Impact of COVID-19 Outbreaks at US Meatpacking Plants on Consumer Preference and Willingness to Pay for Safe Essential Worker Conditions: Evidence from Discrete Choice Survey Analysis

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Abstract

As we are in the midst of an unprecedented global pandemic, supply chains in nearly every industry broke, seemingly overnight. Long before the COVID-19 pandemic, Meatpacking plants were considered to be one of the most difficult and dangerous jobs a person could perform. Workers have complained for decades about horrid working conditions, low pay, and limited medical treatment for workplace injuries. In addition, Zoonotic pandemics, epidemics, and endemics are nothing new in our global society **?** Nevertheless, the emergence of these new diseases and viruses are perilous and usually spread rapidly, with meat processing facilities being uniquely primed for their spread.

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In the context of COVID-19, I empirically investigate whether consumers are willing to pay for safer working conditions in the production of meat products. Specifically, consumers' willingness to pay for fresh meat labeled as coming from a COVID-19 safe facility, with increasing prices representing additional COVID-19 protections for workers. I implement an online discrete choice survey experiment for three types of fresh meat and four alternative choices, per meat type, to elicit consumer valuation for safety characteristics via stated preferences. I use a natural quasi-experiment for treatment and control groups in which placement in the treatment group depends on the respondent or their loved one having been infected with COVID-19(Treatment), and all other respondents placed in the Control group. I estimate a model of consumer choices where a product is defined as a bundle of attributes: price, meat type, and safe working conditions. Varying the attribute space presented to consumers in the experimental-choice design gives us the data variation needed to estimate a discrete choice model as mixed Multinomial Logit specifications. In terms of safer working conditions, I estimate that, on average, consumers would need to be compensated by 25 cents per pound to choose products produced under safer supply-chain working conditions, relative to the average per pound price of 4 dollars and 53 cents for all options displayed. However, higher income individuals value safety more than lower income. Not surprisingly, consumers who were personally infected, or their loved ones, are significantly willing to pay a positive premium for safety compared to respondents not infected with COVID-19. Younger respondents also have a higher willingness to pay for safety than older respondents. These findings have policy implications in that they suggest a market based potential to nudge certain consumer segments who want purchase products from facilities with safer working conditions, namely, by revealing information in the form of a label.

1 Introduction

Understanding consumer preferences is of particular importance to understanding how consumer choices affect supply chain participants, such as firms, essential workers, local communities, and inadvertently, the consumers themselves. This paper attempts to explore how said preferences may change due to awareness towards supply-chain conditions for the essential workers who ensure our food reaches our homes. The rise of eco-labeling and no sweatshop labelsKimeldorf et al. (2006); Johnston et al. (2001) has created a market for sustainable and safe working condition purchasing options, however, currently, "worker-safe" labels are not available to guide consumers who want to follow a diet consistent with such values, especially in reference to COVID-19 making a revealed preference study infeasible. Changing consumers' dietary habits may have a significant impact on the production process if con-

sumers choose to purchase food options based, at least in part, on the conditions faced by workers involved in production. This paper empirically assesses whether consumers respond to information on the safety of workers that process the food they choose, given their personal experience with COVID-19. I utilized a McFadden-style discrete choice methodMcFadden (1974) in order to measure willingness to pay for fresh meat labeled as coming from a COVID-19 safe factory, with increasing prices from the conventional with the difference in profits going directly to additional COVID-19 protections for workers. Respondents had the option to choose conventional price Conventional prices per lb for were obtained from the US Bureau of Labor Statistics: Average Retail Food and Energy Prices, U.S. and Midwest Region data. with no additional worker safety measures(essentially, 'business-as-usual'), 5 percent added to the conventional price for additional worker protections, 10 percent added to the conventional price for increased worker protections, or an option that they do not eat meat/that type of meat. The three meat types respondents answered to were: Sliced Bacon, Boneless Chicken Breast, and Ground Beef. These meats were selected for their relative universal popularity, and the abundance of pork, chicken, and beef plants with COVID-19 outbreaks in the US.

1.0.1 Purpose

I am interested in understanding pandemic consumer behavior and consumer consciousness regarding COVID-19 outbreaks at US meatpacking plants and the subsequent community spread. Ideally, this will lead to a better understanding of how broadly understood the connection between factory farming and the risk for spread of future pandemics is among the general public, and if this may shift consumer behavior in demand for fresh meat coming from facilities operating business-as-usual. Specifically, how likely is it that consumer demand for additional COVID-19 protections for essential workers at US Meatpacking plants will increase given they or a loved one has been infected with COVID-19? The contribution of this research is twofold: (1) to estimate stated preferences and corresponding willingness to pay (WTP)

for worker safety in our food-systems, and (2) to investigate whether consumers respond to information about the safety consequences for laborers working in the production of the food they purchase. The availability of information about a product's safety attributes, such as the conditions workers encounter in the supply-chain, does not necessarily mean consumers will incorporate this information in their decision making, altering their behavior in their daily lives, thus not necessarily resulting in a change in WTP. This study provides a distribution of WTP estimates for attributes of food options during COVID-19 and an empirical test of whether consumers directly incorporate available information. In so doing, I equip resource managers and policy makers with important information on the efficacy of potential labels pertaining to worker and community safety in production, as well as a barometer-reading on consumer stated preferences.

1.1 Background and Importance

When the shelter-in-place orders shut down economies across the globe, news reports helped to increase awareness for precarious circumstances faced by essential workers who prop up our central infrastructure. Consumers were quickly inundated with reports of mass COVID-19 outbreaks within our food supply-chains, markedly at US meatpacking plants, which quickly became the epicenters of large COVID-19 outbreaks Taylor et al. (2020).https://www.wired.com/story/why meatpacking-plants-have-become-covid-19-hot-spots/ Outbreaks at these plants triggered meat shortages and widespread debates on the conditions facing workers. While Executive Order 13917 requiring meat processing plants to remain open fueled these debates, workers were left to choose between their lives and their livelihoods.

For many years, whistle-blowers have been bringing to light the massive environmental damage, health effects, and human rights violations associated with animal agriculture, such as deforestation and methane release, extreme water-use and pollution, air and soil contamination, unsafe and unclean working environments, and their facility's innate ability to be prime breeding grounds for the spread of zoonotic viruses and microbial movement. The

NRDC estimated in 2019 that 9.5-Billion animals are raised annually in the US alone for consumption https://www.nrdc.org/stories/industrial-agricultural-pollution-101. Their fast paced environments mean many can process,for example, an average of 10,000 hogs per day, and 36 chickens per minute, respectively. https://www.nytimes.com/2020/05/04/podcasts/the-daily/meat-processing-coronavirus.html Meatpacking facilities are uniquely primed for COVID-19's rapid spread. In fact, an NCBI study previously finding "substantial evidence of pathogen movement between and among these industrial facilities, release to the external environment, and exposure to farm workers" Graham et al. (2008). Workers stand shoulder-to-shoulder for 11+ hours per day, facilities are heavily air-conditioned, and floors are constantly steamed and wet for cleaning, and the loud environments mean workers must yell to communicate. These factors compound to allow for the effortless transmission of viruses and microbes.https://www.globalplayer.com/podcasts/episodes/7Drbmmj/ However, workers reported little to no safety information, training, or equipment over the first months of the pandemic and the implementation of the Defense Production Act exempting them from Stay-At-Home Orders.https://www.nytimes.com/2020/05/04/podcasts/the-daily/meat-processing-coronavirus.html. Not only was the Occupational Safety and Health Administration(OSHA) found not to be enforcing laws already in place to protect worker health and safety, but they also subsequently refused to issue new emergency temporary standards to address COVID-19.Taylor et al. (2020) OSHA and Industry inaction resulted in thousands of worker outbreaks across US Meatpacking plants.

Most recently and directly, we have seen many fisheries and meat, pork, and poultry plants shut down or experience substantial supply chain disruptions after massive coronavirus outbreaks in their US plants. According to the Washington Post, the meat supply chain broke in one month due to the coronavirus outbreak https://www.washingtonpost.com/business/2020/04/28/mea industry-supply-chain-faq/. Without a promise of increased protections, increased hazard pay, paid sick leave, or even consistent, clear guidelines workers could take to keep themselves safe. This is incredibly unsustainable. Some of the largest outbreaks of COVID-

19 in America have taken place in and around the factory farming and animal agriculture industry. A CDC report found that workers in 115 meat and poultry processing facilities across 19 states tested positive for COVID-19 in the month of April 2020 alone https://www.cdc.gov/mmwr/volumes/69/wr/mm6918e3.htm. As of June 11, 2020, "more than 24,000 coronavirus cases have been linked to US meat plants" https://thehill.com/policy/healthcare/5 nearly-90-percent-of-covid-19-cases-at-meat-plants-hit-minority-workers-cdc, 1,000 of which linked to one single Smithfield Pork packing plant in Sioux Falls, South Dakota https://www.motherjones.co coronavirus-workers-factory-jbs-tyson-smithfield-covid-crisis-sacrifice-outbreaks-beef/.

