

# **Covid-19 Waste Patterns in UW Campus Area Restaurants**

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## **Abstract**

The ongoing Covid-19 pandemic has necessitated multiple responses from governments at all levels across the world, many of which concern the safe operation of businesses, including restaurants. The following research examines the effects of such implementations on the foodservice industry in the immediate area surrounding the University of Wisconsin-Madison, and how these regulations have influenced the waste streams from restaurants in the area.

Existing literature on the subject indicates increases in solid waste since Covid-19 began, and this research aims to determine whether or not this widely observed trend is visible at a smaller geographic scale. Using a combination of widely distributed surveys to UW students and interviews with two officials at the City of Madison and one restaurant owner, we found that there is a general awareness of increased restaurant usage of certain materials since the start of the pandemic, and local homes and businesses alike have altered their waste-related practices and product buying habits in order to adhere to and cope with pandemic-related restrictions. Using these findings, we concluded that business restrictions put in place since the onset of Covid-19 have led to an overall increase in solid waste from Madison's restaurants, which correlates in part with existing scholarly work and opens up possibilities for further specialized research on the topic.

## **Introduction**

With the somewhat sudden onset of the worldwide Covid-19 pandemic, various rules and restrictions have been introduced to try to contain both the spread of the virus and the general public's fear of the spread of the disease. Everyone across the globe has been forced to adapt to the lifestyle changes that decision-making institutions have deemed necessary to defeat or minimize the spread of coronavirus. While Covid-19 is a serious issue and the goal of this project is certainly not to scrutinize or otherwise belittle the pandemic, there are certain indirect aspects of it that we believe deserve more recognition. The measures our societies are currently taking to combat Covid-19 may actually be doing much more harm than good in the long run, in environmental terms. The main aspect we will be focusing on is how this pandemic is affecting the waste-related actions of the foodservice industry, but also looking at how restaurants are responding to the conditions the ongoing pandemic poses as a means of justification or explanation for their waste-related activities. Our overarching research question is as follows: How have Covid-19 policies affected waste streams in the foodservice industry of the UW-Madison campus area?

An example of this trend in action became immediately apparent to one of our researchers, who lives in university housing at the University of Wisconsin-Madison. Being reliant on the dining halls for their daily food consumption, they noticed a great change in the dining halls' resource usages and manner of operation. Dining halls have tried to space out all the seating areas at their facilities, limit capacity of patrons, and make some areas non-accessible to try to encourage social distancing and mitigate the potential spread of the virus. The option to

dine in-person at these facilities was even temporarily suspended by the UW's chancellor for a month during a spike of cases. All of the food is now stored in single use plastic containers, one container for each item. All of the utensils are stored together in a plastic bag, the utensils themselves are made out of plastic, if you want one utensil type, you get them all, and there are only paper and plastic disposable cups now. Increases in single-use plastics on a scale like this, particularly for such a large multi-faceted operation as a university dining hall system, are detrimental to our natural environment, as this will cause heightened amounts of plastic wastes. Furthermore, as far as we currently know, these materials are not biodegradable by commonly practiced methods. This pattern of behaviors inspired us to pursue this topic further, and see if we could successfully relate our personal observations to any global trends in the same topic.

We will be looking into how UW campus area restaurants have adapted their resource usages in accordance with the operating conditions of the ongoing Covid-19 pandemic poses. We will also be contacting relevant sources within the city to see if there are any noticeable changes in the waste streams of the foodservice industry, from their perspectives. The main areas we will be looking into are the new rules the restaurants have implemented (to stop the spread of Covid-19 among employees and patrons as much as possible, while remaining open for business and following government restrictions), and what materials they are using to adhere to these rules (for example, more plastic bags for takeout food orders). Next, looking at how efficient those processes actually are from a business perspective, and their thought processes behind their actions and plans for the future. We will then be looking at what type of materials they are using. We are additionally hypothesizing that a disproportionately large amount of it is single use plastics, which have potentially devastating long term environmental effects. We will also seek

to determine if there are spatiotemporal patterns based on various restaurant aspects, such as food type or relative location.

We will rely on multiple distinct research methods, for the purposes of diversifying our research efforts as well as ensuring that our observations and data can be effectively related together and hopefully form a cohesive conclusion of our research process. Our preliminary data collection will consist of in-depth analyses of available sources, including news articles (both at the local and national levels), government mandates, and company guidelines for safe restaurant operation, if applicable. Following our collection of these data, we will switch our focus to primary community-based sources and observations, namely interviewing restaurant management and local city officials within the relevant departments (e.g. Streets and Recycling, Public Health, and/or Economic Development), which could help us possibly see if we could document increases in waste streams in any capacity. These interviews will be carried out via long-distance virtual communication platforms, such as Zoom, telephone, or email, to accommodate for Covid-19 restrictions. Again, each of our research practices will be carried out whilst adhering to social distancing and other regulations as closely as possible. For further details, please refer to our “Methods” section.

### **Site Setting**

Although this research will rely greatly on more current data from the past calendar year, due to Covid-19’s rapid and recent emergence, to disregard or to otherwise ignore the history and development of Madison’s restaurant industry and food waste systems would be detrimental to

our goals. Therefore, it is our intention in this section to provide a background briefing on the gradual evolution of the role and functions of the foodservice industry in the city of Madison.

Shortly after the city of Madison, Wisconsin was incorporated in 1836, the hospitality industry had a strong presence in the city. In place of buildings committed solely to restaurant services, there were hotels like the Vilas House, the Fess Hotel, and the Park Hotel that typified downtown Madison's cuisine as far back as the 1850's, setting the stage for the expansion of foodservice outlets in the downtown area that remain today. As the 20<sup>th</sup> century began, more and more specified restaurant facilities began to appear, along with an increased diversity in cuisines from around the world. Early on in this period, British, Irish, and German were the most popular foreign cuisines, as they were the largest immigrant populations at the time. As more immigrants arrived from Asia and South America in the mid-20<sup>th</sup> century, however, more restaurant options began popping up in Madison, like Paco's Foods of Mexico, or Paisan's Italian. Out of the nearly 13,000 restaurants and bars in the state of Wisconsin, over 100 are located within the downtown area of Madison alone. While Madison may not command the same respect as a national culinary destination as a sprawling metropolis like Chicago, Madison receives consistent recognition for its restaurant scene, with Midwest Living magazine calling it one of the most established food scenes in the region.

