing raw milk (albeit with a warning label). In this situation, he is both making an autonomous decision to consume the milk and enjoying the liberty to purchase it. In most states, however, the customer would not have this liberty, and would not be able to purchase raw milk at a retail store. In that situation, the person had the autonomy to choose to consume raw milk, but did not have the liberty to purchase it. It should be noted, however, that the consumer's liberty to *drink* raw milk is not violated, only his liberty to *purchase* it at a retail store. Most states allow a person to consume raw milk from a cow they own, and many states allow raw milk to be purchased at farms, even if such sales are prohibited at retail locations (Farm-To-Consumer Legal Defense Fund, 2010-2022; National Conference of State Legislatures, 2016).

It may also be the case that the consumer lives in a state where raw milk sales are allowed at retail stores, and he makes the decision to purchase raw milk under the mistaken belief that it is far superior to pasteurized milk and that any illnesses caused from the milk will be mild and boost his immune system. In this scenario, he had the liberty to purchase raw milk, but did not make a genuinely autonomous choice to do so, since his decision was based on misinformation.

There are a variety of ways that autonomy can be infringed, including persuasion, manipulation, and coercion. While each of these is a distinct concept, the particular category in which an intervention falls can sometimes be debatable. Furthermore, it can sometimes be unclear when a certain action crosses the line from one category to another. This can be problematic when a particular intervention starts out in an ethically acceptable category but changes to some degree and ends up in a different, unacceptable, category.

Persuasion is an active attempt to convince someone to change their behavior or beliefs. Persuasion *may* be considered an infringement on autonomous decision making since the intent is to make someone do something that they did not originally want to do – to change their mind or change their previously made autonomous decision. In our raw milk example, an example of persuasion may be a poster in the dairy section of a supermarket in a state that allows retail sales, that shows a hospitalized child with the caption “raw milk – is it worth the risk?” This may be considered an infringement on autonomy because it does more than simply provide information on the dangers – it uses imagery and fear to attempt to change someone’s decision.

Manipulation is an attempt to change someone's behavior through trickery, deceit, or other dishonest tactics. Manipulation undermines autonomy because the subject is no longer able to make an informed choice, due to the misinformation. In our milk scenario, examples of manipulation might be removing labels so that consumers do not realize they are consuming raw milk, or overstating the nutritional benefits of raw milk, which convinces a person to choose raw milk over pasteurized milk.

Finally, coercion is an attempt to change someone's behavior through some sort of force or threat. In our raw milk example, imagine that a farmer tells a worker that she must drink raw milk in front of the customers to show them that it is safe and to encourage them to buy it. If the worker does not want to drink the raw milk, but is threatened with termination if she does not comply, then she has been coerced and her decision to drink it is not an autonomous one.

When analyzing public health interventions, these infringements on autonomy must be taken into consideration and balanced against the public health benefits to be gained. Furthermore, if various interventions are possible, then the least infringing intervention should be chosen (Kass, 2001; Nuffield Council on Bioethics, 2007).

ETHICAL AND POLITICAL ANALYSIS

The first question we should ask is – broadly speaking – whether it is ethically permissible to attempt to curtail meat consumption (and by extension, meat production) by

implementing interventions at the restaurant level.⁸ For purposes of this question, consumption and production considerations will be analyzed separately.

Consumption-specific considerations

The first consideration is the liberty-limiting principles at issue. When analyzing only *consumption*, on first impression, any limitations would appear to be legal paternalism, restricting consumers' liberty for the sake of what the government believes is best for them.

Upon closer analysis, though, we might find that such interventions are actually soft paternalism (and therefore not paternalism at all). Customers may not understand the health implications of excessive meat consumption and are therefore unable to make a truly autonomous or voluntary decision. Based on the interviews conducted pursuant to aim 1, it appears that interviewees were generally unaware of the negative health effects of consuming too much meat. Other factors may also be affecting their decision making such as habit, expectations of fellow diners, availability of reasonable alternatives, and a number of cognitive biases that lead them to order meat. If customers' decisions to eat meat are not genuinely autonomous, then efforts to alter their behavior would be considered soft paternalism and therefore not really paternalism at all.

⁸ This paper examines whether interventions to curtail meat consumptions in restaurants is ethically and politically *permissible*. It does not examine whether interventions would be politically *feasible*. In fact, many permissible interventions would likely have very little chance of being enacted into law, due in large part to opposition from special interest groups. Furthermore, this paper does not discuss the benefits of the status quo (such as stable employment opportunities) or the short-term detriments of reduced production (such as lost jobs). While changes to the system would likely have certain costs, both financially and socially, I believe that the overall benefits would outweigh the costs.

Furthermore, interventions to curtail excessive meat consumption may also be justified under the harm principle. Such consumption contributes to a large portion of the population with chronic diseases such as cardiovascular disease, obesity, diabetes, and cancer. These chronic diseases cause harm to society in the form of an overburdened healthcare system, increased insurance premiums, loss of productivity, increased taxes to pay for healthcare, among other externalities.

Finally, the interventions will be in restaurants, and will therefore limit the liberty of the restaurant owners to offer whatever they want without restriction. The interventions will not technically be limiting the liberty of the customers to eat meat, since they are still well within their ability to consume meat at home or elsewhere. Thus, interventions can be justified as preventing risk of harm to others – preventing restaurants (actors) from harming customers (others) with large portions of meat. As mentioned previously, restaurants are already required to do or refrain from doing many things to protect public health, including restrictions on what foods they offer. Restaurant restrictions also change over time as new information is discovered. For example, trans fats used to be ubiquitous in restaurants until their dangers became known to public health officials. As evidence mounted, many cities banned their use in restaurants (even before the U.S. Food and Drug Administration banned them from the entire U.S. food supply). Similarly, as the negative health consequences of meat consumption, especially red and processed meat consumption, become increasingly clear, restrictions on their sale may be justified.

Overall, interventions in restaurants to curtail meat consumption are ethically permissible, based on both preventing harm to self and preventing harm to others, though the

justifications may be considered somewhat weak on all accounts. Assuming the customer is aware of the risks, then restricting his choices is legal paternalism, and many people would argue that it is the customer's decision to make. The argument for soft paternalism is stronger, but we would need to ascertain the degree to which people are ignorant of the risks, which would be a significant task, and requires some threshold (exactly what degree of knowledge would be acceptable?). The harm principle offers a better justification, though still not perfect. Harm to society is somewhat tenuous, considering other foods (such as fries, sodas, and desserts) are likely no better for a person, and other behaviors (such as sedentariness, smoking, or lack of sleep) may contribute at least as much to the poor health outcomes of concern. Finally, considering the restaurant to be the "actor" and the customer to be the "other" may be seen as a reach, since it is ultimately the customer who makes the decision whether to eat meat.

Production-specific considerations

When we take meat production into consideration, the basis for interventions strengthens. The negative public health effects that stem from meat production (including, but not limited to, infectious diseases, asthma, antibiotic resistance, and workplace injuries), while more distal than the health effects associated with meat consumption, clearly fall under the harm principle. As discussed earlier, the harms are not only realized by the actors (in this case, the people ordering the meat and thereby maintaining the demand for production) but also by others (including non-meat-eaters) in the form of adverse health outcomes. Thus, if the demand for meat in restaurants can be reduced enough to lessen production, then liberty-

restricting interventions would be justified under the harm principle as potentially preventing the risk of harm to others.

Such interventions could also be justified under the harm principle as preventing the risk of harm to society. Industrial animal farming results in significant harms to society in terms of an overburdened healthcare system, increased insurance premiums, and taxpayer money being used not only to pay for healthcare but also for environmental cleanup efforts. Meat production results in massive amounts of air and water pollution, in addition to the production of greenhouse gases (U.S. Environmental Protection Agency, 2016). Accidents and spills frequently contaminate large bodies of water, killing fish and other aquatic animals (Mallin & Cahoon, 2003). Fish farming destroys protective wetlands (Alongi, 2002) and seagrass meadows (Ruiz et al., 2001; Waycott et al., 2009; Williams, 2007), and contaminates water with pesticides, prophylactic drugs, and waste (Azad et al., 2009; Biao & Kaijin, 2007) as well as parasites and diseases (Cottee & Petersan, 2009; Krkošek et al., 2006). Finally, as explained above, the interventions will be in restaurants, and will therefore limit the liberty of the restaurant owners to offer whatever they want without restriction and will not be limiting the liberty of the customers to eat meat outside of the restaurant setting. Therefore, the harm principle applies here too, as protecting others from harm. In the case of meat production, however, such interventions would be preventing everyone (not just those who order meat) from the negative effects of meat production.

Thus, interventions in restaurants intended to ultimately decrease meat production are also ethically permissible, and the justifications are stronger than those for reducing meat consumption.

Interventions

There are a variety of possible ways that restaurants could reduce meat consumption. Even though we have established that interventions are permissible, it is important to examine each possible intervention to determine whether it would be appropriate and whether there are other, more appropriate, options. For purposes of this paper, the approaches will be considered in four broad categories, ranging from the least restrictive to the most restrictive, and include: (1) education; (2) nudges; (3) incentives; and (4) restrictions.

Category 1 - Education

One type of intervention might entail simply educating consumers of the dangers of eating meat and producing meat, to both their own health and the public's health.

Studies have indicated that consumers are generally unaware of the relationship between meat consumption and health or meat production and the environment (Hartmann & Siegrist, 2017; Stubbs et al., 2018). Likewise, during the interviews of aim 1, it was apparent that very few respondents understood the relationship between excessive meat consumption and health and only one person knew of any association between meat production and environmental problems. Therefore, it appears that there is a need for education on the health and environmental effects of meat consumption and production. Regardless of whether knowledge would actually alter customers' orders, they are currently making their food choices without knowledge of the negative consequences of meat consumption and production, so they are not making a genuinely autonomous decision when deciding whether to eat meat. Giving customers more information would increase their ability to make an informed, autonomous decision.

Education is rarely controversial, though some may object that any attempts to change behavior are inappropriate. That would not be a persuasive argument, as the government has a duty to protect the public's health, and this is the least restrictive way to do that. Consumers are still free to make their own decision, no choices are removed, and they are not covertly nudged or manipulated away from meat without their knowledge. As long as the educational information is correct and not misleading, this type of intervention is ethically permissible, and arguably required so that consumers can make informed choices.

Education can be achieved through general education campaigns or more targeted campaigns in restaurants. For purposes of this paper, the discussion will be limited to education in restaurants. Such interventions can either be completely informational – simply stating the facts to give people more information on which to make their own decision; or they can be persuasive – suggesting to people that they refrain from ordering meat.

Informational material

One type of educational intervention could be to simply state facts for consumers, so that they have more information on which to base their ordering decision. This type of education would not suggest that they order a meatless item, or even try to sway them to order a meatless item – instead it would simply give them information on the risks to health and/or the environment of meat and/or the benefits to health and/or the environment of meatless options. This would be somewhat similar to nutritional information telling people how many calories are in a product, or a label indicating that a product is organic, without telling customers whether they should consume it. For purposes of meat, examples could include statistics on the health and/or environmental effects of meat consumption and/or production.

In a restaurant setting, such information could be provided on a table tent or on a menu. For example, a table tent could explain the World Health Organization's findings that meat is carcinogenic or display a graphic showing the water footprint of various meats and various vegetables. Alternatively, there could be a disclaimer at the bottom of a menu that says "Eating processed meat increased the risk of certain cancers" or "Meat production is the largest contributor to greenhouse gas emissions."

Purely informational educational material is generally considered ethically acceptable, provided it is accurate and honest. In many ways, it enhances customers' ability to make a genuinely informed choice by giving them the information they need to do so. It is important, however, to make sure the information is not only factual and accurate, but also not misleading or incomplete. This might be difficult to accomplish, since it would be impossible to give customers a lot of information at a restaurant, and therefore difficult to give a complete picture. One example where the information could be considered misleading might be telling customers how much water it takes to produce beef and poultry as well as certain plant-based foods, but failing to mention that certain plant-based foods (such as almonds) also use large amounts of water. Another example might be not differentiating among various kinds of meat, as some are certainly worse for health and the environment than others. It may also be difficult to make a statement that would seem "honest" to most people. For example, stating that processed meat increases your risk of cancer is a truthful statement according to most studies, but there are some researchers who disagree (Geiker et al., 2021; Zeraatkar et al., 2019). Furthermore, consumers might interpret "increased risk" as a giant risk instead of a relatively small risk and feel misled. For example, the World Health Organization has reported that a daily

50 g portion of processed meat increases the risk of colorectal cancer by about 18% and a daily 100 g portion of red meat increases it by 17% (World Health Organization, 2015), which may be significantly lower than a customer would presume.