90 percent of the infected workers in America so far have been minority groups and people of color https://thehill.com/policy/healthcare/506190-nearly-90-percent-of-covid-19-cases-at-meat-plants-hit-minority-workers-cdc. This is noteworthy because environmental degradation and human rights violations associated with the animal agriculture sector is a sizable contributor to historical environmental injustices. Furthermore, continuous and sustained environmental injustices are thought to contribute to the vastly higher rates of COVID-19 infections and related deaths of minority groups I am interested in learning if these events will cause a greater desire in affected areas for more sustainable agricultural methods, increased worker's rights.

In Dec 2020, it was found that at least 8 percent of early COVID- 19 infections were tied to the meatpacking industryTaylor et al. (2020), and counties with a large meatpacking facility saw positive infection rates at least 5 times that of comparable counties without these plants. As of May 13th, 2021, 572 US meatpacking plants have had confirmed cases of Covid-19, at least 58,727 meatpacking workers have tested positive for Covid-19, and at least 293 meatpacking workers have lost their lives. https://thefern.org/2020/04/mapping-covid-19-in-meat-and-food-processing-plants/

1.2 Literature Review and Association to Current Research

This paper contributes to the literature surrounding dangerous working conditions among marginalized groups and consumer awareness in the context of a rapidly spreading global pandemic. A better understanding of consumer behavior amid a natural disaster is critical as it sheds light not only on consumer altruism for essential laborers but how consumers respond when the risk impacts them personally, their loved ones, and their communities in such a drastic way. A recent UC Davis study finding that, the "presence of a large beef-packing facility increases per capita infection rates 110 percent", "Large pork and chicken facilities increase transmission rates by 160 percent and 20 percent, respectively", and an "Economic impact of 11.2 billion dollars from deaths, health care costs, lost wages."Saitone et al. (2021)

An established body of literature investigates consumer preferences for working conditions such as child labor and sweatshops (see e.g, Harrison and Scorse (2004)).

Related literature investigates consumer utility and willingness to pay to end these unjust practices. Kimeldorf et al. (2006) looked at both stated and revealed preferences in the apparel sector to estimate consumer willingness to pay for athletic wear made under "Good Working Conditions"(GWC), which they define as "no child labor, no sweatshops, and safe workplaces." The study found that most consumers were eager to communicate their higher (yet decreasing with increased prices for the same product). The researchers found that 86 percent of consumers stated they would be willing to pay 1 dollar more for a 20 dollar garment made under GWC, and 61 percent said they would be willing to pay 5 dollar more for a 20 dollar garment made under GWC. In the revealed preference portion of the study, researchers added a GWC sticker to each pack of socks to further differentiate these from the socks with no labeling. Averaging across all trials, they found that about 30 percent of these consumers were willing to pay a premium to avoid products implied to have been made by sweatshop labor, assuming the signs were seen and understood.

Studying workplace safety within the global meatpacking sector prior to any outbreaks of

COVID-19 shows this has always been a dangerous occupation. A Bibliometric Analysis of Literature concerning injuries of repetitive efforts in workers from the Poultry sector looked at 52 articles aligned with their research theme and used 17 of these articles for analysis from which they found much consistency in repetitive injuries, increasing risk factors for musculoskeletal disorders of the upper extremities.Pinto et al. (2018) This is consistent with claims within the US and is unsurprising given poultry manufacturing facilities process an average of 36 chickens per minutehttps://www.globalplayer.com/podcasts/episodes/7Drbmmj/, a number that the industry and Trump administration attempted to increase throughout its tenure in Washington.

This paper contributes to the literature surrounding unsafe and unjust working conditions among marginalized groups, and consumer behavior in the context of a rapidly spreading global pandemic, specifically within the meat supply-chain. I focus the empirical strategy on this sector due to issues arising from, and highlighted by, the pandemic, to measure consumer preferences for safer working conditions. I closely follow and expand on the existing stated preference literature, which uses a variety of reduced-form and structural approaches to infer the value consumers place on different product attributes that are not observable by consumers at the point of purchase(in my case, examples include harsh or unsafe working conditions, worker access to health care, risk of serious injury or death, and microbial exposure). In the reduced form context, Hedonic price model approaches have been used to estimate relative values for food product attributes **?**McConnell and Strand (2000). Structurally, demand system approaches are estimated to place a willingness to pay for these attributes Teisl et al. (2001); **?**. This study is more closely related to this second literature stream. This paper asks whether consumers might be willing to pay for reduced worker dis-amenities associated with meat production.

1.3 Preliminary Results and Paper Outline

Overall, I find a negative average WTP for food options labeled as being produced under, and contributing to, safer working conditions. I estimate that consumers would, on average, need to be compensated by 25 cents per pound, to choose alternatives featuring the safe option among the alternatives presented to them. The range of estimated WTP for the safe attribute varies between a compensation of 3.82 dollars per pound (for those that surely dislike or do not prefer the given options), to a willingness to pay a premium of 3.60 dollars per pound more for the safe attribute. I find that the heterogeneity of the WTP estimates positively correlate with respondents' income and education, however, age seems to be negatively correlated with the WTP for safer working conditions. I also find that there is significant heterogeneity in the WTP along respondents' gender, race, and if they, or a loved one, had been infected with COVID-19.

The rest of the paper proceeds as follows. Section 2 describes Methods, in the empirical setting, the research design (i.e. the choice survey and identification strategies) and also summarizes the data. Section 3 outlines the model to estimate consumer choices and willingness to pay for product attributes. Section 4 presents the results of the choice model, and section 5 discusses the findings in terms of the average and the distribution of WTP in the sample. Finally, section 6 concludes and presents avenues of future research.

2 Methods

This study utilizes a discrete choice random sample survey to evaluate consumer preferences for work-place sustainability in the safer production of fresh meat. Based in Random Utility Models, Discrete choice experiments are among the most common methods for gathering stated preferenceLu et al. (2013) when revealed preference models are infeasible. The first step is to define a product as being made up of a set of attributes, and then ask respondents to choose a single option among four alternatives, simulating a setting that consumers could

realistically be presented with in the marketplace Tait et al. (2011); Gao and Schroeder (2009). In this section, I describe the survey implemented and its design, as well as report sample summary statistics showing initial evidence on consumer choice among popular fresh meat products, varying the degree to which their production has safer implications for essential workers.

2.1 Main Research Question of Interest

How likely is it that consumer demand for additional COVID-19 protections for essential workers at US Meatpacking plants will increase given they or a loved one has been infected with COVID-19?

2.2 Overview

The main point of interest that I examine is whether consumer preferences shifted towards choosing products from companies that actively protect their workers. Specifically, I design a survey to collect data from residents of the Midwest Region of the United States to test whether there is significant consumer demand surrounding an increase in sustainable and equitable supply-chains practices through their food choice at the hypothetical point of purchase.

The empirical approach to test social awareness towards essential worker risks brought on by the COVID-19 pandemic is to implement a survey modeled to gauge consumer consciousness in regards to worker and community safety in treated(individuals who, either themselves or a loved one, have tested positive for COVID-19), and control groups. I assess whether individuals in the treatment group have a higher willingness to pay for safer working conditions within the meatpacking sector. Respondents are asked to choose between average conventional per lb prices[1] for popular meat products and incrementally higher prices(5%

[1]Conventional prices per lb for were obtained from the US Bureau of Labor Statistics: Average Retail Food and Energy Prices, U.S. and Midwest Region data.

and 10%) that would go directly towards increased worker protections. As a fourth alternative, respondents are given the opportunity to choose none of the three given alternatives. In this model, I assume consumers would be notified that the facility is considered "COVID-19-Safe" via package labeling. Specifically, within each relative choice question, consumers are asked to "Assume higher cost options below would go directly to more COVID-19 protections for workers"

I estimate a model of consumer choice in which a product is defined as a bundle of attributes: price, production meat type, and information regarding safer working conditions through product labeling at the point of choice. Assuming consumers choose the option that maximizes their utility while varying the attribute space presented to consumers in the experimental choice design, and collecting data on consumer characteristics, allows for sufficient data variation to estimate a Logit discrete choice model. The estimated model parameters consist of estimated marginal utilities for price and marginal utilities for other product and individual characteristics.

Finally, by relating marginal utility for the safety attributes to the marginal utility of price allows me to estimate average willingness to pay for said features. In addition, I empirically test whether consumer demographic characteristics affect the willingness to pay. Lastly, by collecting information on whether respondents' or their loved ones at some point contracted COVID-19, I test whether, not only demographic elements, but also COVID-19 exposure significantly affects the consumers' willingness to pay for products hypothetically made under COVID-19 safe working conditions.

2.3 Survey Design

The survey, implemented mainly in late February, 2021, focused on stated preferences for worker safety at US Meatpacking Plants. Among supplemental COVID-19 behavior, impact, and opinion questions, I ask survey respondents questions regarding their demographics, whether they are essential workers, were unemployed due to the pandemic, and whether

they were able to shelter-in-place during the federally suggested mandates. These variables are used as the main characteristics of each respondent used in analysis. In terms assessing respondents' stated preferences for products produced with safer working conditions, I ask them to choose among four different options: one conventional, one safe, a second safe option with a higher price, and a last option not to choose any of the above. Each respondent is asked to repeat the process in three different choice scenarios varying the product; first for bacon, then boneless chicken breast, and finally, ground beef. These meat products were featured in this survey because of their universal popularity and their association to outbreaks in Midwestern processing facilities.