If one were to walk down the length of State Street in the heart of downtown Madison today, they would find both international chain restaurant franchises interspersed with a wide array of restaurants from all kinds of cuisines and origins. There are few places in the midwestern United States in which one could find a traditional Nepalese restaurant like Himal Chuli within a stone's throw of a Noodles and Company location, or a small Thai restaurant just

across from Chipotle, but such is the norm on State Street. Even the campus dining facilities of UW-Madison have made recent strides towards having a diverse selection of food options, based in accommodation for many dietary customs and needs that exist within the student body. In 2018, the dining halls ensured availability of Halal options in all its facilities, and Kosher options have been available for the past decade.

When considering all of our observed aspects of Madison's campus area restaurants, we must acknowledge our positions within the sociospatial dynamics present within them, and how those positions directly influence our observations. For undergraduate UW-Madison students like ourselves, the downtown area mainly plays the role of the business district of the quintessential American "college town". Students that live in the area are effectively encouraged to participate in the business exchanges that take place in this neighborhood, not only due to its proximity to the main campus, but the visual representation of the area as trendy. In other words, downtown is "where the action happens" and it is implied, both culturally and institutionally, that if a UW student wishes to participate in the full college experience, then they must spend at least some of their time and money in the downtown area. Furthermore, as students, we must recognize that we are far from the only demographic group that participates in the sociospatial structure of downtown Madison. The Capitol Square area has many corporate and government business offices, and luxury apartments and condominiums in which workers here reside. On the other end of the spectrum, a sizable portion of Madison's homeless population without permanent residences of their own frequent the downtown area. Because of the contrasting lifestyles and daily routines of these two groups alone, it would be unwise to assume that the downtown area is composed of just one demographic of daily participants. Going forward, we

will continuously remain aware of the varied demographic makeup of the area, and remain cognizant of the role we ourselves play in the makeup of downtown Madison, and how this impacts our research process.

Historically, Madison has been an early adopter of innovative waste management techniques. In 1968, the city became the first in the entire United States to implement a curbside recycling pickup program, starting with a newspaper repurposing program, and expanding into more resources in later decades, like metal, plastic, and yard waste. Madison also implemented a “pilot program” of residential food scraps recycling, which began in 2011 and concluded in 2018. Although this scraps recycling project is no longer in place, Madison continues to develop and integrate new recycling options, and plans on doing so in the near future. By virtue of Madison’s progressive history and mindset towards waste management, our findings may indicate that the waste accumulation trends during Covid-19 are somewhat less pronounced than what they may be in a major city without such modernized waste management practices. However, this is but a mere speculative assumption, and will not exercise any major influence on our research process or data analysis. We still strongly trust that our findings will hold at least some common utility for similarly sized and structured urban environments like Madison, and will not constitute a major anomaly in regards to our topic.

## **Literature Review**

While this research article is mainly going to focus on the negative effects on the environment from Covid-19, it is important to acknowledge that there are studies saying that there are assorted positive effects on the environment due to Covid-19. A main benefit that is

seen across the world is the fact that there are less industrial activities going on. This is because there is less commercial travel, and in general, greenhouse gases are seeing a noticeable decrease (Rume, 2020). One of the most notable things is that people are making their own meals at home more frequently, causing restaurants to need less produce supply, and in general people are trying to be less wasteful when preparing their meals, as they are directly affected by the waste, i.e. they lose money if they waste too much food. However, the general person is more wasteful when it comes to making meals, as dining services usually have professionals who work hard to minimize the amount waste to maximize their profits (Roe, 2020).

Another notable positive about people not dining out as much is the lack of food waste we produce as consumers after we are done eating. Oftentimes, people do not take home their meals after they are done eating if they determine it is not worth the effort. There are different factors that affect if people have food they can take home, like the cost of the food, how long they are at the restaurant, and social factors. With more people dining at home, they simply do not have that option and are forced to choose to waste their food, or conserve it when they are done (Goodman, 2020). It is much easier to rationalize saving a few ounces of meat if they are already at home compared to either having to gorge yourself on the rest of it, take it home, or waste it when at a restaurant. It will be interesting to see if options like “doggy bags” (bags which you take home your leftovers) become more popular due to the pandemic. A study by Sirieix was conducted in 2017 in Europe showed that most people have a positive opinion about doggy bags. They like that it helps reduce food waste in general at a very low cost to the environment, but are mostly unwilling to act on them sometimes due to social norms. More work must be done to encourage the use of doggy bags to take home leftovers, with Covid-19 this may

be increasing as more people are trying to conserve their resources including food and money in this uncertain time, so it will be interesting to see if there has been an increase in the usage of taking home leftovers.

We previously mentioned that people are not eating out as often, which can be a good thing for the environment, but there are also adverse consequences of that. Dining facilities usually buy in bulk as they go through a lot of produce, but that produce has a set shelf life. When not enough people are buying their produce, they are forced to throw it away and because of this millions of pounds of food are turning into food waste, not only at the restaurant level but also at the distribution level. As no one is buying their product, they are forced to destroy millions of pounds of fresh produce (Sharma, 2020). Although some proposed solutions are to turn restaurants into pseudo-markets by selling their bulk produce directly to the consumer, so it will be interesting to see if any businesses in Madison have attempted that. The consumers are suffering a different level as there is a pattern seen in a decrease in the nutritional quality of the food that is being purchased during Covid-19. A lot of these new habits aforementioned are in place due to Covid-19 restrictions, although generally they seem to be decreasing in severity they still remain, just to a lesser extent (Aldaco, 2020).

It is undeniable that take out or delivery services are thriving throughout Covid-19 as companies like Grubhub have seen a 12% increase in profit since the pandemic, but they do have some major drawbacks. A 14% increase in plastic packaging has been seen, as usually takeout involves the usage of plastic or paper bags (Prata, 2020). This is done because food delivery services usually turn the utilization of single-use plastics into a necessity (Kojima, 2020).

One of the biggest issues with the response to Covid-19 is the usage of single use plastics. Not only is it the product of take out companies, but also in general usage of plastics. Medical products like facemasks, gloves, and shields are massive use of plastic waste in the food and restaurant industry (Klemes, 2020). This is something that we are all guilty of, we are all using personal protective measures, whether it be facemasks, gloves, or otherwise, in the name of safety, which is not inherently wrong, but it will have massive effects on the environment. As a society, we are increasing our overall amount of solid wastes, but we are actually abandoning and reducing our recycling and sustainable waste programs right now (Zambrano-Monserrate, 2020), which is rather ironic as they are there to counteract this. These wastes have devastating environmental consequences like soil erosion, pollution of local water supplies, and leaving possibly non-biodegradable waste behind in masses. The materials that we are using are often not recyclable either, this is causing issues with overloads in landfills and waste processing centers (Zambrano-Monserrate, 2020).