Persuasive material

Another type of educational intervention could go a step further and try to persuade people to order less meat. Instead of providing neutral information so that customers can make their own decisions, persuasive material would try to influence what customers order – in this case, persuading them to order meatless items. This would be somewhat similar to traffic light diets that label unhealthy foods in red, moderately unhealthy foods in yellow, and healthy foods in green, with the goal of combating childhood obesity (Vorland et al., 2022). To discourage meat consumption, persuasive material could include a suggestion of a certain meatless special along with information on the detriments of excessive meat consumption, an image comparing greenhouse gas emissions of cows to those of cars, or including guilt-provoking commentary such as “help mitigate climate change – eat a plant based meal.” The Meatless Monday Campaign is an example of a program designed to persuade people to eat less meat while providing resources for foodservice providers to participate in the program (GRACE Communications Foundation, 2022).

Persuasive materials are still generally considered ethically acceptable, but they do have more ethical concerns than educational material that is purely informational. The most significant concern is that customers still retain the ability to make an autonomous choice, and that persuasion has not crossed the line into manipulation, where consumers are no longer able to use their own reasoning abilities (Rossi & Yudell, 2012). Another concern is that

persuasion often uses negative emotions such as fear and anxiety, which may itself results in harm (Schwartz & Woloshin, 2001) and individuals who do not change their behavior may be burdened with feelings of guilt or feel stigmatized (Rossi & Yudell, 2012). For example, meat eaters may suffer anxiety when serving processed meat to their families or feel guilty when they indulge themselves. Finally, some simply find persuasion objectionable on principle, since it presupposes that the person or entity delivering the message knows best. It presumes that the messenger is a better judge of the recipients' best interests, that the messenger is better able to balance the risks and benefits of the targeted behavior, and that the messenger is best suited to choose a specific course of action from various alternatives (Rossi & Yudell, 2012). It also assumes that there is one right choice for everyone (Schwartz & Woloshin, 2001).

Provided the information given to customers is factually correct, and does not intend to mislead them, I believe that persuasive material is ethically acceptable. Written information that a person can choose to ignore will likely not rise to the level of influence that would make it impossible for them to make an autonomous decision about what to eat. Since the effects of meat consumption are not immediate, feelings of fear are unlikely. Most Americans eat meat, and most people consider it perfectly normal and acceptable to do so, so persuasive materials are unlikely to stigmatize people who continue to eat meat. While people may feel some level of guilt, if that guilt ultimately leads them to improve their health, and the health of others, it is an acceptable tradeoff. Finally, attempting to improve personal health should not be deemed morally problematic based simply on principle, and public health experts are, in many ways, well positioned to know what is in the best interest of the public's health. It is also important to remember that customers are not choosing foods in a neutral environment, but in an

environment created by the food industry that puts profits over health. Often, this environment is facilitated by the government in the form of direct subsidies (Imhoff & Badaracco, 2019; Schnepf, 2019), subsidies via negative externalities (Lam et al., 2019; Powers, 2018), and weakening anti-trust laws (Greene, 2016; Powers, 2018). If corporations are trying to persuade people to eat in an unhealthy manner, then it makes sense for the government to try to persuade people to eat more healthfully.

When comparing information-only educational materials with persuasive educational materials, if all things were equal, information-only would be more ethically acceptable because it simply provides information for customers to make their own decisions. However, all things are not equal, and customers are unlikely to significantly change their behavior based on neutral language, especially the very limited information that could realistically be provided in a restaurant setting. Since meat consumption and production can have potentially serious health implications, it is reasonable for the government to actively persuade people to eat less meat. This is similar to attempts to curb tobacco use, where simply telling customers about the dangers of smoking was not effective or adequate, so persuasive messaging (along with other interventions) were ultimately used to address the serious nature of smoking.

Furthermore, when deciding between the two types of educational interventions, persuasion should be chosen when the advantages outweigh the disadvantages of the behavior in question (eating meat) (Oxman et al., 2022). In the U.S., most people overconsume meat, so there are essentially no nutritional detriments from decreasing consumption, yet there are significant advantages. Furthermore, animal production has much greater environmental impact than most plant production. While there may be other advantages associated with meat

consumption (enjoyment, culture, tradition, etc.) there is no reason to believe that nonmeat items cannot eventually provide adequate substitutions, once consumers become accustomed to them. Additionally, persuasion is more justified when the effects of the behavior have a significant impact on others (Schwartz & Woloshin, 2001). As explained earlier, many people are physically harmed by meat production, including people who do not eat meat at all. There are also significant societal harms such as the increased burden on the medical system and increased insurance premiums. These things justify the persuasive nature of the intervention. Therefore, persuasion is an ethically acceptable type of educational intervention.

Regardless of whether the educational intervention is informational or persuasive, it is important to consider whether the intervention would be effective. Several studies have examined the effects of providing information on meat ordering. A few studies have tested whether labeling dishes with environmental messages would alter customers' orders, especially meat orders. The results were mixed. A study in a university canteen in Switzerland found that labeling two of the four hot meal options as "climate friendly" had a statistically significant effect (Visschers & Siegrist, 2015). However, a study in 25 buffet style restaurants (mostly in student canteens) in Denmark found that labeling certain choices as "climate choice" meals had little effect (Pulkkinen et al., 2016). Studies of persuasive messages have fared better. A student restaurant in Sweden labeled each of its seven options with the kilograms of CO₂ emissions next to a green, yellow, or red bar, where the length of the bar corresponded to the quantity of CO₂ and the color represented whether the emissions were considered good, moderate, or high (thus attaching a value judgement and making the labels persuasive). The labeling resulted in a small but significant change in purchasing behavior (Brunner et al., 2018).

Some studies tested both information and persuasion and again, the results were mixed, but persuasion sometimes worked where information did not. A university in the Netherlands found no effect when they showed information on carbon emissions for dishes, but found a modest effect when bars and colors were added (Spaargaren et al., 2013). A university restaurant in Norway offered three dishes per meal – one meat, one fish, and one vegetarian. Labeling only the meat dish with a red symbol stating “high CO₂” did not affect purchases nor did labeling only the vegetarian dish with a green symbol stating “low CO₂.” However, labeling all three dishes – “high CO₂” in red for the meat dish, “medium CO₂” in yellow for the fish dish, and “low CO₂” in green for the vegetarian dish did decrease the amount of meat dishes ordered. However, it is important to note that the effects were short-lived as they were only seen during the first half of the intervention and not during the second, so it may be that persuasive messaging does not work once people become accustomed to the messages (Slapø & Karevold, 2019). Finally, a pair of studies in a university dining hall in the U.S. found that both information (in the form of green leaves next to a menu item) as well as persuasive messaging (in the form of notations stating that a veggie burger is sustainable and/or tasty, along with a suggestion to purchase it), increased the ordering of the sustainable items in the first study and the veggie burger in the second study. However, these effects were only found among women – in both studies, men failed to change their ordering (Piester et al., 2020).

Educating customers, both via information and persuasion, allows customers to maintain their autonomous decision making. Furthermore, it does not limit their liberty to purchase and consume meat if they decide that is what they want to do. Therefore, both

information and persuasion are ethically acceptable but may not be particularly effective, especially long term.

Category 2 - Nudges

A second type of intervention could use what is called a “nudge,” which is “any aspect of the choice architecture that alters peoples’ behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a nudge, the intervention must be easy and cheap to avoid” (Thaler & Sunstein, 2008).

Nudging has received much attention in recent years and many see it as the best type of intervention because it achieves the desired results without restricting choice and is therefore often considered to be the most ethically acceptable type of intervention. Examples of interventions designed to promote healthier food choices include making healthy sides the default (such as a side salad instead of a side of fries), putting healthier items within easier reach than unhealthy foods, or displaying healthier foods more prominently than unhealthy options. In each of these situations, the unhealthy option remains freely available, though it would take a small amount of effort to obtain it.

Nudging does have some critics. Some feel that any attempt to change a person’s behavior without their knowledge is manipulation – an infringement on their autonomy – and therefore, unacceptable. Instead of giving people information to decide for themselves, or even trying to persuade them with their knowledge, nudging works surreptitiously, usually without the consent or even awareness of the target (Nys & Engelen, 2017). For these reasons, nudging has its opponents.

The majority of people, however, seem to feel that most nudging is ethically acceptable, for a variety of reasons. First, while nudging does work surreptitiously, its intent is not to deceive people or prevent them from ultimately making their own decisions. In fact, one of the requirements of a nudge is that it not take away a person's ability to make a poor choice if they want to make that choice. It simply makes people more likely to make the better choice. If a restaurant serves a meal with a side salad as the default instead of fries, but fries are available upon request with no price increase, then the customer has not really lost their ability to make an autonomous decision and certainly has not lost their liberty to order fries.

Furthermore, most people strive to make better choices, but they often fail to do so, due to several environmental factors and cognitive biases. For example, default bias drives people to stick with the default, even if they would actually prefer something different, such as sticking with the default side of fries, even if they would prefer a healthier salad. Conformity bias leads people to make the same choice as others, even if it is not the choice they would make if they were alone or unaware of the choices of others, such as choosing an unhealthy meal over a healthy one. Present bias preference causes people to choose smaller immediate rewards over larger future rewards, such as choosing the pleasure of eating high-calorie foods over the long-term reward of better health. The framing effect causes people to choose one option over an identical option, based solely on presentation, such as choosing a particular dish only when it is featured, but not when it is just included among the other options. The design of the environment, coupled with these and other cognitive biases, can lead people to make choices they would prefer not to make. For example, the design of a menu can influence what a person orders, by, for example, having default sides, featuring particular items, or framing

certain items differently than others. The physical layout of a salad bar or cafeteria can encourage people to order the items easiest to reach. Also, simply being hungry often causes people to make food choices that they would not make if they were not influenced by the feelings of hunger.

Most of us endeavor to eat healthfully, but often fail to eat as healthfully as we would like. Which choice is our true autonomous choice? Is it the ideal choice we identify when we are at home, alone, satiated, with time to think about our health? Or is it the actual choice we make when we are in a restaurant, with friends, hungry, and focused on other things? If the true autonomous decision is made while at home, and nudges are designed to facilitate the at-home decisions, then nudging can be further justified as actually helping people carry out their true choice – the one they would make when not influenced by the environment and cognitive biases. In other words, nudging people toward healthier food choices can counteract the environmental cues or cognitive biases that lead people to make choices they do not actually want to make, enabling them to make the choice that they do want to make (Nys & Engelen, 2017). It is important to also recognize that restaurants (and other food-sellers) exploit cognitive biases and manipulate the environment for their own profit. Menus are often designed to draw attention to the most profitable items, servers are encouraged to upsell and suggest add-ons, and the entire design of most restaurants from the wall color to the background music is designed to make people eat more than they otherwise would eat. Therefore, nudging for the good of public health can be considered a tool to level the playing field and give customers a fighting chance against the for-profit food industry.

There are several nudge techniques that restaurants could employ to encourage customers to eat less meat. These include menu manipulation such as putting meatless items in prime menu locations or highlighting them, featuring meatless items as specials, making all default sides meatless, or having the servers suggest meatless items to customers. One particularly good option would be to simply increase the percentage of meatless offerings on their menu and presenting them along with meat offerings. Doing so would combat a number of cognitive biases. A larger offering of meatless items would make them seem more normal, thereby combating the conformity bias. It would also simply increase the chances of customers finding one of the meatless items appealing and rewarding, lessening the risk of present bias preference. Including them along with the meat items (as opposed to relegating them to a separate “vegetarian” section) would alleviate both the framing bias and the confirmation bias. Restaurants could be required to, for example, offer at least 10 meatless entrees or to make at least 20% of their offerings meatless.

Customers would still be able to choose any meat item that they want, so this would not be an infringement on their autonomy. To the contrary, it might help customers who strive to eat a more plant-based diet actually do so.

In general, nudging works. Studies have shown that nudging is effective at changing behavior, including ordering less meat in food service settings.

Increasing the proportion of meatless items, specifically, has been shown to be effective. Studies in three University of Cambridge cafeterias showed that increasing the number of vegetarian meals offered increased the number of meatless meals ordered. This held true for two observational studies using the meals already chosen by the cafeteria, as well as an

experimental study where the vegetarian choices were doubled (increased from one offering to two offerings) (Garnett et al., 2019). Similarly, the results of the study conducted in aim 2 of this paper found that increasing the percentage of meatless main dishes offered on a specials menu increased the likelihood that an item ordered would be meatless.

Other techniques aimed at nudging customers away from meat have also been studied, with promising (though sometimes conflicting) results. In one study, students in a U.S. university were more likely to order a meatless meal when were presented with a menu containing all meatless items, even though a regular menu offering meat items was also available. (Campbell-Arvai et al., 2014).

Another study conducted in university restaurants in Sweeden offered one vegetarian and two meat options for lunch. The study that found that moving the vegetarian option to the top of the menu and prominently displaying the dish increased the percentage of vegetarian dishes sold (Kurz, 2018).