In order to designate placement among Treatment and Control groups, I ask respondents whether they or someone they love were infected with COVID-19. The group of respondents who selected "Yes" to the infection questions corresponds to the treated group, and the control group consists of those who responded "No"; both of which performed the choice experiment for each of the three meat products. The randomness of whether or not someone was infected with COVID-19 allows for a quasi-natural experiment. By comparing average responses in the treatment and control groups, I can test the role of COVID-19 exposure on food choices and estimated WTP for safe working conditions inferred via the structural choice model. This is done under the assumption that the control group is a good counterfactual to the treatment group.

2.3.1 Possible Biases and Solutions

Possible Biases include: Non-response Response Bias – responses collected via email – so anyone without an email address or reliable email access was likely left out of the sample, and strategic bias. Additional examination will need to be done to validate or refute these biases. Survey Company Completion Rate for this survey was 35.9%. 897 surveys were completed with 7 of those having to be omitted due to out of scope zip-codes. Analysis performed on 890 total responses.

The next subsection analyzes the balance of treatment and control groups and presents the summary statistics of the sample data used in the analysis.

2.4 Data and Summary Statistics

The survey instrument was sent to a total of 897 respondents, where the sample size was determined by budget constraints within the study. The survey was implemented via email by Alchemer(formerly, SurveyGizmo). The respondents were sampled from the Midwestern region of the United States due to the areas disproportionate share of meat processing plants, and this, COVID-19 outbreaks within this sector in 2020: Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Montana, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin.

Summary statistics of the data set are presented in Table **??**. This table is organized in two main parts. In the top we present the demographic components of survey respondents.

I then present the share and the number of respondents stating to have been unemployed due to the pandemic, the average share and the number of respondents classifying themselves as essential workers, the share of respondents stating they were able to shelter in place during the mandates.

In terms of descriptive statistics, the second set of rows in Table **??** presents frequencies by income. There is income variation in the survey sample, with the sample skewed towards respondents with income less than 90 thousand dollars, where the share of respondents earning less than 25 thousand dollars annual income is 23.4%. Only 8% of respondents fall into the two highest income groups.

In terms of reported education there is also considerable variation in the respondents' stated education, ranging from 4.2% having no high school diploma to 13.7% having earned a post university education diploma of a masters or PhD.

The sample has a white respondents' share of 82.6% which is on average consistent if not a bit less than the white population make up of the states we sampled from: Iowa - 90.6%,

Illinois- 76.8%, Indiana - 88.7%, Kansas - 86.3%, Michigan - 79.2% , Minnesota - 83.8%, Montana - 82.9%, North Dakota - 86.9%, Nebraska - 88.1%, Ohio - 81.7%, South Dakota - 84.6%, and Wisconsin - 87.0%, and is higher than the US average white percentage of 76.3%. Table **??** gives a breakdown of white respondent share by state in the sample.

The sample is skewed to women (with 65% share), with a total of 581 women, 296 men, and the remaining respondents stated non binary or preferred not to state. The activities of respondents are quite diverse, though 9% classify themselves as unemployed as their current status. Moving through **??** and **??**, we see that a higher share of respondents state a professional activity in the main activity status but classify themselves as unemployed due to the pandemic, a share of 20.4%. In the sample, 42.6% of the respondents classify themselves as essential workers. On average 56.6% of respondents state they were able to shelter during the mandates. Finally, a total of 625 respondents state that they (or a loved one) were infected with COVID-19 resulting in 70.02 percent of the 890 respondents being in the Treatment group. As I pursue the analysis of stated choices among food choices hypothetically produced under safe and not-safe working conditions. Seven respondents gave zip-codes located outside of the area of interest and were omitted from analysis, giving us a total of 890 valid responses.

2.5 Empirical Setting: Average Choices in Safe Working Conditions Survey

In **??**, I present the share of choice selected for for each type of meat between the presented options, broken-down by control group (left columns) and treated group (middle columns). The right-most columns report choice frequencies and proportions for all respondents. The four alternatives differ in price and in a Safety attribute presented at the time of choice. The "Safe" Options (labeled as coming from a "COVID-19 Safe Facility") are alternatives 2 and 3. The options considered not-safer are alternative 1, which is the conventionally priced option, and alternative 0 is choosing none of the other three.

Among all three meat choice situations, we see that, on average, respondents choose the conventional alternative (option 1) most frequently, between 37.1% and 39.5%. The second highest share of choices falls in alternative 2, the safe working conditions option with a lower price tag than the other safe option, alternative 3. Alternative 0 in **??** corresponds to choosing none of the other three alternatives and we see that, on average, respondents select this option least often, with an overall share between 5.4% and 11.1%.

For those not affected by COVID-19, and thus placed in the Control Group, we see the same statistics just described in the left-most columns of **??**. The same is reported for the Treated group in the middle columns. Comparing the proportion of choices between Treated and Control groups, we see that the safer alternatives are consistently chosen more often in the Treated than in the Control group, with the opposite consistently seen for the conventionally priced alternative 1. Interestingly, the proportion of respondents who opt for none of the three alternatives is notably smaller in the treatment group (between 3.4% and 8.6%), than in the Control group (between 10.2% and 17.0%), sliced bacon commanding the highest share of respondents stating that they wither don't eat meat, or simply don't eat bacon, specifically.

In the next section I describe the structural choice model that allows us to use the observed variation in choices among alternatives, their attributes, and the characteristics of respondents, including treatment status, to infer preferences towards safer working conditions of animal meats.

3 Empirical Strategy to Estimate WTP for Safety Attributes for Workers

The survey data—with individual respondent-specific choice information and demographics—enables us estimate heterogeneous preferences in an econometric discrete choice model.

Recognizing that products can be defined as a bundle of perceived attributes provides

the necessary framework to compute consumer preferences and, ultimately, willingness to pay for product attributes. Starting from a random utility structure(as in McFadden 1974; McFadden and Train 2000; Train 2003) where both the product attributes and the random term are assumed to enter linearly. The utility from consuming a particular product can be described as

$$U_{ji} = X_j\beta_i + \epsilon_{ji}. \tag{1}$$

The matrix X_j indicates the attributes of product j, the vector β_i indicates the marginal utility that individual i places on the perceived attributes, and ϵ_{ji} indicating the error term.

Distributional assumptions about β_i and ϵ_{ij} drive the model decision. If we assume that the extreme value of ϵ_{ij} is independently and identically distributed(iid), we then have a Logit choice model. Additionally specifying

$$\beta_i = \beta_0 + \beta_1 D_i, \tag{2}$$

gives a mixed Logit model, where the marginal utility coefficients vary according to the respondent's observed demographics D_i. This implies different decision-makers may have varying preferences.

Assuming that consumers choose the unit of product j among the possible alternatives N available at a given time that indirectly maximizes their utility, then the probability that good j is chosen can be read as the probability that good j maximizes consumer i's utility

$$\Pr(\text{Choice}_j) = \Pr(U_{ji} > U_{ki}) = \Pr(X_j\beta_i + \epsilon_{ji} > X_k\beta_i + \epsilon_{ki}), \forall k \neq j. \tag{3}$$

The following closed form solution can be derived for the probability that a respondent's choice corresponds to product j as

$$Prob_{ji} = \frac{e^{X_j\beta_i + \alpha \text{Price}_j}}{\sum_{k=0}^{N} e^{X_k\beta_i + \alpha \text{Price}_k}}, \tag{4}$$

where $\alpha = \alpha_0$ is the marginal utility with respect to price, and β_i contains the marginal utilities relative to the remaining attributes X for respondent i. The average utility for the choice of not choosing any of the given purchasing options presented to a respondent is normalized to zero. In other words, the attributes for the outside option are set equal to zero in all the experimental choice cases. This implies that equation (4) becomes

$$Prob_{ji} = \frac{e^{X_j\beta_i + \alpha \text{Price}_j}}{1 + \sum_{k=1}^{N} e^{X_k\beta_i + \alpha \text{Price}_k}}. \tag{5}$$

For this study, we have a Mixed Multinomial Logit model due to the choice set containing more than two(binary) alternatives, in addition to not choosing any of the purchasing alternatives (choosing the outside option).

Finally, given that each respondent makes T choice decisions (for the T different product categories, separately), then the probability of individual i making a sequence of choices among the N alternatives and the outside option ($j = 0, ...N$) is given as

$$S_i = \prod_{t=1}^{T} \prod_{j=0}^{N} \left[\frac{e^{X_{ijt}\beta_i + \alpha \text{Price}_{jt}}}{1 + \sum_{k=1}^{N} e^{X_{ikt}\beta_i + \alpha \text{Price}_{kt}}} \right]^{Y_{ijt}}, \tag{6}$$

where $Y_{ijt} = 1$ if the respondent i chooses alternative j for choice situation t, and 0 otherwise. Given a total of I respondents, the parameters $(\alpha, \beta_0, \beta_1)$ are estimated by maximizing the Log-Likelihood function

$$LL = \sum_{i=1}^{I} ln \prod_{t=1}^{T} \prod_{j=0}^{N} \left[\frac{e^{X_{ijt}\beta_i + \alpha \text{Price}_{jt}}}{1 + \sum_{k=1}^{N} e^{X_{ikt}\beta_i + \alpha \text{Price}_{kt}}} \right]^{Y_{ijt}}. \tag{7}$$

Here, consumers are asked to make three separate choice decisions among four alternatives, varying their respective price and safety characteristics. That is, $T = 3$ and $N = 4$. This means that we estimate our Mixed Multinomial Logit by Maximum Likelihood to investigate the preferences for safer working conditions.