Another thing often ignored is the fact that much of the plastic we are disposing of is personal protective equipment (PPE), which should be treated like biohazardous waste, because it is in our current situation. Although people are often not disposing of it correctly and there is massive evidence that people are just littering their PPE around the world and natural environments (Prata, 2020). What makes this worse is the fact that some citizens like the lower class of Indonesia practice waste picking. Since the waste they are scavenging through can not always be properly managed due to the increase in solid waste, the scavengers are being exposed to biohazardous waste which could also be spreading Covid-19 upon these people (Kojima, 2020).

A study conducted by Tanàto in 2017 showed what restaurants wasted through quantifiable means. During this time the smallest portion of waste came from plastics at 17.1% and the largest being food waste at 28.2%. It will be interesting to see where these numbers move, as plastics will most likely go up due to take out and the usage of PPE, but we are theorising food waste will not be decreasing as it has been shown that food waste has massively been increasing by restaurants, as they have no one to sell their food to before it expires if they are not conducting enough business. What some might view as a solution might be a problem, as glass, paper, and cardboard were all on average wasted more by restaurants than plastics. Although this might be ideal to use these more as they are recyclable, they only are to an extent, as things like paper and cardboard can only be reused so many times before it is no longer viable to recycle them. Thus, it is also important to just look at how they are being recycled, if they are being recycled by using fossil fuels, then it can be argued that it is actually worse for the environment than a single use plastic. Linked to that is the energy it takes to make these, way more energy has to go into making something like a paper bag then compared to a plastic bag. This really goes to show the applicability of the age old question when buying groceries: “paper or plastic?”, the correct answer is still the same in this situation: “I brought my own”.

There is stress mounting on everyone during these times, including dining establishments, they statistically have the most precautions to open up as they need to be healthy, wash hands, disinfect surfaces, have a clean working environment, worry about preparation, delivery, and have social distancing. They have to worry about people also contracting Covid-19 while at their restaurant, as that would be devastating for not only their publicity, but also their business. People have been reported of getting Covid-19 from the air conditioning, something as

minor as that is a factor they have to be concerned over (Rizou, 2020). It has been shown one of the most stressed areas has been waste management systems, which have been effectively overrun by the surge of solid waste. We will not know what the total effects of Covid-19 waste has had on our environment for years to come, as it is still being produced and the effects are not highly prioritized by institutions. It is critical that we study this and learn from this, not only to try to minimize the damage we are doing to the environment, but also so that we can create a solid framework for waste management for other types of massive disasters to be better off in the future (Klemes, 2020).

## **Methods**

For this section, we will provide an extensive, detailed outline of the specific composition of our research techniques, thought processes, and frameworks for analysis of our data and observations. Our main body of preliminary research consists of gathering background knowledge on the broad topics associated with our research, namely plastic usage and waste in the food and hospitality industries. We placed priority upon peer-reviewed articles from scholarly journals, which are known to contain the most in-depth research that functions as a most appropriate material for citation in our project. While perusing articles to use, we remained particularly wary of the timeframe of each article's publication, mainly because the Covid-19 pandemic did not begin to widely appear in scholarly research until the year 2020, so the materials that do exist surrounding the topic are often freshly published, and almost none are a year old or more.

Although this newer body of research can be ideal for its pertinence to our topic, it is also crucial to recognize how newer research has had less time to circulate within scholarly circles and undergo further reviews. Therefore, we exercised extreme caution and attention to detail when selecting articles that are centered around (at least in part) the coronavirus pandemic. Secondly, older research articles present an opposite dilemma; while their age works to their benefit in terms of scholarly acceptance and widespread circulation, their inherent unawareness of the events to come (in the form of Covid-19) partially works to their detriment, in our case at least. Because the conditions present in the subject locations and socio spatial settings of our research have changed so drastically since the pandemic began, there may be multiple instances in which the content and findings of “older” research articles may not be as useful for our project, just because of their age. Thus, it is our job, as the researchers, to peruse these particular articles carefully and make decisions on whether or not their content will or will not be suitable for the means and goals of our project.

Following our initial body of research, we plan on implementing both surveys and interviews to gauge responses from a variety of key populations within our research topic, including restaurant workers, managers, and customers. We do this primarily to allow for diverse perspectives on the issues at hand, and to allow for more convenient classification of any responses into categories. For instance, a restaurant owner and a city official may share the same views on the issue of increased plastic waste accumulation, and our questions for these people will be structured in a manner that would allow us to notice and discuss this further. We plan on primarily reserving interviews for the “higher-ups” with more administrative duties, like managers, owners, or city officials, because they will likely be able to offer more detailed and

experienced insights on their experiences, both individually and from the perspective of their business. Surveys, on the other hand, will follow a similar basic pattern of questions, but will vary slightly depending on the role of who is taking the survey. For example, if a respondent were to indicate that they are a customer, their next questions would be optimized for a customer perspective, the same pattern will apply with workers. Before any interview or survey, we will provide the respondents with a privacy document that they must sign and adhere to before continuing, to ensure visibility and ethical integrity among research subjects.

The interview process will overall aim to elicit respondent-specific perspectives and insights on any observed changes in resource usage patterns, general operations, and waste procedures of the business in question, while establishing and maintaining a rapport among interviewer and interviewee<sup>1</sup>. Although due to Covid-19 restrictions, we are not able to have these interviews take place in-person, we will do our best to create an atmosphere of comfort and trust in which the subject of the interview does not feel pressured or otherwise compelled to alter their honest responses to the questions. Though this may be more difficult over the phone or via online video chat services, this is no excuse to not have as safe and as open conversations as possible with the interviewees. To achieve this effect, our interviews will begin with more background-related questions, for instance asking how long the subject has worked at that location/department, and if their role or position has changed since then.

As the interviews progress, and the interviewee becomes gradually more familiar with the structure, the questions will simultaneously transition into more specific inquiries that aim to gather individualized testimonies from each interviewee. In doing so, we desire not only to gain invaluable personal insights with each interview subject, but open up the possibility of making

connections between any potential commonalities (or notable discrepancies) among responses. Say two restaurant managers indicate that they have been increasing the recycling measures at their businesses lately, but the materials they purchase and use are different, or if a common material is used, they may not both recycle that particular material. Again, these interviews will be predominantly optimized for administrators and official figures, whether within the business or the City of Madison, because we believe that their more exhaustive experience and knowledge of the ins and outs of waste usage patterns and trends will be of greater utility for our research purposes. To further emphasize our commitment to fostering a constructive and friendly interviewing environment, we will additionally embody active listening techniques, and ensure that each interviewee is properly thanked for their time and commitment, both at the beginning and at the end of the interview.