In a self-serve café-style living lab (a restaurant set up specifically to test subjects) in France, customers were more likely to choose the vegetarian option if it was noted as the “dish of the day” (Saulais et al., 2019). However, similar studies in Denmark schools and senior centers (where subjects were between 13 and 17 years old and between 65 and 89 years old, respectively) found that subjects were not more likely to choose the vegetarian dish of the day (dos Santos et al., 2018). Likewise, a similar study of seniors (ages 65 years old and older) in various settings in Denmark, France, Italy, and the United Kingdom also found that labeling the vegetarian choice as the “dish of day” did not result in increased ordering of that dish (Zhou et al., 2019).

An online restaurant simulation study of adults in the United Kingdom examined three types of menu variations. The control menu contained six meat dishes and two vegetarian dishes, with the vegetarian options noted only with a (v) next to the name of the dish. The first variation was one enhancing the name of the first vegetarian dish, the second enclosed it in a box labeled “Chef’s recommendation,” and the third moved both vegetarian dishes to a separate “vegetarian” section. The first two variations increased the likelihood that “infrequent vegetarian eaters” would order a vegetarian dish, but paradoxically, it reduced the likelihood for more frequent vegetarian eaters. The first variation also weakened the frequent vegetarian eaters’ intentions to eat vegetarian in the future. The third variation had no effect on infrequent vegetarian eaters, but had a negative impact on frequent vegetarian eaters, making them less likely to order a vegetarian option (Bacon & Krpan, 2018).

While most of these studies were conducted overseas, and in university dining halls or senior centers, instead of in restaurants in the U.S. serving the general population, they indicate that small changes to the environment do have the potential to nudge people away from meat, though a few studies found no effect.

Finally, nudging customers toward plant-based items does not limit their liberty to purchase and consume meat items – they retain the freedom to order whatever they choose.

For these reasons, nudging is an acceptable public health intervention.

Category 3 – Incentives

A third type of intervention is the use of incentives. For purposes of this discussion, the word “incentives” encompasses both positive incentives and disincentives (which will be referred to as “carrots” and “sticks” for simplicity), each of which can be monetary or in-kind.

Examples of carrots could be a subsidy on meatless items, or some other incentive to order a meatless option (such as a combo meal or a free item), while an example of a stick could be a “sin tax” on meat items.

While carrots and sticks are generally considered an ethical way to encourage healthier behavior, they do have more objections than education or nudges. One of the most well-known sticks to discourage consumption of unhealthy products are sin taxes. Sin taxes have been used in the United States practically since the founding, originally as a source of revenue and more recently to discourage undesirable behavior or consumption (Yelvington & Shughart, 1997). While taxes on alcohol and tobacco have been taxed levied for a long time, and have achieved general acceptance, taxes on sugar sweetened beverages have recently gained traction and have been implemented in several cities and countries (Allcott et al., 2019; Popkin & Ng, 2021).

One common objection to sin taxes is that taxing certain items to dictate what people should and should not consume is the function of a “nanny state” and infringes on citizens’ personal choices (Jou et al., 2014). Another is that such taxes are regressive, affecting low-income people more than better-off individuals (Allcott et al., 2019). Similar complaints may be made against carrots in the form of financial or in-kind incentives. In addition, government subsidies might be viewed as the government inappropriately favoring certain industries over others.

Despite these objections, both carrots and sticks could be useful and acceptable public health interventions. While a sin tax may be an attempt by the government to discourage the consumption of an undesirable substance, it does not take away the ability of a person to consume it. Assuming the tax is minimal, like the soda taxes, then the slight increase in price

will likely not preclude someone from ordering meat if they really want meat. It may, however, prompt them to stop and think about why the government is discouraging it and reflect on whether it is something they really want to consume. Furthermore, while the tax is regressive, like any other tax on consumer products, that alone is not a sufficient reason to oppose it. Since there are plenty of affordable plant-based products that offer adequate nutrition, meat is not a necessity, and the tax can be avoided by opting for a meatless option. Furthermore, since the tax is on meat ordered in restaurants, the tax can be avoided by cooking meat at home.

One significant advantage of sin taxes is that they create revenue, and if used appropriately, can negate some of the negative externalities of meat consumption and production. Meat tax revenue could be earmarked for environmental clean-up, health education programs, programs to reduce chronic diseases related to excessive meat consumption, or even to subsidize meatless alternatives. These benefits might also help make the tax more acceptable to consumers. In addition, meat taxes could help educate consumers about the health and environmental effects of meat consumption and production and help emphasize the importance of mitigating the effects. In response to possible concerns about the government subsidizing certain industries, as mentioned earlier, the government is already subsidizing meat in the form of farm subsidies (Imhoff & Badaracco, 2019; Schnepf, 2019), negative externalities (Lam et al., 2019; Powers, 2018), and weakened antitrust laws (Greene, 2016; Powers, 2018). Subsidizing meatless meals would be minimal by comparison, but arguably ethically necessary to counteract the artificially low meat prices that result from the government subsidies of the meat industry.

Several countries have considered or proposed a meat tax of some sort (Kwasny et al., 2022). In 2011, the Danish Parliament introduced a tax on saturated fat with the goal of improving health. The tax was levied against manufacturers, but was presumed to ultimately affect consumer prices, especially for fats such as butter and margarine. The tax was repealed the following year, citing economic aspects such as increased prices, administrative burdens, and threatening jobs (Vallgård et al., 2015). While the effects on meat purchases were not analyzed, during the short duration of the tax, there was a 10-15% decrease in purchases of butter, butter-blends, margarine, and oil (Jensen & Smed, 2013).

Subsidies may be easier to justify, since they do not have the “punishment” nature of a tax, however, taxes are more likely to be effective. Loss aversion leads people to give more weight to losses than they do to equivalent gains, meaning they would be more likely to alter their behavior in response to a tax (a loss of their personal money) than they would to a comparable incentive (a gain of the same amount of money.) For example, five cent bag taxes have reduced the use of plastic bags by half, while five cent incentives have had little effect (Homonoff, 2018). That said, a study conducted on German students found that offering them 2€ for every vegetarian lunch they chose significantly increased the proportion of vegetarian meals chosen during the experiment. While this is promising, it should be noted that students may be more budget oriented than restaurant customers, and in this study, the 2€ made the lunches almost free, since most meals cost between 2.30€ and 2.80€ (Kaiser et al., 2020).

A meat tax could be implemented in a few different ways. For example, it could add a flat tax to each item that contains meat (such as \$1 per meat dish) or a tax on each unit of

weight of meat (such as \$0.25 per ounce of meat). Alternatively, meat could be taxed as a percentage of the overall price of the meat item (such as 5% of the cost of the dish).

Similarly, either financial or non-financial “carrots” could be attached to meatless items. Examples of financial carrots could include discounting meatless items by a certain percentage or a fixed dollar amount, similar to the study in the German university (Kaiser et al., 2020), or at the state level, simply excluding meatless items from existing restaurant taxes. It would likely work best if it was noted somewhere that meatless items were being subsidized or tax free, so customers realized they were getting a discount and the reason for the discount (such as to “save the planet” or for “better health”) as opposed to simply assuming that the items were worth less. Examples of non-financial incentives could include offering free items with meatless meals (such as a free dessert or drink) or buy-one-get-one deals, though such incentives might be more complicated if the subsidies were coming from the government. In this case, restaurants could be subsidized for each meatless item sold, leaving the restaurants free to decide how to translate that into customer incentives. Still, customers should be made aware of any incentives before they order. If they are unaware that there will be a carrot or stick until after they have ordered, then the incentive could not possibly work. Similarly, if the adjustments are simply incorporated into the prices, without the customer realizing it, this would be more akin to a nudge than an incentive, because the customer would not be given the opportunity to make a conscious choice based on the incentive.

Sticks are more restrictive than education or nudges, though only mildly so. Sticks, such as sin taxes are generally effective – as has been shown with tobacco, alcohol, sugar-sweetened beverages (Chaloupka et al., 2019), and plastic bags (Homonoff, 2018). Carrots, on the other

hand, though less restrictive, may be less effective than sticks due to loss aversion (Homonoff, 2018). Therefore, both are ethically acceptable, but sticks are probably a better option.

Like education and nudging, incentives leave customers free to order meat, so they do not limit individuals' liberty.

Category 4 – Restrictions

The final type of intervention that will be considered is an actual restriction on meat sales in restaurants. At the most extreme end, the sale of all meat could be banned from restaurants, similar to how all trans fat was banned in restaurants in certain cities, even before the federal ban. Alternatively, the sale of certain types of meat that are most harmful both in terms of consumption and environmental impact – such as red and processed meat – could be banned. This would be similar to milk. The sale of the more dangerous raw milk is banned in most restaurants, while the sale of safer pasteurized milk is allowed. Finally, restrictions on large portions of meat could be implemented in restaurants – for example, prohibiting the sale of any portion of meat over four ounces. This would be similar to New York City's proposed (but ultimately failed) "Portion Cap Rule" that sought to restrict the sale of sugar-sweetened beverages over 16 oz (Min, 2013; *New York Statewide Coalition of Hispanic Chambers of Commerce v. New York City Department of Health and Mental Hygiene*, 2013).⁹

Unlike education, nudging, and taxes, outright restrictions could be considered liberty-limiting, since they actually prevent customers from ordering meat (or the type or amount they

⁹ The Portion Cap Rule failed because it was determined, during litigation, that the New York City Board of Health, which promulgated the legislation without a vote by the New York City Council, did not have the authority to do so under the separation of powers doctrine. *New York Statewide Coalition of Hispanic Chambers of Commerce v. New York City Department of Health and Mental Hygiene*, 23, 110 A.D.3d 1, 970 N.Y.S.2d 200, 2013 N.Y. Slip Op. 05505 (Supreme Court, Appellate Division, First Department, New York 2013).

want) in restaurants. While the first three may arguably have had some impact on customers' autonomous decision making regarding what to order, restrictions simply prevent customers from ordering meat, even if they made a fully autonomous decision to do so. In that regard, they are the most restrictive and the most ethically problematic. Opponents might argue that it is one thing to educate or persuade customers, to make it easier for them to make healthy decisions, or to even incentivize or disincentivize them, but that it is unacceptable to outright forbid them. Unlike trans fat and raw milk, there are few widely accepted substitutes for meat, many people do not feel a meal is complete without meat, and meat has important cultural and enjoyment significance. Furthermore, restaurant meals are often enjoyed on special occasions, and it may not be the appropriate time to restrict what people can order.

Although there are strong arguments against restrictions, there may be adequate public health benefits to justify them. First, we should consider whether they are liberty-limiting to customers at all. As discussed earlier in the paper, the restrictions are on the restaurants, and prevent restaurants from serving meat. This is important because customers remain at liberty to eat the type and quantity of meat they want, and can do so anywhere other than a restaurant. Second, while the liberty of the restaurants to serve meat will be limited, this is justified for two reasons. The first reason is that the harm principle justifies the government in limiting the liberty of restaurants for the public good (both to individual customers and society in general) (Feinberg, 1984b). The second reason is that restaurants have a certain amount of corporate responsibility or duty of care to customers, further justifying such restrictions (Nuffield Council on Bioethics, 2007). This is not unlike many other policies that restaurants must follow. For example, restaurants are often prohibited from selling undercooked food,

under the harm principle, but customers are free to eat it at home, so their liberty to eat a rare burger is not infringed. Even before the U.S. Food and Drug Administration banned trans fats from the U.S. food supply, many cities prohibited restaurants from serving foods containing them (Blocs, 2019), but again, customers could eat such foods elsewhere, so their liberty to eat trans fat containing foods was not limited. While not food related, the same rationale applied to smoking bans. Smoking in bars and restaurants was banned in many states to prevent harm to others (employees), yet customers were still free to smoke outside of the bars and restaurants, so their liberty to smoke was not infringed.

Some might argue that while the law is technically restricting the liberty of restaurants to serve meat, the effect is a limitation on the liberty of customers to order meat in a restaurant. While it is true that customers may no longer be able to order meat in a restaurant, liberty is a negative right that does not require the government to facilitate citizens' wishes, but instead only prohibits the government from directly interfering with them, and in this case, there is no direct interference. If a restaurant decides to break the law and serve meat, there is no law restricting the liberty of the customer to order it. Still, there is a strong argument that the effects of the law essentially constitute legal paternalism, at least as far as trying to protect the health of the individual, and thus requires a strong public health justification.

If such restrictions were indeed considered to be liberty-limiting to customers, then a further analysis would be warranted. Given that the harms of meat production affect the health of people other than those who are consuming meat, then the restrictions could be justified based on the harm principle (Feinberg, 1984b). Furthermore, even the direct harm to the individual health of the customers consuming the meat can harm society in terms of

externalities such as an overburdened healthcare system and increased insurance premiums. Again, this is not unlike smoking bans, where the risk of harm to others, even though it is less than the risk to the smoker, is significant enough to justify a ban. It is also not unlike seatbelt laws that require people to protect themselves, in order to prevent the financial harms to society resulting from numerous traffic fatalities.