The ultimate goal is to estimate average and heterogeneous marginal utility, and the resulting willingness to pay (WTP) for the product attributes of interest. We estimate β_i by Maximum Likelihood. The resulting estimates of each respondent's WTP for a particular attribute x_a are obtained as the ratio of β_i and the absolute value of the marginal utility with respect to price α, namely

$$WTP = \frac{\beta_i}{|\alpha|} = \left[\frac{\frac{\partial U_{ijt}}{\partial x_a}}{\frac{\partial U_{ijt}}{\partial Price}} \right] = \frac{\partial Price}{\partial x_a}. \tag{8}$$

This estimate gives us, in price measured in dollars per pound, the willingness to pay for increasing the characteristic x_a by one unit. We can therefore recover not only the average WTP, but also the way the WTP varies across respondent's demographics and other stated characteristics within the sample, including being in the treated group or, for example, being an essential worker.

4 Results: Safer Working Conditions

4.1 Mixed Multinomial Logit Regression Estimates

I present the results of the choice estimates originating from a Mixed Multinomial Logit(MMNL) format, where consumers are asked to choose among four alternatives, varying price, worker safety attributes, and not buying. I investigate whether there is significant average stated marginal utility for the safe options, as well as stated heterogeneity in the marginal utility as a function of observable characteristics of the respondents in terms of demographics and COVID-19 exposure. The coefficients are estimated by maximizing the log-likelihood of the sample, and I perform model comparisons using the Akaike Information Criterion (AIC) among the estimated parameters and use this to discuss the best model used when moving forward.

In **??** I present the estimates of the MMNL choice model parameters, where β_i are given by equation (2). The dependent variable in all regression columns is an indicator variable that is equal to one if the individual chose a safe alternative, and equal to zero otherwise. There are four alternatives to choose from in each of three meat product groups. All regressions include individual fixed effects, controlling for constant characteristics that may, on average, affect their choice behavior, as well as product fixed effects to control for unchanging qualities of each product.

In column (1), the independent variables are price, a product dummy(Constant), and an indicator $Safe$ equal to one if the alternative is listed as having been produced under safe working conditions. From the estimates in column (1) we see that the coefficient on price is negative and significant (-0.499), meaning that a higher price decreases the marginal utility of purchasing a safe alternative. The $Safe$ attribute has an average marginal utility of -0.204 which is negative and significant. This tells us that, on average, respondents have a marginal dis-utility in choosing the alternatives featuring a COVID-19 $Safe$ Facility disclaimer. Column (2) further adds whether a respondent is in the Treated Group(if the respondent or a loved one had COVID-19), as interactions of Treatment Status with the $Safe$ and Buy product attributes. Here, the Buy variable is a constant that indicates if the respondent chose any of the purchasing options. What we see is that, on average, people in the Control group(not infected with COVID-19) have a dis-utility from choosing the $safe$ attribute (point estimate of -0.430, whereas the Treated group, relative to the control group, has a positive and significant marginal utility for safety with a point estimate for the Treated and Safe Interaction being 0.320.

Column (3) adds demographic characteristic interactions, such as Level of Education and Age, with the variables in column (2). This framing allows us to estimate the average marginal utility for all variables in column (2), as well as departures from those averages with respect to observable characteristics of the respondents. Column (4) adds interactions between $Safe$ and reported essential worker or unemployment status, as well as interactions

if the respondent was able to shelter-in-place during the suggested directives. Column (5) adds triple interactions of Treated, Safe, and Demographics. Even though all the lower order terms of triple interactions are included in the specification in columns (3) (4), and (5), they are not all reported in **??** due to space limitations.

Looking at column (3) we find that the log likelihood increases to -3058.00, relative to -3101.00 in column (2), implying that column (3) explains more of the variation in choices than column (2). Moreover, when comparing models, the specifications in column (5) is ultimately preferred given its lower AIC estimate of 6043.3.

There is heterogeneity in columns (3) to (5) that the averages in (2) mask, given that many of the coefficients associated with the interaction of respondents' characteristics and the Safe attribute are statistically different from zero in columns (3) and (4), with the exception of identifying as White. In particular, looking at column (4), we see that the incremental marginal utility for the safe attribute decreases significantly with Age given the negative and significant coefficient of -0.010 on the interaction of "AgeSafe. Characteristics such as Income and Education are both positive and significant, indicating an increase in marginal utility for the safe attribute as the level for each variable increases.

Sheltered respondents value the safe attribute significantly relative to those that were not able to shelter given the positive and significant point estimate of the marginal utility for the interaction "ShelterSafe" equal to 0.760. Essential workers do not significantly value the safe attribute (point estimate of -0.105 but not significant(omitted from table output to save space), and neither do individuals who stated they became unemployed due to the pandemic: the interaction of "UnemployedSafe" having a non-significant coefficient of -0.157(also omitted from table output).

Looking at the estimates in Column (5) the demographic interactions with the safe attribute are mostly consistent with the estimates in column (4) and, additionally, due to treatment status, white respondents value the safe attribute significantly more if not affected by COVID (the coefficient on the interaction "WhiteSafe" has a positive and significant point

estimate of 0.346), but the white respondents exposed to COVID-19 (in the treatment group) do not seem to value the safety attribute, and have a remarkably lower marginal utility compared to the control group(treatment group interacted with WhiteSafe: "T-WhiteSafe", has a negative and highly significant point estimate of -0.854). For the treated group, higher education is associated with a higher marginal utility for the safe attribute than in the control group, given the point estimate of "T-EducSafe" of 0.540.

4.2 Key Takeaways

I find that on average people who, either themselves or a loved one, had COVID-19 value safe working conditions more than non-affected respondents, which is consistent with what I had originally suspected. Moreover, it's found that, overall, respondents with higher income, as well as younger respondents, put a positive and significant marginal utility on the safety attribute. Finally, there is no differential heterogeneity in the treatment group and in the control group in the way respondents value the safe attribute depending on their demographics, except for education, race, and Essential worker status(Additional treatment interactions omitted from output due to non-significance, to save table space). For the subsequent willingness to pay analysis in the following section, I use the choice estimates from column (5) of **??** because this regression has the lowest Akaike (AIC) criterion in the defined selections of 6043.3.

5 Willingness to Pay (WTP)

Dividing the marginal utilities of product attributes on average and interacted with respondents characteristics and treatment status by the marginal utility of price yields a data set of estimated willingness to pay for each of the respondents in the sample. The next subsections discuss the WTP estimates and how they relate to observable characteristics of respondents. I will analyze a series of graphical correlations and estimate a multivariate linear regression

model, in which the dependent variable is the respondent j WTP_j and the explanatory variables are the characteristics of the respondents given by the equation

$$WTP_j = \mu_0 + X_j\mu_1 + v_j, \tag{9}$$

where X_j is a matrix of characteristics of respondent j, μ_1 is a vector of parameters, and v_j are unobserved factors contributing to j's WTP.

5.1 Consumer WTP for Increased COVID-19 Safety Measures in US Meatpacking Plants

Each respondent's WTP for the safe attribute is obtained as the ratio between the marginal utility estimate of β_i for safety and the marginal utility of price α from the model estimates in **??**.

The variation in estimated individual divergence from the average WTP may be due to the fact that respondents have different demographic or stated characteristics, as well as treatment status. This is investigated by allowing the estimated marginal utilities β_i and the resulting WTP_i with respondents' demographics, essential worker and unemployment status, and exposure to COVID-19(The entire distributions are given in

Table 6 shows that, overall, respondents would need to be compensated to choose alternatives featuring the safe working condition option. The estimated (negative) WTP among respondents ranges from a compensation of 3.82 dollars per pound, to a willingness to pay a premium of 3.60 dollars per pound for safer working conditions. The average among all respondents is a compensation (discount) of 25 cents per pound to choose the products containing a safe attribute. Therefore, there is a fraction of respondents who do not value (preferring the conventionally priced option or preferring not to choose any of the given alternatives), and those who do value worker safety when it's disclosed in a discrete choice setting.