With our surveys, our goal is to provide a quicker, more convenient platform for more rudimentary data collection that can be processed and analyzed in a more quantitative manner. Like with our interviews, these surveys cannot and will not be given in person in any capacity, so we will utilize the UW-Madison-provided Qualtrics platform to structure and publish our surveys for each specified survey path. Moreover, in a similar manner to our interviews, each iteration of our surveys will be catered to the position of the survey respondent, after the preliminary introductory questions. To distribute our surveys we will use our social media, reach out to fellow students, classmates, and friends who fit the respondents we are going for, and utilize the geography major mailing list. The surveys are designed to take only around 5 minutes and have two different versions, one for customers of dining establishments and another for workers of

dining establishments. The data collection for our surveys will begin on November 4th, 2020 and end on November 25th, 2020.

Following the conclusions of the interview and survey processes, our main data synthesis stage will begin. We will analyze our survey responses based on each response, and using the Reports function within the Qualtrics platform, will construct informative graphs and figures to illustrate our findings in an easily understood manner, and use these visuals to develop specific conclusions. For our interview results, considering their more qualitative nature, we will turn to a simpler approach, developing a compilation of themes and motifs that were either commonly seen in interview responses, or vary based on a pre-selected list of categories. We believe that using this approach is the safest course of action to take, whether the responses have lots in common or vary greatly depending on the respondent.

After we utilize these methods, we hope we can draw sound conclusions, based on both our personal research and our understanding of the already extant literature on the subject. As a reminder, our main objective is to find some sort of observable trend, no matter the extent, in plastic waste accumulation and processing since the overarching business restrictions put in place due to the outbreak of Covid-19. We are counting on our abilities as researchers and as geographers to guide us to this point, and we hold the utmost confidence that we will do our very best to achieve this aim.

## **Results**

We administered two surveys through Qualtrics, the UW-Madison-provided platform for survey creation and administration. One survey was designed for people who were working in

the food industry during Covid-19, this consisted of 19 questions and we obtained 27 responses. The other survey was available to anyone who was a student of UW-Madison or lived in the Madison area, this was about their experiences with dining during Covid-19, this consisted of 20 questions and we obtained 90 responses for that survey. Furthermore, we conducted three interviews with people who work with waste management or in the food industry. We felt that these areas would give us a good grasp on how the Madison community felt in regards to the response by restaurants to Covid-19.

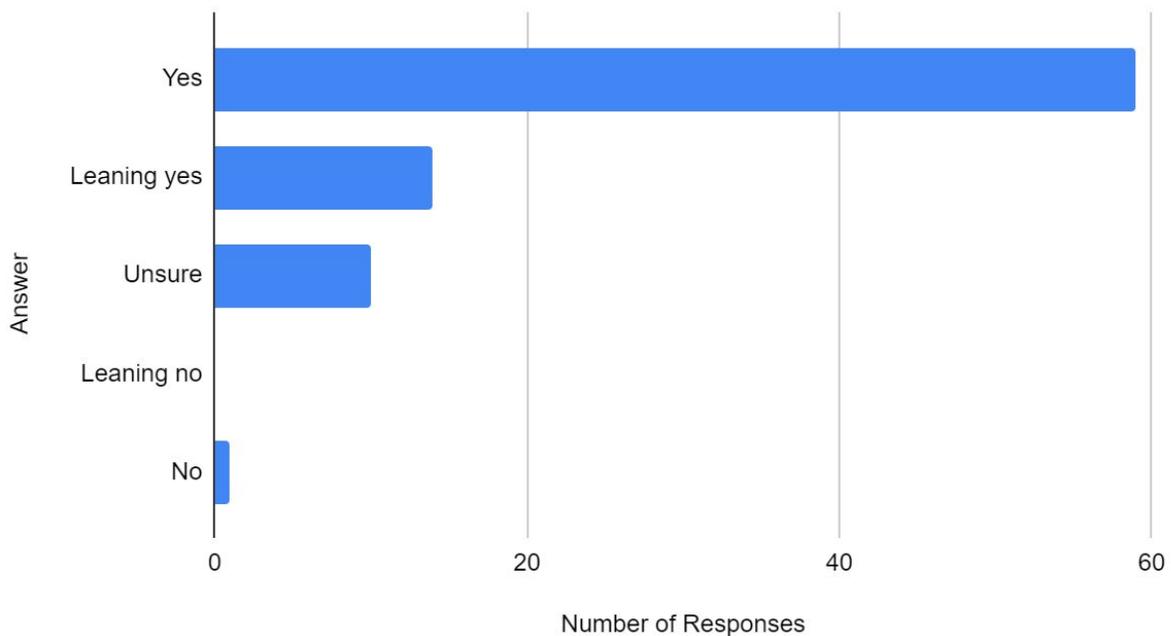
### **Customer Survey**

We first analysed the food experience survey, as that had the most responses and possibly some of the most useful data giving insight into what the average person has experienced during this time. Although this survey had 90 responses, only 84 people finished the survey. Throughout this survey there are several conditional questions that will change the number of questions the participant would have to answer. Therefore no one is presented with the full 20 questions contained within the survey. The initial question in the survey determined that 85% (N=77) of our participants are students of UW-Madison, the majority are senior students at 49% (N=35). Of our participants, 69% (N=58) live either in university housing, on campus, east campus, or south campus. This indicates to us that the majority of our participants live in an area we believe to be directly connected to the pandemic-related trends seen at the restaurants in the surrounding area.

One question we found important to ask was if our participants considered themselves environmentalists or not, as this is something that can be directly related to our research topic. Of the 84 respondents, 49 (58%) said they do consider themselves to be environmentalists, 11 (13%)