If, however, the harm to others is too remote, we may be left with legal paternalism – limiting the liberty of the customer for his own good, and thereby necessitating a thorough analysis to determine if such restrictions are appropriate (Feinberg, 1984c). As noted earlier, there are five considerations when contemplating whether legal paternalism is justified: (1) the likelihood that harm to the actor will occur from the given course of action; (2) the seriousness of that harm being risked; (3) the likelihood that the intervention will be effective; (4) the importance of achieving the desired outcome; and (5) the necessity of the behavior in question and whether there are reasonable alternatives available (Feinberg, 1973).

1. The likelihood that harm to the actor will occur

The first consideration is the likelihood that harm to the actor will occur from the given course of action. In other words, what are the chances that a person will harm himself from ordering meat? This is a difficult question to answer – on a population level, there is compelling evidence that excessive meat consumption is harmful to the people consuming it, but it is impossible to know if any individual consuming meat in a restaurant will be harmed. It is conceivable that some people may eat very little meat at home, but enjoy it mostly at restaurants, and are not at risk of excessive consumption. Some people, of course, are simply able to eat meat with no adverse consequences, either through genetics or other lifestyle

choices. Furthermore, the risk will depend on what type of meat the customer orders, as red and processed meats are generally considered more harmful than poultry or fish.

2. The seriousness of that harm being risked

The second consideration is the seriousness of the harm being risked. In other words, how serious are the consequences of excessive meat consumption? The harms from excessive meat consumption (or even moderate consumption of red and processed meat), if realized, can be quite serious. Chronic diseases, such as obesity, diabetes, cancer, and heart disease can lead to a lifetime of morbidity and in many cases, early death. While it is sometimes tempting to downplay the seriousness of harms that are not immediate (like infectious diseases or acute injuries), it would be a mistake not to consider chronic diseases, which can impair a person's entire life and lead to an early death, as serious.

3. The likelihood that the intervention will be effective

The third consideration is the likelihood that the intervention will be effective. Put another way, will the intervention result in the desired outcome? This is also a difficult question to answer. It is quite likely that the restrictions will reduce meat consumption in restaurants. Even without the ability to order meat (or the type or size desired), people will likely still go to restaurants for the social aspects, just like people continued to patronize bars and restaurants after smoking was banned (Cornelsen et al., 2014). There is even a good chance that people will not "make up the difference" at home, since it seems unlikely that people would bother to cook a substitute meal after eating a restaurant meal, just because it lacked meat.

While meat bans are rare, two studies have tried to gauge the possible effectiveness. These studies occurred in elementary and secondary schools, so the results may not be

generalizable to restaurants, but they are worth noting. The first study occurred in two elementary schools in Belgium that served each student a predetermined individually proportioned meal each day. When the school made that meal vegetarian one day a week, consumption rates of the vegetarian dishes were not statistically different from consumption rates of the meat dishes, indicating that the students found them acceptable enough to eat (De Keyzer et al., 2012). A weekly meatless day was also studied in 33 Finnish schools (ranging from elementary to upper secondary) that utilized a self-serve buffet style service. This study found that during early implementation there was a decrease in lunch participation, a decrease in food taken, and an increase in plate waste. Later in the study, there was still a decrease in food taken, but lunch attendance and plate waste returned to normal, indicating that students gradually began to accept the changes and figure out what foods they liked, but still consumed somewhat less on vegetarian days (Lombardini & Lankoski, 2013).

Even if such restrictions were successful in reducing meat consumption, it is still unclear whether this would result in a reduction of chronic diseases. Obesity, diabetes, cardiovascular disease, and cancer have many causes, and reducing one source may not have a clear discernable effect. Furthermore, as noted above, it is not clear whether decreasing meat consumption in restaurants would actually decrease demand enough to lower production at the farm level.

4. The importance of achieving the desired outcome

The fourth consideration is the importance of achieving the desired outcome. In other words, how valuable is it to be free from meat-related chronic diseases. It is probably fair to assume that people would much prefer to be healthy and disease free, and to live long and

healthy lives. As discussed earlier, cognitive biases sometimes make it difficult for us to achieve these goals, but most people value health, even if they do not have to willpower or knowledge to live a healthy lifestyle. Therefore, the desired outcome is quite important.

5. The necessity of the behavior in question and whether there are reasonable alternatives available

The fifth consideration is the necessity of the behavior in question and whether there are reasonable alternatives available. This is asking whether it is necessary to eat meat (or red or processed meat, or large portions of meat) in restaurants and whether there are adequate substitutions. The answer is that it is not necessary and that there are reasonable alternatives. People can have perfectly healthy and nutritious diets with no meat (and certainly with no red or processed meat or large portions of meat). However, in this case, meat would only be restricted in restaurants, so even if nutritional deficiencies were a concern, customers could ameliorate them by eating meat at home or by choosing another animal-based food (such as eggs, cheese, or other dairy products) which would still be available in restaurants. Regarding reasonable alternatives, the answer might depend somewhat on which type of restrictions we are considering (total ban, red/processed meat ban, or size restrictions). If restaurants were banned from selling meat altogether, then there would be plenty of alternatives available ranging from meat substitutes and tofu, to produce, pastas, grains, and beans. Plenty of people manage to maintain a vegetarian diet and still patronize restaurants. Furthermore, if restaurants were no longer allowed to serve meat, they would certainly start serving appealing meat-free alternative to keep customers happy. In addition, animal-based proteins would also still be available in the form of eggs, cheese, and other dairy products. If restaurants were only

banned from selling red and processed meat, all of the above would still be available, in addition to poultry and fish, making it even easier for customers to find suitable alternatives. Finally, if restaurants were only banned from selling large meat portions, then customers would have no true restrictions at all – they would be able to eat any meat they chose, and if they wanted a large portion, they could order two or more servings.

Given all of the considerations above, there is adequate justification for all three types of restrictions, provided the restrictions are effective. If it was determined that they were not effective, then the liberty-limitations could no longer be justified on public health grounds. Assuming all three are equally effective, then the restriction on size would be the best option since it is the least restrictive and leaves the customer with the most choices.

CHOOSING AMONG ACCEPTABLE ALTERNATIVES

Thus far, a case has been made for implementing any of the proposed policies. However, the final step is determining which of the policy options is the *most* ethically acceptable. To even be considered for implementation, policies must be tailored to address the underlying public health problem, be deemed effective, and be the least restrictive while still adequately addressing the public health problem. This involves a bit of a balancing act – the least restrictive policies would often be the least effective, while the most restrictive will be the most effective (Kass, 2001; Nuffield Council on Bioethics, 2007). Thus, all factors should be considered and weighed against each other.

The Nuffield Council on Bioethics provides an “intervention ladder” illustrating possible government interventions. The steps on the ladder – from least restrictive at the bottom to most restrictive at the top – are as follows: (1) do nothing or simply monitor the current

situation; (2) provide information; (3) enable choice; (4) guide choices through changing the default policy; (5) guide choices through positive incentives; (6) guide choices through disincentives; (7) restrict choice; and (8) eliminate choice. The Nuffield Council suggests that the interventions closest to the bottom should be implemented before those at the top, provided those at the bottom adequately address the public health problem at issue (Nuffield Council on Bioethics, 2007).

Information: In our case, the least restrictive intervention proposed was to provide information to consumers and allow them to make their own decision. This does not restrict choice at all, and arguably helps consumers by providing them with information they may not have otherwise known. Unfortunately, studies are mixed but indicate that that information alone tends to be ineffective at discouraging meat consumption in restaurants.

Persuasion: The next least restrictive intervention was to persuade customers to order less meat in restaurants using persuasive messaging. While studies have shown that persuasion is more effective than information, there is evidence that persuasive material aimed at reducing meat consumption is only effective in the short term and may be ineffective with men.

Enable choice: The next option is to enable choice by adding more meatless options to restaurant menus. Even if a customer wants to eat a plant-based diet, the choices in most restaurants make it difficult. While most have one or two options, few have a wide variety of options to appeal to a myriad of tastes. While a true vegetarian will relent and order an option that does not particularly excite them, other people will likely just turn to a more appealing meat option, due to lack of good meatless choices. Adding choices enhances the ability of customers who want to eat a plant-based meal to do so, and also simply makes it more likely

that other customers, with no strong preference for a meat or meatless meal, will choose a meatless meal. While requiring a certain number or percentage of meatless options does limit the liberty of restaurants to some degree, the degree is small. Restaurants would still be able to choose their own recipes and still be able to offer meat, they just may have to increase the number of meatless offerings. The Nuffield Council also proffers that food and drink industries, through their duty of corporate social responsibility, have an obligation to help customers make healthier choices (Nuffield Council on Bioethics, 2007). Simply adding additional meatless items to a menu is one of the least restrictive ways the government could compel a restaurant do this. Finally, previous studies have found that increasing meatless options increased meatless ordering (Garnett et al., 2019) and the results of aim 2 support these findings. Thus, this approach has a good likelihood of reducing meat consumption.

Positive incentives: The next option is to offer positive incentives (or carrots) to encourage customers to order less meat. Carrots are considered more restrictive than enabling choice, and require a significant input of tax money to pay for the incentive. Furthermore, carrots to order less meat, without adding additional meatless options are unlikely to work well, since people likely will not order something that does not appeal to them simply to save a few dollars. One study found a 2€ incentive was effective at increasing vegetarian lunch orders, but that study was conducted on students and resulted in a nearly free meal (Kaiser et al., 2020).

Disincentives: A similar option is to offer disincentives (or sticks), such as a meat tax, to discourage customers from ordering meat. Sticks are considered more restrictive than carrots and may be criticized for their regressive nature. That said, they are likely to be more effective

than carrots, as people tend to be more sensitive to losses (like taxes) than they are to gains (like monetary rewards) due to the cognitive bias of loss aversion. A meat tax could be effective, since other sin taxes on products like soda, alcohol, and tobacco have been successful in reducing consumption of those products. Since a meat tax is more restrictive than adding additional meatless options to a menu, it should not be the choice if adding additional meatless items proves similarly effective. If, however, pilot studies show superior effectiveness, then meat taxes would also be a viable option to consider.

Restrictions: Restrictions on meat in restaurants is the most restrictive option presented. Similar restrictions in restaurants of items such as trans fat and smoking showed that the restrictions were effective – people continued to patronize restaurants even though they were not able to consume trans fat or smoke while there. Since this type of intervention arguably interferes with customers personal liberty, it should only be used if all other options fail.

CONCLUSION

My conclusion is that requiring restaurants to offer a certain percentage of meatless items is the best course of action. It is not coercive or manipulative and it does not limit customers' liberty to order meat if they want to order it. To the contrary, it facilitates customers who desire to decrease meat consumption by making it more likely that they can find a suitable option. For customers with no strong preference between meat and meatless options, increasing the percentage of meatless options may help them overcome a number of cognitive biases that might cause them to choose meat options and will also make it more likely that they will find a tempting option. Finally, the results of aim 2, along with studies in three

University of Cambridge cafeterias (Garnett et al., 2019), indicate that such an intervention may be effective.

TABLES

Table 1.1. *Demographics of stakeholders and restaurants.*

Restaurant Number	Restaurant Type	Respondent Role	Respondent Gender
1	American	Owner	Female
		Server	Female
		Server	Female
2	American	Owner	Female
3	Italian	Manager	Female
4	American	Owner	Female
		Owner & Chef	Male
5	American	Owner	Female
6	American	Server	Female
7	American	Owner	Male
8	French	Manager	Female
9	Italian	Owner	Male
10	Italian	Owner	Male
11	Seafood	Owner	Male
12	American	Owner	Female
		Owner	Male
13	Italian	Undefined	Female
		Server	Female
		Server	Female
14	American	Chef	Male

Table 2.1. *Percentage of meatless items offered on the regular and specials menus.*

	Total % meatless items	Average (SD) % meatless items	Min % meatless items	Max % meatless items
Regular Menu				
Main dishes	10	-	-	-
Side dishes	23	-	-	-
Total dishes	13	-	-	-
Specials Menus				
Main dishes	-	9.7 (11.2)	0.0	42.9
Side dishes	-	31.5 (18.2)	0.0	80.0
Total dishes	-	19.8 (10.3)	0.0	44.5

Table 2.2. *Number of meal services, tickets, and items analyzed.*

Dates	February 17, 2019 – May 23, 2019
Number of meal services	134
Number of lunch services	64
Number of dinner services	70
Number of tickets	3,102
Number of items ordered	8,671

Table 2.3. *Items categorized as “side items” and items categorized as “garnishes.”*

Items in the “side items” column were counted as “food items” while items in the “garnishes” column were not counted as “food items.”