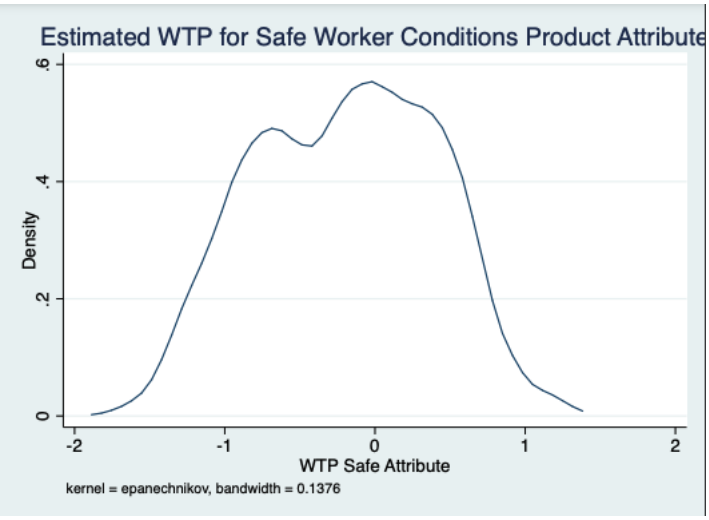

Figure 1

Variable	**n**	**Min**	**q_1**	**$\tilde{x}$**	**$\bar{x}$**	**q_3**	**Max**	**s**	**IQR**
Overall WTP	10032	-3.82	-1.22	-0.35	-0.25	0.76	3.60	1.35	1.98
For Treated Group	10032	0.00	0.00	0.19	0.13	0.19	0.19	0.09	0.19
By Income Range	10032	-0.48	-0.20	-0.14	-0.15	-0.07	0.00	0.13	0.14
By Age	10032	0.29	0.48	0.62	0.69	0.89	1.50	0.26	0.41
By Education Level	10032	0.00	0.27	0.54	0.56	0.80	0.80	0.23	0.54
Female	10032	0.00	0.00	0.35	0.23	0.35	0.35	0.17	0.35
Essential Workers	10032	-0.32	-0.32	0.00	-0.14	0.00	0.00	0.16	0.32
Unemployed Due to C-19	10032	0.00	0.00	0.00	0.06	0.00	0.30	0.12	0.00
Sheltered-In-Place	10032	0.00	0.00	0.30	0.18	0.30	0.30	0.15	0.30
White	10032	-0.67	-0.67	-0.67	-0.42	0.00	0.00	0.32	0.67

Table 6: Sample Summary Statistics for various individual characteristics.

Respondents with the most negative willingness to pay for the safe attribute are the oldest individuals in the sample, though additional demographics also help to explain variation in the estimated WTP. Figures 13 and 13 show correlations between estimated WTP_i for the safe attribute and demographic characteristics of the respondents in the sample.

The top left panel of Figure 13 depicts a scatter plot of the WTP and the income groups of respondents. It shows a positive relationship between the WTP and income (as shown in the fitted line added to the scatter plot in the top left panel). The top right panel repeats

5.1.1 Results Summary

I estimate a multivariate linear regression model(9) to further explore marginal effects of the individual's characteristics. The results in Table **??** can be interpreted as follows. The estimated parameters shed an interesting pattern with the estimated WTP, holding all characteristics equal. First, on average, respondents in the treated group (Respondent or a Loved One got COVID-19) value the safe attribute by 86 cents per pound more than the control group respondents, controlling for all other covariates in the model (income, education, age, etc), a finding consistent with past survey evidence during the pandemic where 25% of consumers believe that a company's treatment of its employees has increased in importance as a buying criterion since the crisis started.[2]

Income and Education have a positive, significant marginal effects on the WTP given the coefficients. Respondents who could shelter during the mandates are, on average, willing to pay 1.46 dollars more per pound for the safe attribute than the non-sheltered respondents, holding all else equal.

White respondents reveal a need to be offered an average 57.2 cents per pound discount relative to non-white respondents in order to choose the safe attribute.

Finally, one more year of age decreases WTP by about .027 cents per pound for the safe attribute, ceteris paribus. Meaning that a respondent 10 years older would need to be compensated, on average, about 27 cents more than a respondent 10 years younger. This result is consistent with evidence from past studies that find younger generations are motivated to include personal ethics when making purchase decisions than older adults.[3]

[2]https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/survey-us-consumer-sentiment-during-the-coronavirus-crisis#. Similarly, an Edelman report estimates that 81% of those surveyed expect brands to "do what is right." See https://www.edelman.com/sites/g/files/aatuss191/files/2020-06/2020%20Edelman%20Trust%20Barometer%20Specl%20Rept%20Brand%20Trust%20in%202020.pdf

[3]https://www.psfk.com/2017/12/psfk-launches-the-forecast-z-report.html

6 Conclusion

This paper investigates stated survey evidence on the U.S. population's willingness to pay for food produced under safer working conditions. It also uses two experimental treatments at the time of the survey implementation to estimate how willingness to pay is affected by information on how food choices impact our environment, and if COVID-19 affected consumer stated preferences are impacted by the COVID-19 pandemic. More specifically, we empirically determine if consumers would pay more for food if the increase in price helped to protect essential workers in food supply chains.

This study utilizes a discrete choice random sample survey to evaluate consumer preferences for work-place sustainability in the safer production of fresh meat. Based in Random Utility Models, Discrete choice experiments are among the most common methods for gathering stated preferenceSmall and Rosen (1981); McFadden and Train (2000); Hensher and Bradley (1993) when revealed preference models are infeasible. The first step is to define a product as being made up of a set of attributes, and then ask respondents to choose a single option among four alternatives, simulating a setting that consumers could realistically be presented with in the marketplace Lee and Hatcher (2001); Hoffman and Duncan (1988). In this section, I describe the survey implemented and its design, as well as report sample summary statistics showing initial evidence on consumer choice among popular fresh meat products, varying the degree to which their production has safer implications for essential workers.

I find when informing consumers about conditions faced by essential workers in meat-packing plants in regards to the COVID-19 pandemic, on average, respondents would have to be compensated to chose an option featuring a safe attribute relative to the alternatives presented. The average WTP is negative and is estimated to be -25 cents per pound, and the estimated WTP across all respondents ranges between -3.82 to 3.60 dollars per pound. Younger respondents seem to be willing to accept the lowest compensation or pay a positive premium to choose the safe attribute, while older respondents fall within those that dislike

safe options the most. The WTP for safety increases significantly among respondents in the Treatment group(who had, or a loved one had, COVID-19), as well as when interacting with income, education, and the ability to shelter-in-place and/or work-from-home during the federally suggested mandates.

6.0.1 Policy Implications

The consumer valuation estimates provide insights into the policy debate regarding how to label and present food products Tait et al. (2011) in the U.S. marketplace, specifically regarding consumer awareness for essential workers' labor conditions. While a comprehensive cost-benefit analysis would additionally require data on the cost of production, these findings have policy implications in that they suggest that for at least some consumers, there may be some demand-side, market-based potential to nudge the segments of consumers who want to choose products from companies who protect their workers.

6.1 Study Limitations and Recommendations for Future Research

This paper offers valuable insights into the effectiveness of revealing information in the form of effective product labeling. However, there are three potential limitations: (1) This study captured consumers' stated preferences and not actual behaviors, (2) the relatively small sample size, and (3) The sample showing to be a less than perfect representation of the overall U. S. population. At most, and in its current state, this study would only be applicable for the area and demographics surveyed.

Given that there can be distinct disparities between consumers' stated preferences and their actual purchasing behavior **?**, future work should extend the experimental approach into a retail-level consumer field study—using revealed preferences rather than survey choices, ideally based on a larger and more representative sample. Furthermore, future research should repeat the survey during non-pandemic years, given that the WTP estimates may differ if the analysis is performed in a stronger economy and when worker safety concerns

are less salient. We must remember that many millions of people have lost wages, jobs, and have had increased expenses in many cases over the COVID-19 pandemic. The economic crises brought on and worsened by COVID-19 would undoubtedly influence a person's stated willingness to pay an increased price for a good.

Additional Explanatory Tables and Graphs can be found at the end.

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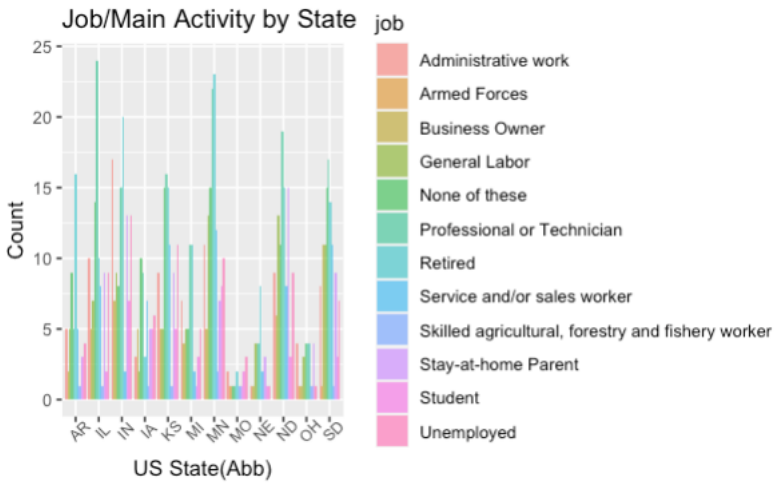