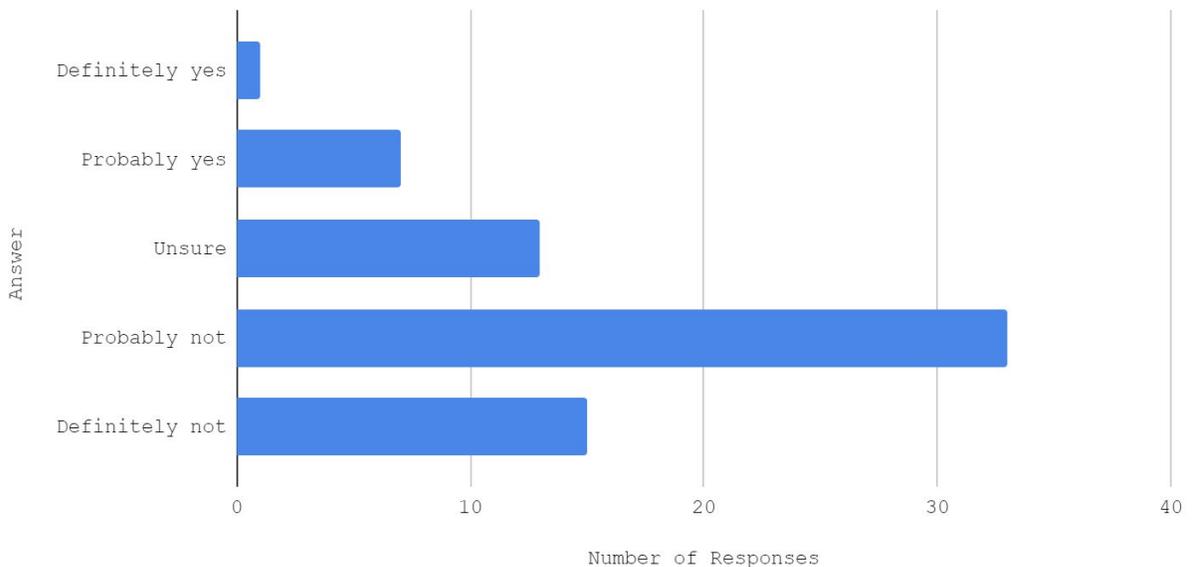
of respondents said they do not consider themselves environmentalists, and 24 (28%) said they were unsure. With this data we can show that the majority of our respondents do consider themselves environmentalists, which may have influenced their responses to the rest of the survey. Our next question was closely related, asking if they have noticed an increase in the amount of plastic usage by restaurants or dining facilities in response to Covid-19. The results show that even people who may not consider themselves environmentalists are noticing the issue, as only one respondent said no, 10 (11%) said they were unsure, 14 (16%) said they were leaning yes, and the remaining respondents 59 (70%) said yes, they have noticed an increase (Figure 1)<sup>2</sup>.

Figure 1- Have you noticed an increase in the amount of plastic used by resturants and or dining facilities in response to Covid-19?



If the respondent answered either yes or leaning yes, they were prompted by a question asking if the amount of plastic that local restaurants have been using in response to Covid-19 was worth the unknown effects that the generated plastic might have on the environment. 1% (N=1) of respondents believe that it is definitely worth the unknown effects the plastic may have, 10% (N=7) said probably worth it, 19% (N=13) of respondents are unsure, 48% (N=33) of respondents said the amount of plastic being used is probably not worth the unknown consequences, and 22% (N=15) of respondents said it was definitely not worth it. From this data we can show that around 70% of people do not believe the amount of plastic being used in response to Covid-19 is worth the unknown consequences it may have on the environment (Figure 2). Despite the trends that the responses exhibit, we are not able to determine if the trends are due to the respondents' opinions on the virus itself, their opinions on the plastics being used, a combination of those, or something completely different.

**Figure 2- Is the amount of plastic being used during the pandemic worth the unknown effects the generated plastic waste might have on the environment?**

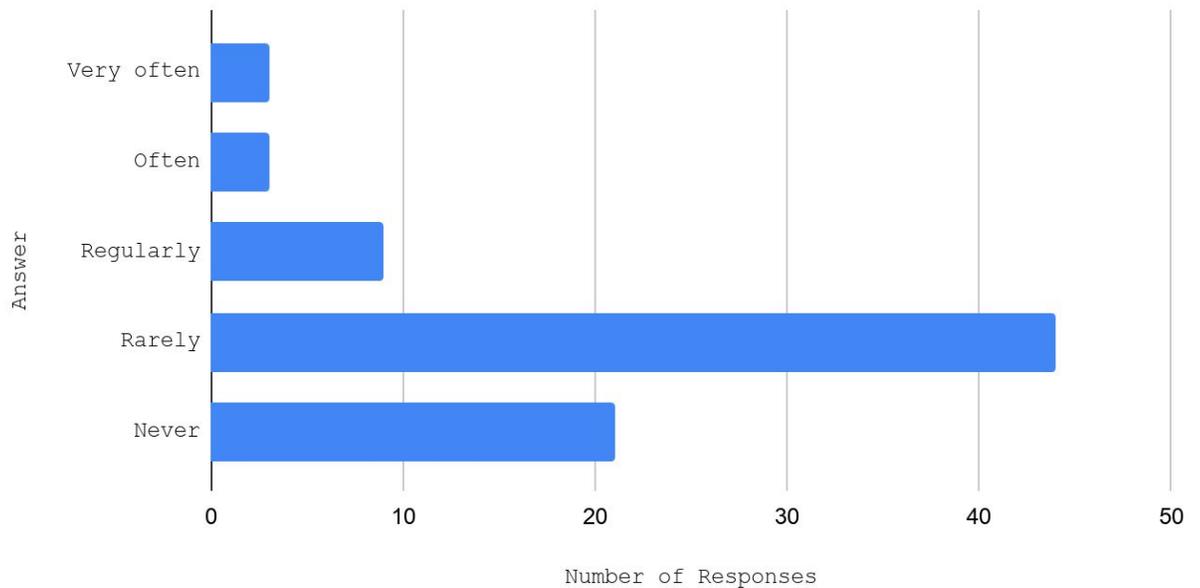


When asked if there is any type of dining establishment that sticks out more than others in the regard of plastic usage, former dine-in establishments were at the top with 30% (N=40) of the votes, followed by dining halls at 24% (N=32), and followed by fast food restaurants at 19% (N=26). However, it is important to note that dining hall numbers may have been higher, if they were not excluded to the general public. This is mainly due to dining halls usually not being as frequented by people who do not live in university housing. There is also a new statute implemented during the pandemic which states that only residents of university housing can eat at dining halls, meaning this number could have been higher if it was open to the public. The general consensus with if there was any specific food or cuisine type restaurants that stuck out was mixed, with the highest result of 36% (N=37) saying that they were indifferent, followed by fast food or casual restaurants at 18% (N=19), and then American and Asian restaurants tied for third at 15% (N=15).

When asked if they have used online food delivery services during the pandemic, 66% (N=53) of respondents said that they have. Most of them only utilize this service a few times a month at 57% (N=30), and 36% (N=19) said they used these services at least once a week. The next question asked if Covid-19 has affected how often they go out to eat, 85% (N=68) of participants said it had. The next question prompted them to gauge how often they went out since the pandemic, 55% (N=44) of participants said they have rarely gone out, followed by 26% (N=21) saying they have not gone out during the pandemic (Figure 3). If they answered that they never went out they were prompted with one last question before their survey ended, asking why they have not gone out. The main reason people have not gone out during the pandemic at all is

because they want to slow or inhibit the spread of Covid-19 at 46% (N=18) and they are worried of catching Covid-19 at 38% (N=15).