Side items	Garnishes
Coleslaw	Sour cream
Apple sauce	Au jus sauce
Roll	Horseradish sauce
Fries (including steak fries and sweet potato fries)	Any dressings (ranch, parmesan, blue cheese, etc.)
Baked potato	Burger toppings (lettuce, tomato, onion, mushroom, cheese, bacon)
	Gravy

Table 2.4. Relationship between percentage of meatless main dishes offered and the likelihood that a main dish ordered is meatless.

Source	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i> (95% lower)	<i>B</i> (95% upper)
Fixed Effects					
% meatless mains offered	.00169	.00030	5.69***	.00111	.00228
Intercept	.03358	.00417	8.05 ***	.02540	.04176
Random Effects					
Ticket Number	.00249	.00066	N/A	.00148	.00417
Error (Residual)	.04507	.00107	N/A	.04302	.04721

Note. [†] $p < .10$, * $p < .05$. ** $p < .01$. *** $p < .001$. $N = 5,233$. Number of meal tickets = 2,674. Mixed-method maximum likelihood estimation was used. No other variables were in the model.

Table 2.5. Relationship between percentage of meatless side dishes offered and the likelihood that a side dish ordered is meatless.

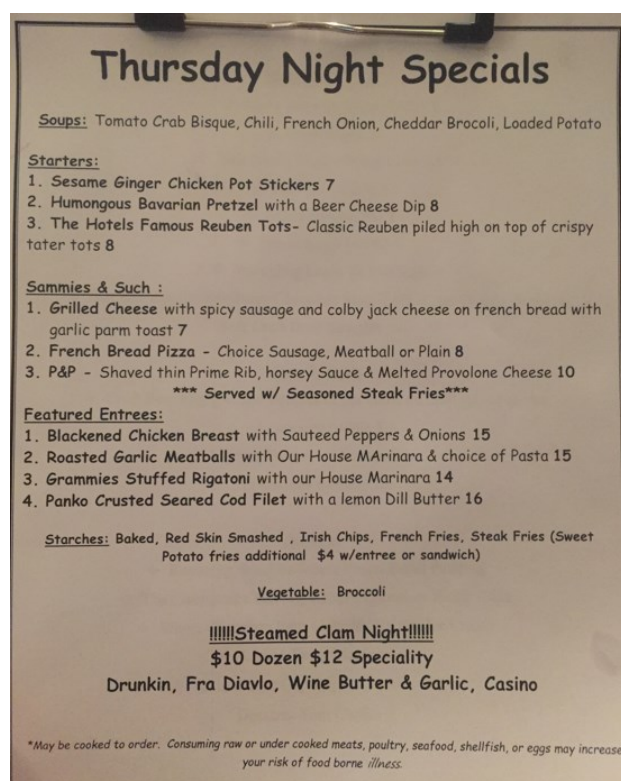
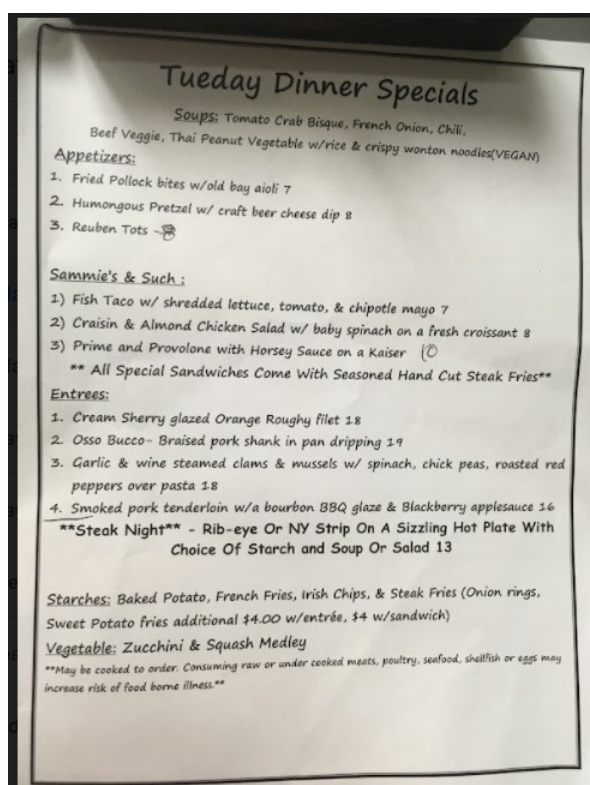
Source	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i> (95% lower)	<i>B</i> (95% upper)
Fixed Effects					
% meatless sides offered	.00012	.00045	.24	-.00077	.00099
Intercept	.32591	.01671	19.50 ***	.29315	.35866
Random Effects					
Ticket Number	.01895	.00470	N/A	.01166	.03080
Error (Residual)	.20240	.00636	N/A	.19031	.21525

Note. [†] $p < .10$, * $p < .05$. ** $p < .01$. *** $p < .001$. $N = 3,438$. Number of meal tickets = 1,788. Mixed-method maximum likelihood estimation was used. No other variables were in the model.

FIGURES

Figure 2.1. Examples of specials menus (Tuesday night and Thursday night).

Tomato Crab Bisque, French Onion, and Chili were offered every day and included in the regular menu. Therefore, they were not counted as specials, even though they were reiterated on the specials menu. Any additional soups noted on the specials menu (in this case Beef Veggie and Thai Peanut on Tuesday's menu and Cheddar Broccoli and Loaded Potato on Thursday's menu) were counted as specials, since they were not offered every day and were not included in the regular menu. Furthermore, the featured weekly specials (Steak Night on Tuesday and Steamed Clam Night on Thursday) were counted as specials, even though they were also noted in the regular menu, because each one was not offered every day.



REFERENCES

- Al-Asheeri, S., Freije, A., & Perna, S. (2020). Farmed Versus Wild Fish Consumption in Relation to Fatty Acid Composition in the Kingdom of Bahrain. *Egyptian Journal of Aquatic Biology and Fisheries*, 24(7-Special issue), 803-816.
- Ali, H., & Khan, E. (2018). Bioaccumulation of non-essential hazardous heavy metals and metalloids in freshwater fish. Risk to human health. *Environmental chemistry letters*, 16(3), 903-917.
- Allcott, H., Lockwood, B. B., & Taubinsky, D. (2019). Regressive sin taxes, with an application to the optimal soda tax. *The Quarterly Journal of Economics*, 134(3), 1557-1626.
- Alongi, D. M. (2002). Present state and future of the world's mangrove forests. *Environmental conservation*, 29(3), 331-349.
- American Bar Association. (2021). Two centuries of law guide legal approach to modern pandemic.
<https://www.americanbar.org/news/abanews/publications/youraba/2020/youraba-april-2020/law-guides-legal-approach-to-pandemic/>
- Anzman-Frasca, S., Mueller, M. P., Sliwa, S., Dolan, P. R., Harellick, L., Roberts, S. B., Washburn, K., & Economos, C. D. (2015). Changes in children's meal orders following healthy menu modifications at a regional US restaurant chain. *Obesity*, 23(5), 1055-1062.
- Appleby, P. N., & Key, T. J. (2016). The long-term health of vegetarians and vegans. *Proceedings of the Nutrition Society*, 75(3), 287-293.
- Avery, R. C., Wing, S., Marshall, S. W., & Schiffman, S. S. (2004). Odor from industrial hog farming operations and mucosal immune function in neighbors. *Archives of Environmental Health: An International Journal*, 59(2), 101-108.
- Azad, A., Jensen, K. R., & Lin, C. K. (2009). Coastal aquaculture development in Bangladesh: unsustainable and sustainable experiences. *Environmental management*, 44(4), 800-809.
- Bacon, L., & Krpan, D. (2018). (Not) Eating for the environment: The impact of restaurant menu design on vegetarian food choice. *Appetite*, 125, 190-200.
- Barnhill, A. (2015). Choice, Respect and Value: The Ethics of Healthy Eating Policy. *Wake Forest JL & Pol'y*, 5, 1.
- Biao, X., & Kaijin, Y. (2007). Shrimp farming in China: operating characteristics, environmental impact and perspectives. *Ocean & Coastal Management*, 50(7), 538-550.
- Bloks, S. A. (2019). The Regulation of Trans Fats in Food Products in the US and the EU. *Utrecht Law Review*, 15(3).
- Bouvard, V., Loomis, D., Guyton, K. Z., Grosse, Y., Ghissassi, F. E., Benbrahim-Tallaa, L., Guha, N., Mattock, H., & Straif, K. (2015). Carcinogenicity of consumption of red and processed meat. *Lancet Oncology*, 16(16), 1599-1600.
[https://doi.org/https://doi.org/10.1016/S1470-2045\(15\)00444-1](https://doi.org/https://doi.org/10.1016/S1470-2045(15)00444-1)
- Bowen, J. T., & Morris, A. J. (1995). Menu design: can menus sell. *International Journal of Contemporary Hospitality Management*, 7(4), 4-9.
- Brunner, F., Kurz, V., Bryngelsson, D., & Hedenus, F. (2018). Carbon label at a university restaurant—label implementation and evaluation. *Ecological economics*, 146, 658-667.

- Burkholder, J., Libra, B., Weyer, P., Heathcote, S., Kolpin, D., Thome, P. S., & Wichman, M. (2007). Impacts of waste from concentrated animal feeding operations on water quality. *Environmental health perspectives*, 308-312.
- Campbell-Arvai, V., Arvai, J., & Kalof, L. (2014). Motivating sustainable food choices: The role of nudges, value orientation, and information provision. *Environment and Behavior*, 46(4), 453-475. <https://doi.org/10.1177/0013916512469099>
- Caprara, G. (2018). Diet and longevity: The effects of traditional eating habits on human lifespan extension. *Mediterranean Journal of Nutrition and Metabolism*, 11, 261-294. <https://doi.org/10.3233/MNM-180225>
- Casey, J. A., Curriero, F. C., Cosgrove, S. E., Nachman, K. E., & Schwartz, B. S. (2013). High-density livestock operations, crop field application of manure, and risk of community-associated methicillin-resistant *Staphylococcus aureus* infection in Pennsylvania. *JAMA internal medicine*, 173(21), 1980-1990.
- Casey, J. A., Kim, B. F., Larsen, J., Price, L. B., & Nachman, K. E. (2015). Industrial Food Animal Production and Community Health. *Current environmental health reports*, 2(3), 259-271. <https://doi.org/10.1007/s40572-015-0061-0>
- Centers for Disease Control and Prevention. (2019). *Antibiotic resistance threats in the United States, 2019*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. <https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf>
- Centers for Disease Control and Prevention, U.S. Environmental Protection Agency, National Oceanic and Atmospheric Agency, & American Water Works Association. (2010). *When every drop counts: protecting public health during drought conditions -- a guide for public health professionals*. Atlanta: U.S. Department of Health and Human Services. https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf
- Chaloupka, F. J., Powell, L. M., & Warner, K. E. (2019). The use of excise taxes to reduce tobacco, alcohol, and sugary beverage consumption. *Annu Rev Public Health*, 40(1), 187-201.
- Charmaz, K. (2014). *Constructing grounded theory*. Sage.
- Choi, J. G., Lee, B. W., & Mok, J. W. (2010). An experiment on psychological gaze motion: A re-examination of item selection behavior of restaurant customers. *Journal of Global Business and Technology*, 6(1), 68.
- Cioffi, C. E., Levitsky, D. A., Pacanowski, C. R., & Bertz, F. (2015). A nudge in a healthy direction. The effect of nutrition labels on food purchasing behaviors in university dining facilities. *Appetite*, 92, 7-14.
- Clinton, S. K., Giovannucci, E. L., & Hursting, S. D. (2020). The world cancer research fund/American institute for cancer research third expert report on diet, nutrition, physical activity, and cancer: impact and future directions. *The Journal of nutrition*, 150(4), 663-671.
- Cobe, P. (2013). "Menus of Change" tries to be a GPS for healthier menus *Restaurant Business*. <http://www.restaurantbusinessonline.com/ideas/innovations/menus-change-tries-be-gps-healthier-menus>