Figure 2

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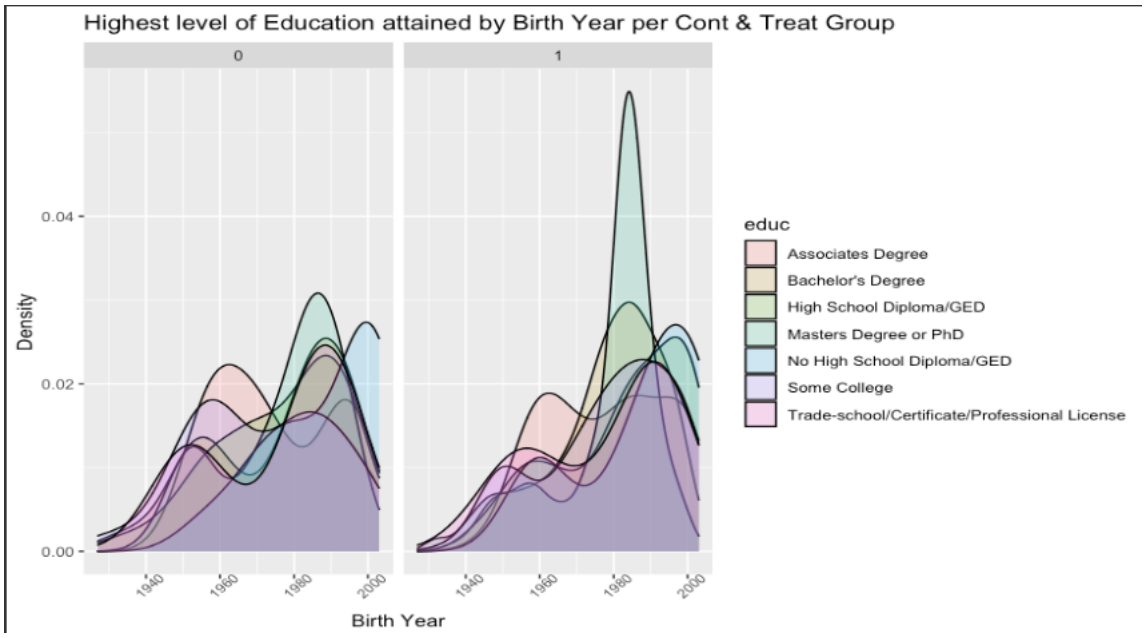

Figure 3

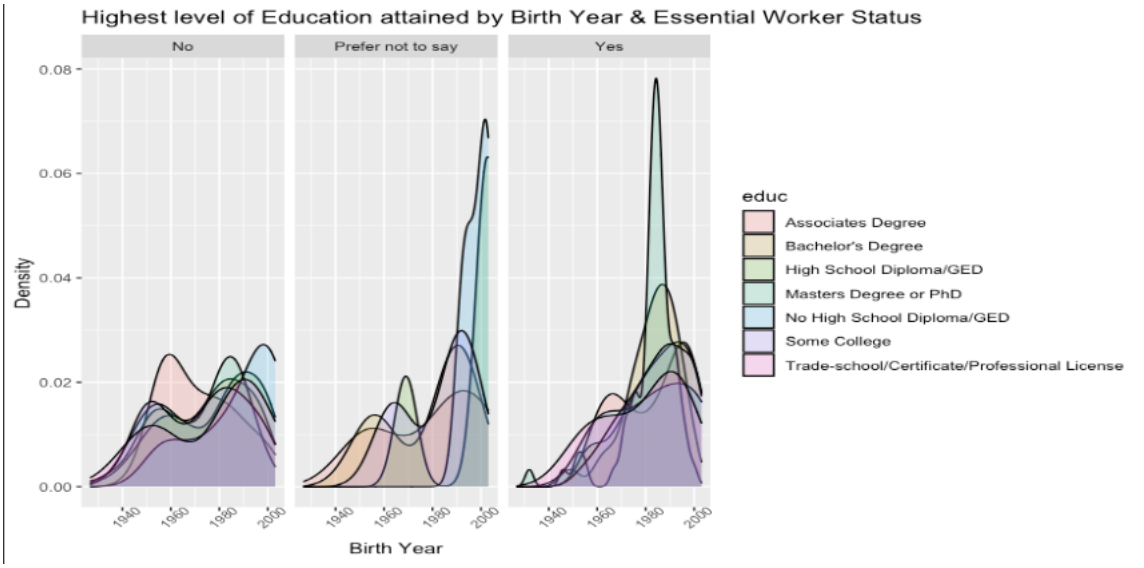

Figure 4

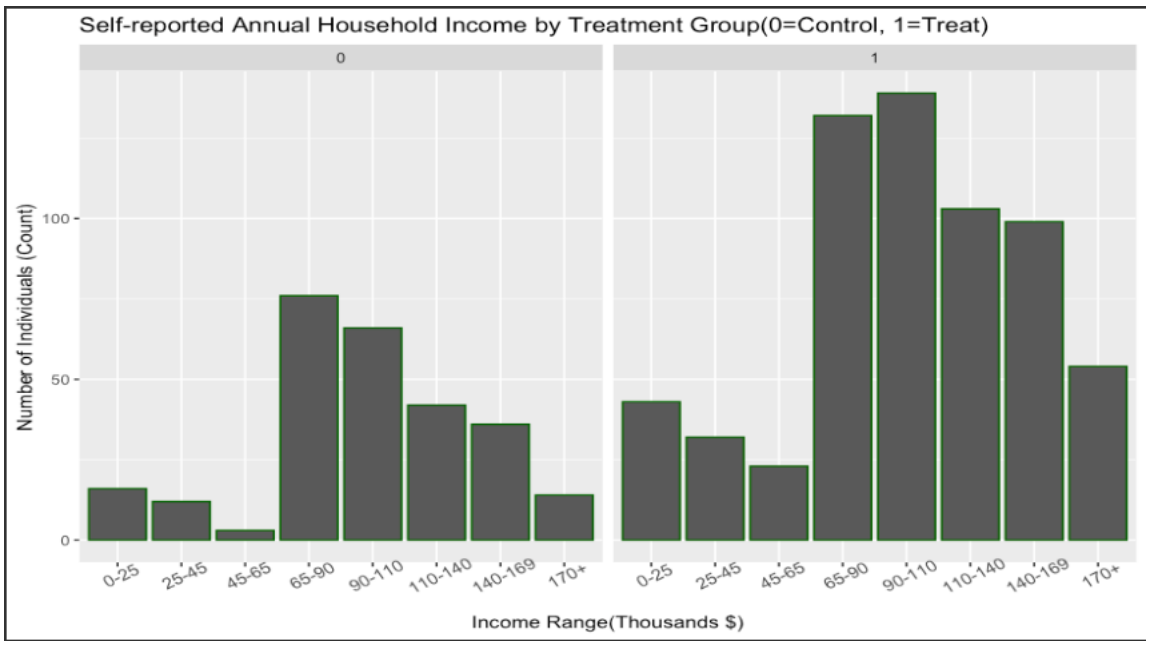

Figure 5

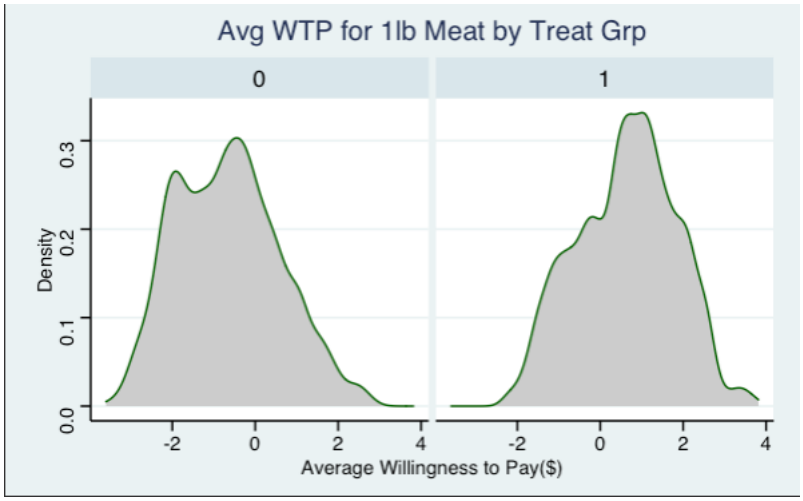

Figure 6

Variable	Levels	n	%	∑%
Household Size	Just me	180	20.2	100.0
	2	264	29.7	29.7
	3	174	19.6	49.2
	4	172	19.3	68.5
	5	60	6.7	75.3
	6+	40	4.5	79.8
	all	890	100.0	
Annual HH Income Range	$24,999 or less$	208	23.4	37.9
	$25,000 to 44,999$	205	23.0	60.9
	$45,000 to 64,999$	145	16.3	77.2
	$65,000 to 89,999$	135	15.2	92.3
	$90,000 to 109,999$	68	7.6	100.0
	$110,000 to 139,999$	59	6.6	6.6
	$140,000 to 169,999$	44	4.9	11.6
	$170,000+$	26	2.9	14.5
	all	890	100.0	
Education	No High School Diploma/GED	37	4.2	75.2
	High School Diploma/GED	212	23.8	57.3
	Trade-school/Certificate/Professional License	20	2.2	100.0
	Some College	201	22.6	97.8
	Associates Degree	105	11.8	11.8
	Bachelor's Degree	193	21.7	33.5
	Masters Degree or PhD	122	13.7	71.0
	all	890	100.0	
Race_Ethnicity	White	735	82.6	100.0
	Asian	29	3.3	3.8
	Black or African American	75	8.4	12.8
	Hispanic or Latino/a	34	3.8	16.6
	Middle Eastern or North African	4	0.5	17.1
	American Indian or Alaska Native	5	0.6	0.6
	Native Hawaiian or Pacific Islander	2	0.2	17.3
	Bi-Racial or Multi-Racial	5	0.6	4.4
	Other	1	0.1	17.4
	all	890	100.0	
Gender ID	Female	581	65.3	65.3
	Male	296	33.3	98.5
	Trans or Binary	9	1.0	100.0
	Prefer not to say	4	0.5	99.0
	all	890	100.0	
Job/Main Activity	Administrative work	86	9.7	9.7
	Business Owner	52	5.8	15.8
	Professional or Technician	147	16.5	53.0
	Service and/or sales worker	68	7.6	76.5
	General Labor	77	8.7	24.5
	Skilled agricultural, forestry and fishery worker	9	1.0	77.5
	Armed Forces	3	0.3	10.0
	Retired	141	15.8	68.9
	Stay-at-home Parent	79	8.9	86.4
	Student	42	4.7	91.1
	Unemployed	79	8.9	100.0
	None of these	107	12.0	36.5
	all	890	100.0	