Figure 3- How often have you been eating out since the pandemic started (not including take out)?



The group that had gone out during Covid-19 were prompted to ask how satisfied they were with their dining experience, 72% (N=42) of participants said they were either very satisfied or somewhat satisfied, 19% (N=11) were indifferent, and 10% (N=6) of respondents were somewhat or very dissatisfied (Figure 4). They were then asked what regulations they preferred when it came to enforcing Covid-19 rules at dining establishments, the main rules preferences were spread out seating at 31% (N=45), maximum occupancy limits at 27% (N=38), and mask mandates for everyone there at 25% (N=36), which include the customers as well as the employees. It is interesting to note that 5% (N=7) of the responses said they would prefer to have the rules return to pre-Covid-19, which was still going on throughout the time frame the

survey was available (Figure 5).

Figure 4-How would you rate your overall satisfaction with how dining establishments are handling and responding to Covid-19?

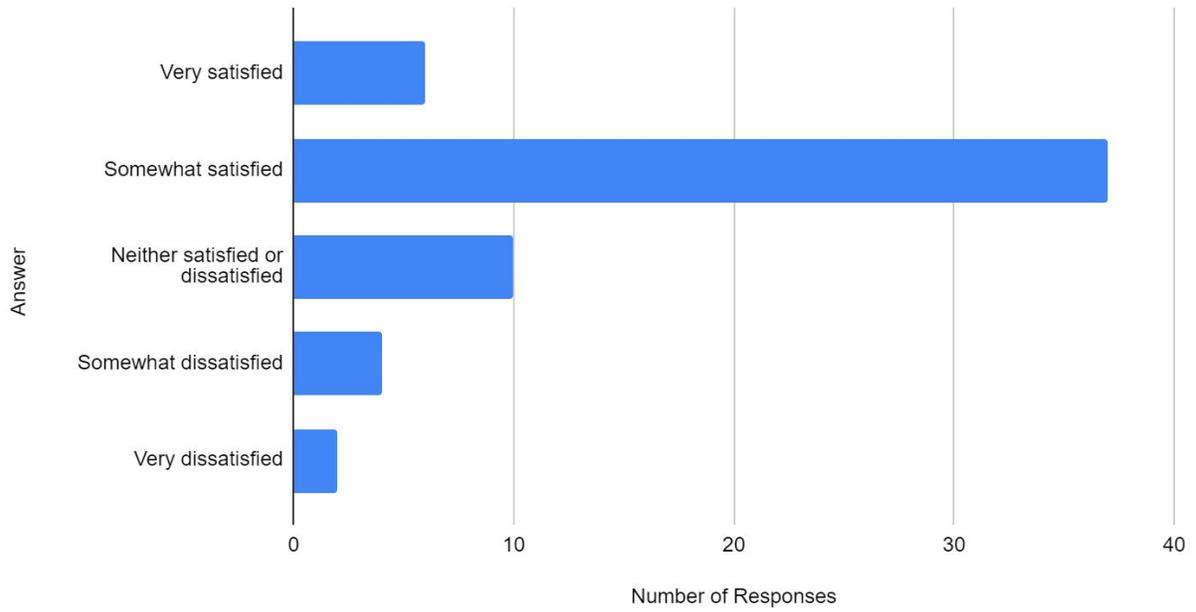
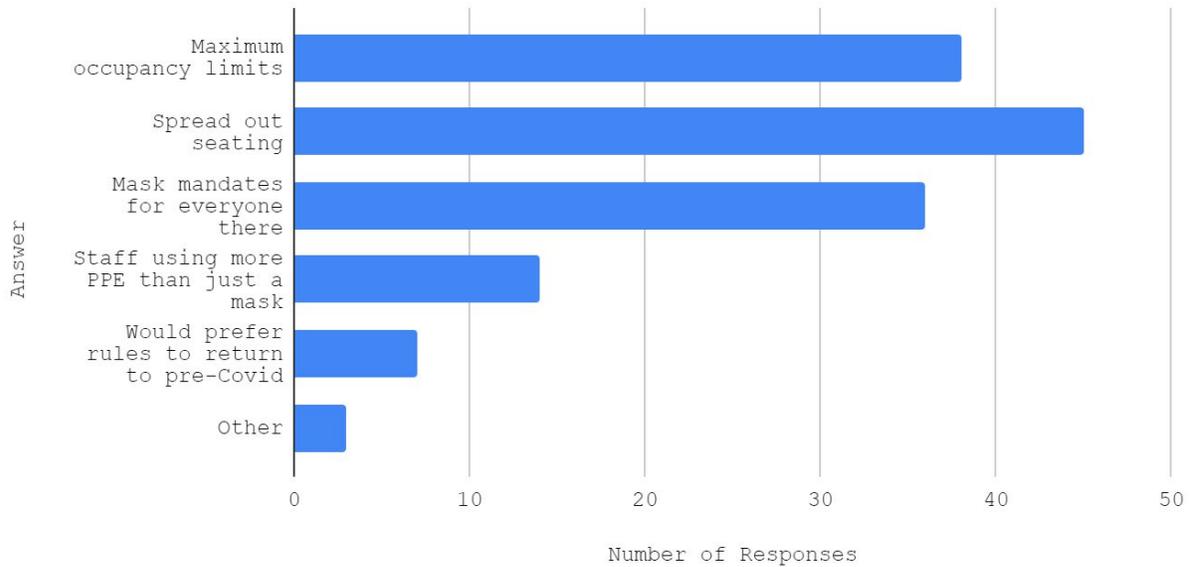


Figure 5- Do you have a preference/inclination for any particular rules that are enforced at dine-in establishments? Select all that apply:



### Food Worker Survey

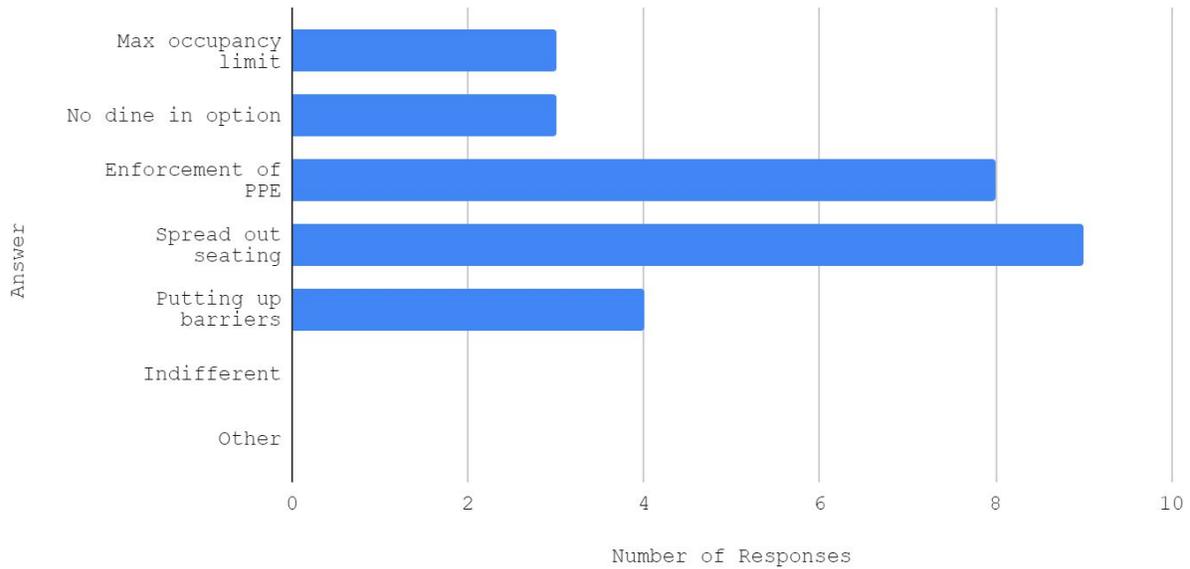
Our second survey was administered to people who worked or are working in the foodservice industry during Covid-19, although the turnout was only 26 participants who initiated the survey. Unfortunately given the small sample size of only 9 participants finishing the survey, we can not make any definitive statements concerning the results of the survey. This is because it is much harder to reach any statistical significance. Regardless, the data is important to look at so some patterns may be noticed. There was not a consensus result in location or academic year of the participants. Some of the significant data was that only 3 (30%) participants claimed that they received hazard pay, 1 (10%) claimed they have but it has stopped, and 6 (60%) have not received any at all. The majority felt safe working during the pandemic at

50% (N=5), while 20% (N=2) said they did not, the remaining 30% (N=3) felt indifferent about their safety status during the pandemic. None of the participants stated that they were unhappy with how their employer was responding to Covid-19, with 89% (N=8) being somewhat or extremely satisfied, the remaining 10% (N=1) being neither satisfied nor dissatisfied with their response.

Some interesting points to examine are that the general belief among employees is their employer is enacting Covid-19 protocols because of a genuine fear of Covid-19 at 18% (N=5) or wanting to slow the spread of Covid-19 at 29% (N=8). Participants did believe that their employers were enforcing rules due to government rules at 21% (N=6), public opinion at 18% (N=5), and corporate ruling at 14% (N=4), which if true, it does pose a question as to if their employer would respond differently to Covid-19 if there were no government restrictions or the public was not as invested in the pandemic. Results were relatively similar to the customers when asked if they believed if any rules were more effective than others, with spread out seating

at 33% (N=9) and enforcement of PPE at 30% (N=8) (Figure 6).

Figure 6- Are there any rules your employer has enacted you believe are more effective than others? Select all that apply:



The notice of food waste is much more indecisive here, as 3 (33%) said they have noticed, 4 (44%) saying they are unsure, and 2 (22%) saying no. With those results no definitive conclusions can be drawn. Although, the results are much more conclusive when looking at if they believe there is more plastic usage since Covid-19, as 8 (89%) responded yes, and the other respondent said maybe. With the split belief it is due to more take out options at 46% (N=6) or safety regulations due to Covid-19 at 46% (N=6), and the remainder saying it is due to an increase in food waste at 8% (N=1). When asked how they believe their employer should proceed at this time considering the circumstances, 3 (33%) participants said they believe they should enact more rules, 5 (56%) participants said they should stay the same, and one (11%) wanted their employer to revert to pre-Covid-19 rules.

## **Interviews**

In addition to our surveys, we carried out three successful interviews with figures familiar with plastic waste trends, city pandemic responses, and the local restaurant industry<sup>1</sup>. Firstly, we spoke with Bryan Johnson, who is the Recycling Coordinator and Public Information Officer at the City of Madison's Department of Streets and Recycling. Mr. Johnson has worked in the department for ten years overall, and has held this position for five years, with his duties primarily concerning the development and distribution of information to the public about Madison's recycling programs. During our conversation, Mr. Johnson detailed how his department implemented Covid-19 related measures in accordance with Wisconsin Governor Tony Evers' "Safer at Home" order in March 2020, but never ceased operations outright, as they are considered to be an essential function of the Madison city operations. While his department did not experience any drastic changes in its solid waste and recycling collections during Covid-19, Mr. Johnson did mention how Madison is generating greater amounts of solid waste since the pandemic took hold (which he backed up with numerical data that he graciously provided), and certain recyclable materials have undergone changes in pricing recently, namely mixed paper and plastics. Furthermore, Mr. Johnson noted that, along with the increase, "a bigger proportion of our waste is coming from those residential sources," as opposed to commercial ones (This could possibly be related to an increase in take out ordering from restaurants, as is indicated in one of our surveys, but further, more specific research would be necessary to justify this). While Mr. Johnson was unable to comment directly on the restaurant industry itself during Covid-19, he did express an optimism in grassroots efforts across the city

of Madison for future encouragement of greater usage of recyclable and compostable materials, as long as the proper sanitary precautions are put in place and when it is feasible to do so.

“Community education and engagement is a big part of my job,” Mr. Johnson added, “and a lot of people really saw this pandemic as a bit of a roadblock at first, myself included, but we are trying to make the best of it and use it as a chance to incorporate that strong community involvement aspect into the department as much as possible”.