- Cornelsen, L., McGowan, Y., Currie-Murphy, L. M., & Normand, C. (2014). Systematic review and meta-analysis of the economic impact of smoking bans in restaurants and bars. *Addiction*, 109(5), 720-727.
- Cottee, S. Y., & Petersan, P. (2009). Animal welfare and organic aquaculture in open systems. *Journal of agricultural and environmental ethics*, 22(5), 437-461.
- Culinary Institute of America. (2015). *Menus of Change Annual Report*.
http://www.menusofchange.org/images/uploads/pdf/CIA-Harvard_MenusofChange_AnnualReport_2015a.pdf
- Culinary Institute of America. (2016). *Menus of Change Resources*. The Culinary Institute of America. <http://www.menusofchange.org/news-insights/resources/>
- Culinary Institute of America. (2019). *Menus of Change 2019 Annual Report*.
- Cummings, P., & Rivara, F. P. (2004). Car occupant death according to the restraint use of other occupants: a matched cohort study. *Jama*, 291(3), 343-349.
- Davey, G. K., Spencer, E. A., Appleby, P. N., Allen, N. E., Knox, K. H., & Key, T. J. (2003). EPIC–Oxford: lifestyle characteristics and nutrient intakes in a cohort of 33 883 meat-eaters and 31 546 non meat-eaters in the UK. *Public health nutrition*, 6(3), 259-268.
- Davis, C. G., & Lin, B.-H. (2005a). *Factors affecting U.S. beef consumption*. Economic Research Service/USDA.
https://www.ers.usda.gov/webdocs/outlooks/37388/29633_Idpm13502_002.pdf?v=9078.8
- Davis, C. G., & Lin, B.-H. (2005b). *Factors affecting U.S. pork consumption*. Economic Research Service/USDA.
https://www.ers.usda.gov/webdocs/outlooks/37377/15778_Idpm13001_1_.pdf?v=400.3
- Dayan, E., & Bar-Hillel, M. (2011). Nudge to nobesity II: Menu positions influence food orders. *Judgment and Decision Making*, 6(4), 333.
- De Keyzer, W., Van Caneghem, S., Heath, A.-L. M., Vanaelst, B., Verschraegen, M., De Henauw, S., & Huybrechts, I. (2012). Nutritional quality and acceptability of a weekly vegetarian lunch in primary-school canteens in Ghent, Belgium: ‘Thursday Veggie Day’. *Public health nutrition*, 15(12), 2326-2330.
- Donham, K., Haglind, P., Peterson, Y., Rylander, R., & Belin, L. (1989). Environmental and health studies of farm workers in Swedish swine confinement buildings. *British journal of industrial medicine*, 46(1), 31-37.
- Donham, K. J., & Gustafson, K. E. (1982). Human occupational hazards from swine confinement. American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.
- Donham, K. J., Knapp, L., Monson, R., & Gustafson, K. (1982). Acute toxic exposure to gases from liquid manure. *Journal of Occupational and Environmental Medicine*, 24(2), 142-145.
- Donham, K. J., Merchant, J. A., Lassise, D., Popendorf, W. J., & Burmeister, L. F. (1990). Preventing respiratory disease in swine confinement workers: intervention through applied epidemiology, education, and consultation. *American journal of industrial medicine*, 18(3), 241-261.

- Donham, K. J., & Pependorf, W. J. (1985). Ambient levels of selected gases inside swine confinement buildings. *The American Industrial Hygiene Association Journal*, 46(11), 658-661.
- Donham, K. J., Reynolds, S. J., Whitten, P., Merchant, J. A., Burmeister, L., & Pependorf, W. J. (1995). Respiratory dysfunction in swine production facility workers: Dose-response relationships of environmental exposures and pulmonary function. *American journal of industrial medicine*, 27(3), 405-418.
- Donham, K. J., Yeggy, J., & Dague, R. R. (1988). Production rates of toxic gases from liquid swine manure: Health implications for workers and animals in swine confinement buildings. *Biological wastes*, 24(3), 161-173.
- dos Santos, Q., Nogueira, B. M., Rodrigues, V. M., Hartwell, H., Giboreau, A., Monteleone, E., Dinnella, C., & Perez-Cueto, F. J. (2018). Nudging using the 'dish of the day' strategy does not work for plant-based meals in a Danish sample of adolescent and older people. *International Journal of Consumer Studies*, 42(3), 327-334.
- Downs, J. S., Loewenstein, G., & Wisdom, J. (2009). Strategies for Promoting Healthier Food Choices. *American Economic Review*, 99(2), 159-164.
<https://doi.org/http://www.aeaweb.org/aer/>
- Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Seyboth, K., Matschoss, P., Kadner, S., Zwickel, T., Eickemeier, P., Hansen, G., & Schlömer, S. (2011). IPCC special report on renewable energy sources and climate change mitigation. *Prepared By Working Group III of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK*. https://www.ipcc.ch/site/assets/uploads/2018/03/SRREN_FD_SPM_final-1.pdf
- Engle, T., & Spears, J. (2004). Effect of finishing system (feedlot or pasture), high-oil maize, and copper on conjugated linoleic acid and other fatty acids in muscle of finishing steers. *Animal Science*, 78, 261-269.
- Farm-To-Consumer Legal Defense Fund. (2010-2022). *Raw Milk Nation - Interactive Map*.
<https://www.farmtoconsumer.org/raw-milk-nation-interactive-map/>
- Fehrenbach, K. S., Richter, A. C., & Santo, R. E. (2015). A critical examination of the available data sources for estimating meat and protein consumption in the USA. *Public health nutrition*, 1-10.
- Feinberg, J. (1971). Legal paternalism. *Canadian journal of philosophy*, 1(1), 105-124.
- Feinberg, J. (1973). Hard cases for the harm principle. *Social Philosophy*, 36-54.
- Feinberg, J. (1984a). *The moral limits of the criminal law* (Vol. 1-4). Oxford University Press.
- Feinberg, J. (1984b). *The moral limits of the criminal law: Harm to others* (Vol. 1). Oxford University Press.
- Feinberg, J. (1984c). *The moral limits of the criminal law: Harm to self* (Vol. 3). Oxford University Press.
- Food and Agriculture Organization of the United Nations. (2014). *The state of world fisheries and aquaculture, 2014*. Food and Agriculture Organization of the United Nations.
<https://www.fao.org/3/i3720e/i3720e.pdf>
- Fraser, G. E. (2009). Vegetarian diets: what do we know of their effects on common chronic diseases? *The American journal of clinical nutrition*, 89(5), 1607S-1612S.
<https://doi.org/10.3945/ajcn.2009.26736K>

- Fry, J. P., Love, D. C., MacDonald, G. K., West, P. C., Engstrom, P. M., Nachman, K. E., & Lawrence, R. S. (2016). Environmental health impacts of feeding crops to farmed fish. *Environment international*, 91, 201-214.
- Garnett, E. E., Balmford, A., Sandbrook, C., Pilling, M. A., & Marteau, T. M. (2019). Impact of increasing vegetarian availability on meal selection and sales in cafeterias. *Proceedings of the national academy of sciences*, 116(42), 20923-20929.
- Geiker, N. R. W., Bertram, H. C., Mejbourn, H., Dragsted, L. O., Kristensen, L., Carrascal, J. R., Bügel, S., & Astrup, A. (2021). Meat and human health—Current knowledge and research gaps. *Foods*, 10(7), 1556.
- Gentile, D. (2014, 7/9/2014). The 11 Untold Secrets of Menu Design. *Thrillist*. <https://www.thrillist.com/eat/nation/restaurant-menu-secrets-menu-design>
- Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A., & Tempio, G. (2013). *Tackling climate change through livestock: a global assessment of emissions and mitigation opportunities*. Food and Agriculture Organization of the United Nations (FAO).
- Glanz, K., Resnicow, K., Seymour, J., Hoy, K., Stewart, H., Lyons, M., & Goldberg, J. (2007). How major restaurant chains plan their menus: the role of profit, demand, and health. *American Journal of Preventive Medicine*, 32(5), 383-388.
- Godfray, H. C. J., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., Pierrehumbert, R. T., Scarborough, P., Springmann, M., & Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science*, 361(6399), eaam5324.
- Goldberg, A. M., & Rollin, B. (2015). Perspective 12.1. Husbandry and Industry: Animal Agriculture, Animal Welfare, and Human health. In R. Neff (Ed.), *Introduction to the U.S. Food System. Public Health, Environment, and Equity* (pp. 294-296). Jossey-Bass.
- GRACE Communications Foundation. (2022). *The Monday Campaigns - Meatless Monday*. GRACE Communications Foundation. <https://www.mondaycampaigns.org/meatless-monday>
- Grassian, D. T. (2020). The dietary behaviors of participants in UK-based meat reduction and vegan campaigns—A longitudinal, mixed-methods study. *Appetite*, 154, 104788.
- Greene, J. L. (2016). USDA's 'GIPSA Rule' on Livestock and Poultry Marketing Practices. R41673. *Washington, DC: Congressional Research Service*.
- Gromfin, R. (2014). *What is Menu Engineering* The Restaurant Boss https://www.youtube.com/watch?v=O8c8F_020r0
- Guéguen, N., Jacob, C., & Ardiccioni, R. (2012). Effect of watermarks as visual cues for guiding consumer choice: An experiment with restaurant menus. *International Journal of Hospitality Management*, 31(2), 617-619.
- Hartmann, C., & Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. *Trends in Food Science & Technology*, 61, 11-25.
- Harvey, F. (2016, March 21. 2016). Eat less meat to avoid dangerous global warming, scientists say. *The Guardian*. <http://www.theguardian.com/environment/2016/mar/21/eat-less-meat-vegetarianism-dangerous-global-warming>

- Hasan, M. R., Hecht, T., De Silva, S., & Tacon, A. (2007). *Study and analysis of feeds and fertilizers for sustainable aquaculture development*. Food and Agriculture Organization of the United Nations.
- Hensdill, C. (1998). A guide to menu engineering. *Hotels*, 32(1), 69-72.
- Hertwich, E. (2010). *Assessing the environmental impacts of consumption and production: priority products and materials*. UNEP/Earthprint.
- Hoekstra, A. Y., & Mekonnen, M. M. (2012). The water footprint of humanity. *Proceedings of the national academy of sciences*, 109(9), 3232-3237.
- Hollenbeck, J. E. (2016). Interaction of the role of Concentrated Animal Feeding Operations (CAFOs) in Emerging Infectious Diseases (EIDS). *Infect Genet Evol*, 38, 44-46. <https://doi.org/10.1016/j.meegid.2015.12.002>
- Homonoff, T. A. (2018). Can small incentives have large effects? The impact of taxes versus bonuses on disposable bag use. *American Economic Journal: Economic Policy*, 10(4), 177-210.
- Ichikawa, M., Nakahara, S., & Wakai, S. (2002). Mortality of front-seat occupants attributable to unbelted rear-seat passengers in car crashes. *The Lancet*, 359(9300), 43-44.
- Imhoff, D. (2010). *The CAFO reader: the tragedy of industrial animal factories*. Watershed Media.
- Imhoff, D., & Badaracoo, C. (2019). Who Benefits from the Farm Bill? In *The Farm Bill* (pp. 11-17). Springer.
- International Agency for Research on Cancer. (2015, October 26, 2015). *IARC Monographs evaluate consumption of red meat and processed meat*. https://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf
- Jensen, J. D., & Smed, S. (2013). The Danish tax on saturated fat—short run effects on consumption, substitution patterns and consumer prices of fats. *Food policy*, 42, 18-31.
- Johnson III, J. A., & Johnson, A. M. (2015). Urban-rural differences in childhood and adolescent obesity in the United States: A systematic review and meta-analysis. *Childhood Obesity*, 11(3), 233-241.
- Jou, J., Niederdeppe, J., Barry, C. L., & Gollust, S. E. (2014). Strategic messaging to promote taxation of sugar-sweetened beverages: lessons from recent political campaigns. *American Journal of Public Health*, 104(5), 847-853.
- Just, D. R., & Wansink, B. (2009). Smarter lunchrooms: using behavioral economics to improve meal selection. *Choices*, 24(3), 1-7.
- Kahleova, H., Levin, S., & Barnard, N. (2017). Cardio-Metabolic Benefits of Plant-Based Diets. *Nutrients*, 9(8), 848. <https://www.mdpi.com/2072-6643/9/8/848>
- Kaiser, F. G., Henn, L., & Marschke, B. (2020). Financial rewards for long-term environmental protection. *Journal of Environmental Psychology*, 68, 101411.
- Kass, N. E. (2001). An ethics framework for public health. *American Journal of Public Health*, 91(11), 1776-1782.
- Kearney, J. (2010). Food consumption trends and drivers. *Philosophical transactions of the royal society B: biological sciences*, 365(1554), 2793-2807.
- Kelly, T. J., Kiefer, N. M., & Burdett, K. (1994). A demand-based approach to menu pricing. *The Cornell Hotel and Restaurant Administration Quarterly*, 35(1), 48-52.