Table 1: Sample Demographics

Variable	Levels	n	%	∑%
Sheltered-in-Place	No	365	41.0	41.0
	Prefer not to say	21	2.4	43.4
	Yes	504	56.6	100.0
	all	890	100.0	
Essential Worker	No	492	55.3	55.3
	Prefer not to say	19	2.1	57.4
	Yes	379	42.6	100.0
	all	890	100.0	
Unemployed due to COVID-19	No	689	77.4	77.4
	Prefer not to say	19	2.1	79.5
	Yes	182	20.4	100.0
	all	890	100.0	

Table 2: COVID-19 Work Status

State	$\text{MedAge}_{\text{Sample}}$	$\text{AvgHHSize}_{\text{Sample}}$	$\text{MedAge}_{\text{Census}}$	$\text{AvgHH}_{\text{Census}}$	
IA	43.5	2.34	38.2	2.40	
IL	35.0	2.91	38.1	2.57	
IN	42.0	2.61	37.7	2.52	
KS	38.0	2.91	36.7	2.51	
MI	36.0	2.73	39.7	2.47	
MN	44.0	2.46	38.0	2.49	
MO	40.0	2.78	38.6	2.46	
ND	43.0	2.79	35.1	2.30	
NE	47.0	2.84	36.5	2.45	
OH	37.0	2.79	39.4	2.43	
SD	38.0	3.04	37.0	2.43	
WI	38.0	2.97	39.5	2.39	
State	$\text{White\%}_{\text{Census}}$	$\text{MedAge\%}_{\text{Diff}}$	$\text{AvgHHSize\%}_{\text{Diff}}$	$\text{White\%}_{\text{Sample}}$	$\text{White\%}_{\text{Diff}}$
IA	90.6	13	-3	93.10	3.0
IL	76.8	-8	12	71.72	-7.0
IN	88.7	11	4	82.88	-7.0
KS	86.3	3	15	82.14	-5.0
MI	79.2	-10	10	75.49	-5.0
MN	83.8	15	-1	83.33	-1.0
MO	82.9	4	12	88.28	6.0
ND	86.9	20	19	100.00	14
NE	88.1	25	15	92.00	4.0
OH	81.7	-6	14	74.07	-10
SD	84.6	3	22	85.19	1.0
WI	87.0	-4	22	89.81	3.0

Table 3: Midwest Sample and Midwest Census Demographics

Variable	**Levels**	$\mathbf{n}_0$	$\%_0$	$\sum \%_0$	$\mathbf{n}_1$	$\%_1$	$\sum \%_1$	$\mathbf{n}_{\text{all}}$	$\%_{\text{all}}$	$\sum \%_{\text{all}}$
Bacon Choice	0	45	17.0	17.0	54	8.6	8.6	99	11.1	11.1
	1	111	41.9	58.9	241	38.6	47.2	352	39.5	50.7
	2	85	32.1	91.0	219	35.0	82.2	304	34.2	84.8
	3	24	9.1	100.0	111	17.8	100.0	135	15.2	100.0
	all	265	100.0		625	100.0		890	100.0	
Chicken Choice	0	27	10.2	10.2	21	3.4	3.4	48	5.4	5.4
	1	109	41.1	51.3	221	35.4	38.7	330	37.1	42.5
	2	90	34.0	85.3	235	37.6	76.3	325	36.5	79.0
	3	39	14.7	100.0	148	23.7	100.0	187	21.0	100.0
	all	265	100.0		625	100.0		890	100.0	
Ground Beef Choice	0	30	11.3	11.3	37	5.9	5.9	67	7.5	7.5
	1	106	40.0	51.3	233	37.3	43.2	339	38.1	45.6
	2	90	34.0	85.3	222	35.5	78.7	312	35.1	80.7
	3	39	14.7	100.0	133	21.3	100.0	172	19.3	100.0
	all	265	100.0		625	100.0		890	100.0	

Table 4: Alternative Chosen for each Animal meat by Treatment Group. Treatment Group: Individuals personally infected with COVID-19 or with close Loved One infected with COVID-19. Alternative Choice: Safer Choice=2,3 Not Safer=0,1

Table 5: Mixed Multinomial Regression Results

	Dependent variable:				
	Choice				
	(1)	(2)	(3)	(4)	(5)
Constant	4.060***	3.650***	4.390***	4.070***	4.110***
	(0.341)	(0.352)	(0.504)	(0.517)	(0.519)
price	−0.499***	−0.507***	−0.512***	−0.516***	−0.519***
	(0.067)	(0.068)	(0.068)	(0.068)	(0.069)
safe	−0.204***	−0.430***	−0.503***	−0.838***	−0.550
	(0.047)	(0.081)	(0.192)	(0.215)	(0.335)
safeTreated		0.320***	0.238**	0.192**	−0.097
		(0.093)	(0.096)	(0.098)	(0.419)
buyTreated		0.747***	0.760***	0.729***	0.630***
		(0.171)	(0.175)	(0.178)	(0.180)
AgeSafe			−0.008***	−0.007**	−0.008*
			(0.003)	(0.003)	(0.005)
IncSafe			0.063**	0.043*	0.035
			(0.025)	(0.025)	(0.049)
Educ			−0.361***	−0.394***	−0.354***
			(0.109)	(0.112)	(0.112)
EducSafe			0.264***	0.230***	−0.139
			(0.054)	(0.056)	(0.099)
White			0.529**	0.472**	0.412*
			(0.224)	(0.227)	(0.231)
WhiteSafe			−0.254**	−0.203	0.346*
			(0.123)	(0.125)	(0.208)
Female			−0.666***	−0.669***	−0.644***
			(0.199)	(0.201)	(0.201)
ShelterSafe				0.760***	0.989***
				(0.092)	(0.169)
Essential				0.684***	0.668***
				(0.199)	(0.200)
T_EducSafe					0.540***
					(0.118)
T_WhiteSafe					−0.854***
					(0.254)
T_EssentialSafe					−0.384*
					(0.203)
AIC	6251.1	6211.8	6146.4	6064.5	6043.3
Observations	2,508	2,508	2,508	2,508	2,508
Log Likelihood	−3,123.000	−3,101.000	−3,058.000	−3,011.000	−2,993.000
Note:					*p<0.1; **p<0.05; ***p<0.01

Table 7

	Dependent variable:
	WTP
Treatment Group	0.860^{***}
	(0.013)
Annual Household Income	0.074^{***}
	(0.004)
Education Level	0.375^{***}
	(0.007)
Age	-0.027^{***}
	(0.0003)
Female	-0.139^{***}
	(0.013)
White	-0.572^{***}
	(0.016)
Essential Workers	-0.248^{***}
	(0.012)
Sheltered-in-Place	1.460^{***}
	(0.012)
Unemployed Due to COVID-19	-0.240^{***}
	(0.015)
Observations	10,032
R^2	0.811
Adjusted R^2	0.811
Residual Std. Error	0.595 (df = 10023)
F Statistic	$4{,}792.000^{***}$ (df = 9; 10023)
Note:	*p<0.1; **p<0.05; ***p<0.01

Variable	**Levels**	$\mathbf{n}_{\text{No}}$	$\%_{\text{No}}$	$\sum \%_{\text{No}}$	$\mathbf{n}_{\text{Yes}}$	$\%_{\text{Yes}}$	$\sum \%_{\text{Yes}}$	$\mathbf{n}_{\text{all}}$	$\%_{\text{all}}$	$\sum \%_{\text{all}}$
Bacon Choice	0	59	12.0	12.0	31	8.2	8.2	90	10.3	10.3
	1	192	39.0	51.0	158	41.7	49.9	350	40.2	50.5
	2	162	32.9	83.9	135	35.6	85.5	297	34.1	84.6
	3	79	16.1	100.0	55	14.5	100.0	134	15.4	100.0
	all	492	100.0		379	100.0		871	100.0	
Chicken Choice	0	32	6.5	6.5	9	2.4	2.4	41	4.7	4.7
	1	174	35.4	41.9	152	40.1	42.5	326	37.4	42.1
	2	178	36.2	78.0	143	37.7	80.2	321	36.9	79.0
	3	108	21.9	100.0	75	19.8	100.0	183	21.0	100.0
	all	492	100.0		379	100.0		871	100.0	
Ground Beef Choice	0	43	8.7	8.7	16	4.2	4.2	59	6.8	6.8
	1	180	36.6	45.3	157	41.4	45.6	337	38.7	45.5
	2	167	33.9	79.3	139	36.7	82.3	306	35.1	80.6
	3	102	20.7	100.0	67	17.7	100.0	169	19.4	100.0
	all	492	100.0		379	100.0		871	100.0	