- Khazan, O. (2014). The Restaurant Menu That Nudges People Toward Healthy Food. *The Atlantic*. <http://www.theatlantic.com/health/archive/2014/08/the-restaurant-menu-that-will-make-people-want-to-buy-healthy-food/375625/>
- Kim, B., Horrigan, L., Love, D. C., & Nachman, K. E. (2015). Food Animal Production. In R. Neff (Ed.), *Introduction to the U.S. Food System. Public Health, Environment, and Equity* (pp. 289-315). Jossey-Bass.
- Kim, B., Neff, R., Santo, R., & Vigorito, J. (2015). *The Importance of Reducing Animal Product Consumption and Wasted Food in Mitigating Catastrophic Climate Change*. Johns Hopkins Center for a Livable Future.
- Kincaid, C. S., & Corsun, D. L. (2003). Are consultants blowing smoke? An empirical test of the impact of menu layout on item sales. *International Journal of Contemporary Hospitality Management*, 15(4), 226-231.
- Kivela, J. (2004). Results of a qualitative approach to menu planning using control and experimental groups. *Journal of Foodservice Business Research*, 6(4), 43-65.
- Krkošek, M., Lewis, M. A., Morton, A., Frazer, L. N., & Volpe, J. P. (2006). Epizootics of wild fish induced by farm fish. *Proceedings of the national academy of sciences*, 103(42), 15506-15510.
- Kurz, V. (2018). Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and management*, 90, 317-341.
- Kwasny, T., Dobernig, K., & Riefler, P. (2022). Towards reduced meat consumption: A systematic literature review of intervention effectiveness, 2001–2019. *Appetite*, 168, 105739.
- Kwong, L. Y. L. (2005). The application of menu engineering and design in Asian restaurants. *International Journal of Hospitality Management*, 24(1), 91-106.
- Lagasse, L., & Neff, R. (2010). Balanced menus: A pilot evaluation of implementation in four San Francisco Bay Area hospitals. *Baltimore (MD): John Hopkins School of Public Health*.
- Lam, Y., Fry, J. P., & Nachman, K. E. (2019). Applying an environmental public health lens to the industrialization of food animal production in ten low-and middle-income countries. *Globalization and health*, 15(1), 1-20.
- Lappé, A. (2016). *Lobbyists distort our idea of a healthy diet*. Al Jazeera America. <http://america.aljazeera.com/opinions/2016/1/lobbyists-distort-our-idea-of-a-healthy-diet.html>
- Lasky, T., Sun, W., Kadry, A., & Hoffman, M. K. (2004). Mean total arsenic concentrations in chicken 1989-2000 and estimated exposures for consumers of chicken. *Environmental health perspectives*, 112(1), 18-21.
- Li, Q., Ma, C., Zhang, Q., & Shi, H. (2021). Microplastics in shellfish and implications for food safety. *Current Opinion in Food Science*, 40, 192-197.
- Lin, B.-H., & Mentzer Morrison, R. (2012). Food and Nutrient Intake Data: Taking a Look at the Nutritional Quality of Foods Eaten at Home and Away From Home. *Amber Waves*. <http://www.ers.usda.gov/amber-waves/2012-june/data-feature-food-and-nutrient-intake-data.aspx#.V12vePkrLIU>

- Liu, J.-H., Jones, S. J., Sun, H., Probst, J. C., Merchant, A. T., & Cavicchia, P. (2012). Diet, physical activity, and sedentary behaviors as risk factors for childhood obesity: an urban and rural comparison. *Childhood Obesity (Formerly Obesity and Weight Management)*, 8(5), 440-448.
- Lockyer, T. (2006). Would a restaurant menu item by any other name taste as sweet? *Hospitality Review*, 24(1), 3.
- Lombardini, C., & Lankoski, L. (2013). Forced choice restriction in promoting sustainable food consumption: Intended and unintended effects of the mandatory vegetarian day in Helsinki schools. *Journal of consumer policy*, 36(2), 159-178.
- López-Alt, J. K. (2016, Mar 8, 2016). Why Is My Vegan Entree as Expensive as the Meat? *Serious Eats*. <http://www.serious-eats.com/2016/03/menu-pricing-vegan-vegetarian-meat.html>
- Lutfiyya, M. N., Lipsky, M. S., Wisdom-Behounek, J., & Inpanbutr-Martinkus, M. (2007). Is rural residency a risk factor for overweight and obesity for US children? *Obesity*, 15(9), 2348-2356.
- Mallin, M. A., & Cahoon, L. B. (2003). Industrialized animal production—a major source of nutrient and microbial pollution to aquatic ecosystems. *Population and Environment*, 24(5), 369-385.
- Mandell, I., Buchanan-Smith, J., & Campbell, C. (1998). Effects of forage vs grain feeding on carcass characteristics, fatty acid composition, and beef quality in Limousin-cross steers when time on feed is controlled. *Journal of Animal Science*, 76(10), 2619-2630.
- Maxwell, J. A. (2012). *Qualitative research design: An interactive approach*. Sage publications.
- McCall, M., & Lynn, A. (2008). The effects of restaurant menu item descriptions on perceptions of quality, price, and purchase intention. *Journal of Foodservice Business Research*, 11(4), 439-445.
- Megson, D., Brown, T., Jones, G. R., Robson, M., Johnson, G. W., Tiktak, G. P., Sandau, C. D., & Reiner, E. J. (2022). Polychlorinated biphenyl (PCB) concentrations and profiles in marine mammals from the North Atlantic Ocean. *Chemosphere*, 288, 132639.
- Meiselman, H. L., Hedderley, D., Staddon, S. L., Pierson, B. J., & Symonds, C. R. (1994). Effect of Effort on Meal Selection and Meal Acceptability in a Student Cafeteria. *Appetite*, 23(1), 43-55. <https://doi.org/http://dx.doi.org/10.1006/appe.1994.1033>
- Melina, V., Craig, W., & Levin, S. (2016). Position of the Academy of Nutrition and Dietetics: vegetarian diets. *Journal of the Academy of Nutrition and Dietetics*, 116(12), 1970-1980.
- Mill, J. S. (2002). *On liberty*. Dover Publications
- Min, H. (2013). Large-sized soda ban as an alternative to soda tax. *Cornell JL & Pub. Pol'y*, 23, 187.
- Moore, T. C., Fong, J., Hernández, A. M. R., & Pogreba-Brown, K. (2021). CAFOs, novel influenza, and the need for One Health approaches. *One Health*, 13, 100246.
- Morrison, P. (1997). Menu engineering in upscale restaurants. *British Food Journal*, 99(10), 388-395.
- Moslehi, N., Asghari, G., Mirmiran, P., & Azizi, F. (2021). Longitudinal association of dietary sources of animal and plant protein throughout childhood with menarche. *BMC pediatrics*, 21(1), 1-7.

- Mozaffarian, D. (2016). Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity A Comprehensive Review. *Circulation*, 133(2), 187-225.
- Mulders, M., Haenen, A., Geenen, P., Vesseur, P., Poldervaart, E., Bosch, T., Huijsdens, X., Hengeveld, P., Dam-Deisz, W., & Graat, E. (2010). Prevalence of livestock-associated MRSA in broiler flocks and risk factors for slaughterhouse personnel in The Netherlands. *Epidemiology and infection*, 138(05), 743-755.
- Naipaul, S., & Parsa, H. (2001). Menu price endings that communicate value and quality. *Cornell Hotel and Restaurant Administration Quarterly*, 42(1), 26-37.
- National Conference of State Legislatures. (2016). *State Milk Laws*.
<https://www.ncsl.org/research/agriculture-and-rural-development/raw-milk-2012.aspx#2>
- National Public Radio. (2012). *After Uproar, USDA Walks Back 'Meatless Monday' Support*. National Public Radio. <http://www.npr.org/sections/thetwo-way/2012/07/26/157432998/after-uproar-usda-walks-back-meatless-monday-support>
- Nature Conservancy. (2016a). *Climate Change Impacts, Heat-Related Illness and Disease*. The Nature Conservancy. <http://www.nature.org/ourinitiatives/urgentissues/global-warming-climate-change/threats-impacts/human-health.xml>
- Nature Conservancy. (2016b). *Climate Change Impacts, Increased Risk of Drought, Fire, and Floods*. The Nature Conservancy.
<http://www.nature.org/ourinitiatives/urgentissues/global-warming-climate-change/threats-impacts/drought-fire-floods.xml>
- Neff, R. A., Edwards, D., Palmer, A., Ramsing, R., Righter, A., & Wolfson, J. (2018). Reducing meat consumption in the USA: a nationally representative survey of attitudes and behaviours. *Public Health Nutr*, 21(10), 1835-1844.
<https://doi.org/10.1017/s1368980017004190>
- New York Statewide Coalition of Hispanic Chambers of Commerce v. New York City Department of Health and Mental Hygiene, 23, 110 A.D.3d 1, 970 N.Y.S.2d 200, 2013 N.Y. Slip Op. 05505 (Supreme Court, Appellate Division, First Department, New York 2013).
- Nigra, A. E., Nachman, K. E., Love, D. C., Grau-Perez, M., & Navas-Acien, A. (2017). Poultry consumption and arsenic exposure in the US population. *Environmental health perspectives*, 125(3), 370-377.
- Nuffield Council on Bioethics. (2007). *Public health: ethical issues*.
- Nys, T. R., & Engelen, B. (2017). Judging nudging: Answering the manipulation objection. *Political Studies*, 65(1), 199-214.
- Orlich, M. J., Jaceldo-Siegl, K., Sabaté, J., Fan, J., Singh, P. N., & Fraser, G. E. (2014). Patterns of food consumption among vegetarians and non-vegetarians. *British journal of nutrition*, 112(10), 1644-1653.
- Osterberg, D., & Wallinga, D. (2004). Addressing externalities from swine production to reduce public health and environmental impacts. *American Journal of Public Health*, 94(10), 1703-1708.

- Oxman, A. D., Fretheim, A., Lewin, S., Flottorp, S., Glenton, C., Helleve, A., Vestrheim, D. F., Iversen, B. G., & Rosenbaum, S. E. (2022). Health communication in and out of public health emergencies: to persuade or to inform? *Health Research Policy and Systems*, 20(1), 1-9.
- Ozdemir, B. (2012). A review on menu performance investigation and some guiding propositions. *Journal of Foodservice Business Research*, 15(4), 378-397.
- Ozdemir, B., & Caliskan, O. (2015). Menu Design: A Review of Literature. *Journal of Foodservice Business Research*, 18(3), 189-206.
- Pahlow, M., van Oel, P., Mekonnen, M., & Hoekstra, A. (2015). Increasing pressure on freshwater resources due to terrestrial feed ingredients for aquaculture production. *Science of the Total Environment*, 536, 847-857.
- Parry, M., Canziani, O., Palutikof, J., Van der Linden, P., & Hanson, C. (2007). *Climate Change 2007 - Impacts, Adaptation and Vulnerability* Contribution of working group II to the fourth assessment report of the IPCC.
- Peters, J. C., Beck, J., Lande, J., Pan, X., Cardel, M., Ayoob, K., & Hill, J. (2015). Using healthy defaults in Walt Disney World restaurants to improve nutritional choices. *Journal of the Association for Consumer Research*, 1(1), 92-103.
- Physicians Committee for Responsible Medicine. (2022). *Healthy School Food*. Physicians Committee for Responsible Medicine. <https://www.pcrm.org/good-nutrition/healthy-communities/healthy-school-food>
- Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite*, 91, 114-128.
- Piester, H. E., DeRieux, C. M., Tucker, J., Buttrick, N. R., Galloway, J. N., & Wilson, T. D. (2020). "I'll try the veggie burger": Increasing purchases of sustainable foods with information about sustainability and taste. *Appetite*, 155, 104842.
- Popkin, B. M., & Ng, S. W. (2021). Sugar-sweetened beverage taxes: Lessons to date and the future of taxation. *PLoS medicine*, 18(1), e1003412.
- Powers, M. (2018). Food, fairness, and global markets. *The Oxford Handbook of Food Ethics*, 367.
- Pulkkinen, H., Roininen, T., Katajajuuri, J.-M., & Järvinen, M. (2016). Development of a Climate Choice meal concept for restaurants based on carbon footprinting. *The International Journal of Life Cycle Assessment*, 21(5), 621-630.
- Rapp, G. (2009, 8/5/16). *Menu Engineers. The Psychology of Eating Out*. [Interview]. YouTube. https://www.youtube.com/watch?v=aZ_G2gQr8Uw
- Ratcliffe, M., Burd, C., Holder, K., & Fields, A. (2016). Defining rural at the US Census Bureau. *American community survey and geography brief*, 1(8), 1-8.
- Reducitarian Foundation. (2022). *Reducitarian Foundation*. Reducitarian Foundation. <https://www.reducetarian.org/>
- Reynolds, D., Merritt, E. A., & Pinckney, S. (2005). Understanding menu psychology: An empirical investigation of menu design and consumer response. *International Journal of Hospitality & Tourism Administration*, 6(1), 1-9.
- Rogers, D. (2013, June 25, 2013). Bye-bye 'Meatless Mondays'. *Politico*. <http://www.politico.com/story/2013/06/bye-bye-meatless-mondays-093349>