Table 8: Alternative Chosen for each Animal meat for Essential Workers. Alternative Choice: Safer Choice=2,3 Not Safer=0,1

Variable	**Levels**	$\mathbf{n}_{\text{No}}$	$\%_{\text{No}}$	$\sum \%_{\text{No}}$	$\mathbf{n}_{\text{Yes}}$	$\%_{\text{Yes}}$	$\sum \%_{\text{Yes}}$	$\mathbf{n}_{\text{all}}$	$\%_{\text{all}}$	$\sum \%_{\text{all}}$
Bacon Choice	0	17	8.9	8.9	13	7.0	7.0	31	8.2	8.2
	1	96	50.3	59.2	61	33.0	40.0	158	41.7	49.9
	2	59	30.9	90.0	75	40.5	80.5	135	35.6	85.5
	3	19	9.9	100.0	36	19.5	100.0	55	14.5	100.0
	all	191	100.0		185	100.0		379	100.0	
Chicken Choice	0	4	2.1	2.1	4	2.2	2.2	9	2.4	2.4
	1	91	47.6	49.7	60	32.4	34.6	152	40.1	42.5
	2	69	36.1	85.9	73	39.5	74.0	143	37.7	80.2
	3	27	14.1	100.0	48	25.9	100.0	75	19.8	100.0
	all	191	100.0		185	100.0		379	100.0	
Ground Beef Choice	0	9	4.7	4.7	6	3.2	3.2	16	4.2	4.2
	1	91	47.6	52.4	64	34.6	37.8	157	41.4	45.6
	2	66	34.5	86.9	73	39.5	77.3	139	36.7	82.3
	3	25	13.1	100.0	42	22.7	100.0	67	17.7	100.0
	all	191	100.0		185	100.0		379	100.0	

Table 9: Table 2: Alternative Chosen for each Animal meat for those who chose to Shelter-in-Place and/or were able to work from home. Alternative Choice: Safer Choice=2,3 Not Safer=0,1

Variable	Levels	$\mathbf{n}_{\text{No}}$	$\%_{\text{No}}$	$\sum \%_{\text{No}}$	$\mathbf{n}_{\text{Yes}}$	$\%_{\text{Yes}}$	$\sum \%_{\text{Yes}}$	$\mathbf{n}_{\text{all}}$	$\%_{\text{all}}$	$\sum \%_{\text{all}}$
Bacon Choice	0	75	10.9	10.9	18	9.9	9.9	93	10.7	10.7
	1	284	41.2	52.1	63	34.6	44.5	347	39.8	50.5
	2	224	32.5	84.6	74	40.7	85.2	298	34.2	84.7
	3	106	15.4	100.0	27	14.8	100.0	133	15.3	100.0
	all	689	100.0		182	100.0		871	100.0	
Chicken Choice	0	35	5.1	5.1	9	5.0	5.0	44	5.0	5.0
	1	254	36.9	41.9	71	39.0	44.0	325	37.3	42.4
	2	261	37.9	79.8	61	33.5	77.5	322	37.0	79.3
	3	139	20.2	100.0	41	22.5	100.0	180	20.7	100.0
	all	689	100.0		182	100.0		871	100.0	
Ground Beef Choice	0	51	7.4	7.4	11	6.0	6.0	62	7.1	7.1
	1	272	39.5	46.9	61	33.5	39.6	333	38.2	45.3
	2	237	34.4	81.3	69	37.9	77.5	306	35.1	80.5
	3	129	18.7	100.0	41	22.5	100.0	170	19.5	100.0
	all	689	100.0		182	100.0		871	100.0	

Table 10: Alternative Chosen for each Animal meat for those Unemployed due to or during the pandemic. Alternative Choice: Safer Choice=2,3 Not Safer=0,1

Variable	Levels	n	%	$\sum$ %
Local Government	No	185	20.8	20.8
	No opinion	41	4.6	25.4
	Unsure	179	20.1	45.5
	Yes	485	54.5	100.0
	all	890	100.0	
Corporations	Agree	339	38.1	38.1
	Disagree	36	4.0	42.1
	Neither Agree or Disagree	164	18.4	60.6
	Strongly Agree	309	34.7	95.3
	Strongly Disagree	42	4.7	100.0
	all	890	100.0	
Individuals Themselves	Agree	321	36.1	36.1
	Disagree	138	15.5	51.6
	Neither Agree or Disagree	232	26.1	77.7
	Strongly Agree	121	13.6	91.2
	Strongly Disagree	78	8.8	100.0
	all	890	100.0	
Increased Automation	Agree	263	29.6	29.6
	Disagree	98	11.0	40.6
	Neither Agree or Disagree	348	39.1	79.7
	Strongly Agree	142	16.0	95.6
	Strongly Disagree	39	4.4	100.0
	all	890	100.0	

Table 11: Opinion regarding who should protect workers

Variable	Levels	n	%	∑%
Will get COVID Vaccine	Agree	167	18.8	18.8
	Disagree	98	11.0	29.8
	Neither Agree or Disagree	148	16.6	46.4
	Strongly Agree	318	35.7	82.1
	Strongly Disagree	159	17.9	100.0
	all	890	100.0	
Chooses to Wear a Mask in Public	No	63	7.1	7.1
	Prefer not to say	8	0.9	8.0
	Sometimes	94	10.6	18.5
	Yes	725	81.5	100.0
	all	890	100.0	
Believes Pandemic Safety Help stop Spread	Agree	267	30.0	30.0
	Disagree	52	5.8	35.8
	Neither Agree or Disagree	121	13.6	49.4
	Strongly Agree	351	39.4	88.9
	Strongly Disagree	99	11.1	100.0
	all	890	100.0	
Food Purchasing and Future Outbreaks	Agree	256	28.8	28.8
	Disagree	135	15.2	43.9
	Neither Agree or Disagree	356	40.0	83.9
	Strongly Agree	82	9.2	93.1
	Strongly Disagree	61	6.8	100.0
	all	890	100.0	
Personally Impacted by Plant Outbreaks	No	731	82.1	82.1
	Prefer not to say	21	2.4	84.5
	Yes	138	15.5	100.0
	all	890	100.0	
Chose to Dec Meat Cons	I do not eat meat	48	5.4	5.4
	No	688	77.3	82.7
	Prefer not to say	13	1.5	84.1
	Yes	141	15.8	100.0
	all	890	100.0	

Table 12: COVID-19 Pandemic Opinions and Experience. Respondents were asked to answer each of the following, Descending from Top: (1)Respondent will get the COVID-19 vaccine when it's available to them. (2) Respondent chooses to wear a face mask when out in public. (3) Believes recommended pandemic safety measures, such as social distancing, hand sanitizer, and face masks, help to stop the spread of COVID-19. (4)Knowledge of future food processing plant outbreaks of COVID-19 would shift respondent's food purchasing habits. (5)Respondent has been personally impacted by COVID-19 outbreaks at meatpacking plants. (6)Respondent chose to decrease meat consumption due to COVID-19 outbreaks at meatpacking plants.

Variable	Levels	n	%	∑%
Bar or Restaurant	OPTION 1	157	17.6	18.0
	OPTION 2	485	54.5	74.6
	OPTION 3	171	19.2	93.8
	OPTION 4	55	6.2	100.0
	OPTION 5	19	2.1	20.1
	all	890	100.0	
Schools	OPTION 1	152	17.1	17.3
	OPTION 2	502	56.4	75.6
	OPTION 3	171	19.2	94.8
	OPTION 4	46	5.2	100.0
	OPTION 5	17	1.9	19.2
	all	890	100.0	
Barber Shops and Beauty Salons	OPTION 1	153	17.2	17.3
	OPTION 2	543	61.0	80.9
	OPTION 3	129	14.5	95.4
	OPTION 4	41	4.6	100.0
	OPTION 5	23	2.6	19.9
	all	890	100.0	
Nursing Homes	OPTION 1	97	10.9	11.0
	OPTION 2	451	50.7	63.9
	OPTION 3	246	27.6	91.6
	OPTION 4	75	8.4	100.0
	OPTION 5	20	2.2	13.3
	all	890	100.0	
Malls and Retail Shops	OPTION 1	149	16.7	16.7
	OPTION 2	576	64.7	83.7
	OPTION 3	116	13.0	96.7
	OPTION 4	29	3.3	100.0
	OPTION 5	20	2.2	19.0
	all	890	100.0	
Non-Essential Office Buildings	OPTION 1	120	13.5	13.7
	OPTION 2	529	59.4	75.4
	OPTION 3	164	18.4	93.8
	OPTION 4	55	6.2	100.0
	OPTION 5	20	2.2	16.0
	all	890	100.0	

Table 13: Opinion regarding Level at which Businesses should remain Open. Options for each Business or Institution were as follows:
OPTION 1: Fully open for normal, in-person business with little to no safety precautions.
OPTION 2: Open with mask mandates, sanitizer, and/or social Distancing.
OPTION 3: This business should not open until COVID-19 is under control.
OPTION 4: Unsure
OPTION 5: No opinion