- Rollin, B. E. (2014). This ain't agriculture. In G. Marvin & S. McHugh (Eds.), *Routledge Handbook of Human-Animal Studies* (pp. 84-96). Routledge.
- Rossi, J., & Yudell, M. (2012). The use of persuasion in public health communication: an ethical critique. *Public Health Ethics*, 5(2), 192-205.
- Rozin, P., Hormes, J. M., Faith, M. S., & Wansink, B. (2012). Is meat male? A quantitative multimethod framework to establish metaphoric relationships. *Journal of Consumer Research*, 39(3), 629-643.
- Rozin, P., Scott, S., Dingley, M., Urbanek, J. K., Jiang, H., & Kaltenbach, M. (2011). Nudge to nobesity I: Minor changes in accessibility decrease food intake. *Judgment and Decision Making*, 6(4), 323.
- Ruiz, J. M., Pérez, M., & Romero, J. (2001). Effects of fish farm loadings on seagrass (*Posidonia oceanica*) distribution, growth and photosynthesis. *Marine Pollution Bulletin*, 42(9), 749-760.
- Rylander, R. (1986). Role of endotoxins in the pathogenesis of respiratory disorders. *European journal of respiratory diseases. Supplement*, 154, 136-144.
- Saini, R. K., & Keum, Y.-S. (2018). Omega-3 and omega-6 polyunsaturated fatty acids: Dietary sources, metabolism, and significance—A review. *Life sciences*, 203, 255-267.
- Saksena, M., Okrent, A., Anekwe, T. D., Cho, C., Dicken, C., Effland, A., Elitzak, H., Guthrie, J., Hamrick, K., & Hyman, J. (2018). *America's Eating Habits: Food Away from Home, 2018*. U.S. Department of Agriculture, Economic Research Service
- Satija, A., Bhupathiraju, S. N., Spiegelman, D., Chiuve, S. E., Manson, J. E., Willett, W., Rexrode, K. M., Rimm, E. B., & Hu, F. B. (2017). Healthful and Unhealthful Plant-Based Diets and the Risk of Coronary Heart Disease in U.S. Adults. *Journal of the American College of Cardiology*, 70(4), 411-422. <https://doi.org/doi:10.1016/j.jacc.2017.05.047>
- Saulais, L., Massey, C., Perez-Cueto, F. J., Appleton, K. M., Dinnella, C., Monteleone, E., Depezay, L., Hartwell, H., & Giboreau, A. (2019). When are “Dish of the Day” nudges most effective to increase vegetable selection? *Food policy*, 85, 15-27.
- Schiffman, S. S., Miller, E. A. S., Suggs, M. S., & Graham, B. G. (1995). The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents. *Brain research bulletin*, 37(4), 369-375.
- Schiffman, S. S., Walker, J. M., Dalton, P., Lorig, T. S., Raymer, J. H., Shusterman, D., & Williams, C. M. (2000). Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts. *Journal of Agromedicine*, 7(1), 7-81.
- Schindler, R. M., Parsa, H., & Naipaul, S. (2011). Hospitality Managers' Price-Ending Beliefs A Survey and Applications. *Cornell Hospitality Quarterly*, 52(4), 421-428.
- Schnepf, R. (2019). *2018 Farm Bill Primer: The Farm Safety Net*.
- Schwartz, L. M., & Woloshin, S. (2001). The case for letting information speak for itself. *Effective Clinical Practice*, 4(2).
- Sergentanis, T. N., Ntanasis-Stathopoulos, I., Tzanninis, I.-G., Gavriatopoulou, M., Sergentanis, I. N., Dimopoulos, M. A., & Psaltopoulou, T. (2019). Meat, fish, dairy products and risk of hematological malignancies in adults—a systematic review and meta-analysis of prospective studies. *Leukemia & lymphoma*.

- Seyitoğlu, F. (2016). A Conceptual Study on Menu Planning and The Selection of Menu Items. *Proceedings of The 7th MAC 2016*, 183.
- Shoemaker, S., Dawson, M., & Johnson, W. (2005). How to increase menu prices without alienating your customers. *International Journal of Contemporary Hospitality Management*, 17(7), 553-568.
- Shomaker, S. (1993). A proposal to improve the overall price value perception of a product line. *Journal of Restaurant & Foodservice Marketing*, 1(1), 89-101.
- Shukla, P. R., Skeg, J., Buendia, E. C., Masson-Delmotte, V., Pörtner, H.-O., Roberts, D., Zhai, P., Slade, R., Connors, S., & Van Diemen, S. (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. International Panel on Climate Change.
- Simopoulos, A. P. (2002). The importance of the ratio of omega-6/omega-3 essential fatty acids. *Biomedicine & pharmacotherapy*, 56(8), 365-379.
- Singh, P. N., Sabaté, J., & Fraser, G. E. (2003). Does low meat consumption increase life expectancy in humans? *The American journal of clinical nutrition*, 78(3), 526S-532S.
- Slapø, H. B., & Karevold, K. I. (2019). Simple eco-labels to nudge customers toward the most environmentally friendly warm dishes: An empirical study in a cafeteria setting. *Frontiers in Sustainable Food Systems*, 40.
- Smith, M., Love, D. C., Rochman, C. M., & Neff, R. A. (2018). Microplastics in seafood and the implications for human health. *Current environmental health reports*, 5(3), 375-386.
- Sobol, M. G., & Barry, T. E. (1980). Item positioning for profits: Menu boards at bonanza international. *Interfaces*, 10(1), 55-60.
- Spaargaren, G., Van Koppen, C., Janssen, A. M., Hendriksen, A., & Kolfschoten, C. J. (2013). Consumer responses to the carbon labelling of food: a real life experiment in a canteen practice. *Sociologia Ruralis*, 53(4), 432-453.
- Stahler, C. (2015). How often do Americans eat vegetarian meals? And how many adults in the US are vegetarian? . <http://www.vrg.org/blog/2015/05/29/how-often-do-americans-eat-vegetarian-meals-and-how-many-adults-in-the-u-s-are-vegetarian-2/>
- Stubbs, R., Scott, S., & Duarte, C. (2018). Responding to food, environment and health challenges by changing meat consumption behaviours in consumers.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- Thomsen, S. T., Assunção, R., Afonso, C., Boué, G., Cardoso, C., Cubadda, F., Garre, A., Kruisselbrink, J. W., Mantovani, A., & Pitter, J. G. (2021). Human health risk–benefit assessment of fish and other seafood: a scoping review. *Critical Reviews in Food Science and Nutrition*, 1-22.
- Thomson Reuters & National Public Radio. (2012). *Thomson Reuters - NPR Health Poll - Meat Consumption*.
https://media.npr.org/documents/2012/june/NPR_report_MeatConsumption_1203.pdf
- Turchini, G. M., Torstensen, B. E., & Ng, W. K. (2009). Fish oil replacement in finfish nutrition. *Reviews in Aquaculture*, 1(1), 10-57.

- Turner-McGrievy, G., Wirth, M. D., Hill, K. L., Dear, E. R., & Hébert, J. R. (2021). Examining commonalities and differences in food groups, nutrients, and diet quality among popular diets. *Clinical nutrition ESPEN*, 41, 377-385.
- U.S. Census Bureau. (2021). *2010 Urban Area FAQs. How many people reside in urban or rural areas for the 2010 Census? What percentage of the U.S. population is urban or rural?* <https://www.census.gov/programs-surveys/geography/about/faq/2010-urban-area-faq.html>
- U.S. Department of Agriculture. (2012, July 23, 2012). *Greening Headquarters Update* <http://www.zimmcomm.biz/usda/HQGreeningUpdatesJuly2012.pdf>
- U.S. Department of Agriculture. (2020). *Dietary Guidelines for Americans, 2020-2025*.
- U.S. Environmental Protection Agency. (2016). *U.S. Greenhouse Gas Inventory Report: 1990-2014*. <https://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html>
- Vallgård, S., Holm, L., & Jensen, J. D. (2015). The Danish tax on saturated fat: why it did not survive. *European journal of clinical nutrition*, 69(2), 223-226.
- Van Horn, L. (1997). Fiber, lipids, and coronary heart disease: a statement for healthcare professionals from the nutrition committee, American Heart Association. *Circulation*, 95(12), 2701-2704.
- Visschers, V. H., & Siegrist, M. (2015). Does better for the environment mean less tasty? Offering more climate-friendly meals is good for the environment and customer satisfaction. *Appetite*, 95, 475-483.
- Vital, S., Cardoso, C., Avio, C., Pittura, L., Regoli, F., & Bebianno, M. (2021). Do microplastic contaminated seafood consumption pose a potential risk to human health? *Marine Pollution Bulletin*, 171, 112769.
- Vorland, C. J., Bohan Brown, M. M., Cardel, M. I., & Brown, A. W. (2022). Traffic Light Diets for Childhood Obesity: Disambiguation of Terms and Critical Review of Application, Food Categorization, and Strength of Evidence. *Current Developments in Nutrition*, 6(3), nzac006.
- Walker, P., Rhubart-Berg, P., McKenzie, S., Kelling, K., & Lawrence, R. S. (2005). Public health implications of meat production and consumption. *Public health nutrition*, 8(04), 348-356.
- Wansink, B., & Hanks, A. S. (2013). Slim by design: serving healthy foods first in buffet lines improves overall meal selection. *PLoS One*, 8(10), e77055.
- Wansink, B., Painter, J. E., & Van Ittersum, K. (2001). Do Descriptive Menu Labels Bias a Person's Taste? *Cornell Hotel and Restaurant Administrative Quarterly*, 42(6), 68-72.
- Wansink, B., Van Ittersum, K., & Painter, J. E. (2005). How descriptive food names bias sensory perceptions in restaurants. *Food quality and preference*, 16(5), 393-400.
- Waycott, M., Duarte, C. M., Carruthers, T. J., Orth, R. J., Dennison, W. C., Olyarnik, S., Calladine, A., Fourqurean, J. W., Heck Jr, K. L., & Hughes, A. R. (2009). Accelerating loss of seagrasses across the globe threatens coastal ecosystems. *Proceedings of the national academy of sciences*, 106(30), 12377-12381.
- Wijendran, V., & Hayes, K. (2004). Dietary n-6 and n-3 fatty acid balance and cardiovascular health. *Annu. Rev. Nutr.*, 24, 597-615.

- Williams, C. D., Whitley, B. M., Hoyo, C., Grant, D. J., Iraggi, J. D., Newmgraman, K. A., Gerber, L., Taylor, L. A., McKeever, M. G., & Freedland, S. J. (2011). A high ratio of dietary n-6/n-3 polyunsaturated fatty acids is associated with increased risk of prostate cancer. *Nutrition research*, 31(1), 1-8.
- Williams, S. L. (2007). Introduced species in seagrass ecosystems: status and concerns. *Journal of Experimental Marine Biology and Ecology*, 350(1-2), 89-110.
- Wisdom, J., Downs, J. S., & Loewenstein, G. (2010). Promoting Healthy Choices: Information versus Convenience. *American Economic Journal. Applied Economics*, 2(2), 164-178.
- Wollenberg, E., Richards, M., Smith, P., Havlík, P., Obersteiner, M., Tubiello, F., Herold, M., Gerber, P., Carter, S., & Reisinger, A. (2016). Reducing emissions from agriculture to meet the 2° C target. *Global change biology*, 22(12), 3859-3864.
- World Health Organization. (2015). *Cancer: Carcinogenicity of the consumption of red meat and processed meat*. <https://www.who.int/news-room/questions-and-answers/item/cancer-carcinogenicity-of-the-consumption-of-red-meat-and-processed-meat#:~:text=An%20analysis%20of%20data%20from,cancer%20is%20not%20as%20strong>
- Wu, Y., Gu, Q., Cui, X., Zhu, Z., Zang, J., Wang, Z., Wu, F., & Shen, X. (2021). Higher poultry consumption was associated with an earlier age at menarche. *Acta Paediatrica*, 110(3), 889-895.
- Yang, S. S., Kimes, S. E., & Sessarego, M. M. (2009). Menu price presentation influences on consumer purchase behavior in restaurants. *International Journal of Hospitality Management*, 28(1), 157-160.
- Yelvington, B., & Shughart, W. F. (1997). Excise taxes in historical perspective. *Taxing choice: The predatory politics of fiscal discrimination*, 31-56.
- Zeraatkar, D., Johnston, B. C., Bartoszko, J., Cheung, K., Bala, M. M., Valli, C., Rabassa, M., Sit, D., Milio, K., & Sadeghirad, B. (2019). Effect of lower versus higher red meat intake on cardiometabolic and cancer outcomes: a systematic review of randomized trials. *Annals of internal medicine*, 171(10), 721-731.
- Zhou, X., Perez-Cueto, F. J., Dos Santos, Q., Bredie, W. L., Molla-Bauza, M. B., Rodrigues, V. M., Buch-Andersen, T., Appleton, K. M., Hemingway, A., & Giboreau, A. (2019). Promotion of novel plant-based dishes among older consumers using the 'dish of the day' as a nudging strategy in 4 EU countries. *Food quality and preference*, 75, 260-272.