Our second interview was with Stacie Reece, who also works with the City of Madison as the Sustainability Program Coordinator. Ms. Reece has a background with Madison-area sustainability nonprofits, and is the first person to ever hold the position of Sustainability Program Coordinator within the City of Madison, which was created in November of 2018. As her position is relatively new, Ms. Reece explained that little has changed in her role directly because of the pandemic, but the dynamic conditions on a daily basis within Madison have raised the need for rapid and thorough responses from her department, and collaboration with other departments as well (including Streets and Recycling). Again, Ms. Reece recalled that the month of March 2020 was fraught with speculation that culminated in a transition to a “work from home” structure for her division, and the period of time since then has consisted largely of logistical adjustments and adaptations designed to keep Madison’s sustainability missions and goals progressing. “I would definitely say that the work I do is not too difficult to be done remotely,” Ms. Reece said, “so I suppose I am a bit lucky in that regard. The transition was thankfully very rapid.” When asked about her role’s involvement in Madison’s waste streams, Ms. Reece mentioned that general waste and recycling goals are involved in her sustainability plans, mentioning her department’s recent citywide plastic straw ordinance, which she conceived

herself and implemented gradually with community involvement. While she has observed increases in disposable to-go containers and similar objects among Madison's residential sector, she believes that popular support of local businesses, including restaurants, remains a critical topic during the pandemic, and stated "it is an ideal way for Madisonians to support local businesses financially, which is generally a good thing." Furthermore, Ms. Reece mentioned how she expects some waste-related behaviors to remain in practice after the pandemic concludes, which will keep waste levels high. "A lot of the behaviors that the city is seeing from a waste management perspective, I think those will stick for at least the foreseeable future," Ms. Reece predicted. From her department's perspective, Ms. Reece stated that despite the current socioeconomic climate, their overall goal remains working towards a portfolio of overall sustainable business practices in food service applications, and has often looked to other major cities across the country (specifically citing Boulder, Colorado's compostable foodservice materials program) for both ideas and inspiration for future sustainability ventures. Ms. Reece recognized that there is still quite a lot of work to be done regarding any initiatives for citywide plastic waste reduction in the restaurant industry, but remains optimistic that this will prove to be a worthy venture once the pandemic concludes.

Our third and final interview took place with Peter McElvanna, co-owner of The Coopers Tavern restaurant and bar on downtown Madison's Capitol Square, he has been in an ownership role at The Coopers since it opened eleven years ago. Mr. McElvanna described how his restaurant initially closed its dine-in services in mid-March 2020, and by early April was closed entirely, and would not reopen until early June. Even when the restaurant reopened, it was at 25% customer seating capacity, and business was relatively slow. "A lot of our customers are

local government workers and businessmen who stop by for lunch meetings,” McElvanna noted, “and that really doesn’t happen anymore”. However, The Coopers has initiated new partnerships with online food delivery platforms, (UberEats, EatStreet, etc.), which it did not have before the pandemic, and Mr. McElvanna estimates that about 60% of their overall business comes from these outlets now. With this newfound dependence on third-party delivery services, Mr. McElvanna noted, there has been a general trend towards customers buying simpler, lower-cost menu items. “There’s no real market for those higher-end menu items now, you know, steaks, stuff like that,” Mr. McElvanna explained, “so we just took them off our menu and stuck with our more basic items,” among those Mr. McElvanna mentioned by name were soups, salads, and sandwiches. Additionally, Mr. McElvanna mentioned how The Coopers has strived in the past for strong commitments to using recyclable and biodegradable materials where possible, and these practices have continued at the business during the pandemic. Mr. McElvanna estimates that both the usage and purchasing of products that fall within those parameters has tripled since the reopening, and although he recognizes that his restaurant is probably more of a progressive example in this regard when compared to other similarly sized businesses, he has hope that the local restaurant industry will implement standards on the matter in the foreseeable future.

## **Analysis**

Given the relatively small sample size, it would neither be right nor justifiable to make a broad generalization with our data. Despite this, we do believe our research gives us a good idea about how UW-Madison students and people who inhabit the area around campus feel about the environmental issues that have arisen in response to Covid-19, specifically when it comes to

dining establishments. Again, we must recognize that our data is from an area that is considered predominantly politically liberal, and our data indicates that well over half of our participants (58%) consider themselves to be environmentalists, which again can influence the answers and may not be representative of the general public, whether that be in Madison, Wisconsin, the Midwest, or elsewhere.

There is a general popular awareness concerning the increase of plastic from the local restaurant industry, as over 86% of participants noticed some sort of plastic increase (Figure 1). Our survey participants also feel that this is probably not worth the consequences the plastic may have on the environment, as over 69% of respondents believe the amount of plastic being used is not worth it (Figure 2). This may not be in line with how other cities or even college students feel, this is again because we are in a predominantly liberal area and also as shown by our survey consistent with many environmentalists. Following these results, we decided to use a chi-square test for independence to find any potential linkages between the body of responses to both the question from Figure 2, concerning the respondent's opinion on the effects of the increased plastic use, and the question asking if the respondent personally identified as an environmentalist. Our null hypothesis stated that there is no such linkage between the proclaimed environmentalist attitudes among respondents and their views on the justification of increased plastic use, and our alternative hypothesis stated the opposite, that these factors are in fact linked. Please note that for purposes of statistical integrity in the end result, only survey responses that answered both questions of interest are considered. The tables and further calculations can be found below:

**Table 1: Contingency table comparing common responses to both environmentalist and justified plastic use questions**

	Environmentalist	Undecided	Not environmentalist	Totals
Definitely worth it	0	1	0	1
Probably worth it	6	0	1	7
Unsure	11	0	2	13
Probably not worth it	14	12	7	33
Definitely not worth it	6	8	1	15
Totals	37	21	11	69

**Table 2: Expected values of the common responses, using the formula of (row total \* column total)/total # of observations using the values from Table 1**

	Environmentalist	Undecided	Not environmentalist
Definitely worth it	0.536	0.304	0.159
Probably worth it	3.754	2.130	1.116
Unsure	6.971	3.957	2.072
Probably not worth it	17.696	10.043	5.261
Definitely not worth it	8.043	4.565	2.391

**$X^2$ , or sum of all (observed - expected)<sup>2</sup>/expected = 17.701 with 8 degrees of freedom**

**P-value using the above criteria: 0.024**

**Since 0.024 < 0.05, we can reject the null hypothesis, and conclude that we have enough statistical evidence to conclude that the responses between the environmentalist question and the plastic use justification question are linked.<sup>2</sup>**

It is rather challenging to determine if there is a type of restaurant or cuisine type that uses more plastic than another, as the results from the survey were pretty well distributed across the board. Although, certain areas like dining halls might have been higher than other responses, if they were open to the general public. It also matters how often an individual has gone out since the pandemic started, because as shown by our data 26% of participants have not been out to eat since the start of Covid-19 (Figure 3). This can have an effect if some areas are not being experienced as much as others, and the observation that the people who have not gone out have mostly done so because of fear of Covid-19 and wanting to contain the spread must also be properly noted. There is also a noticeable response of 8% of participants saying that food delivery is just more convenient, causing them not to go out during Covid-19, which can be accounted for as 66% of our participants have claimed to use food delivery services during the pandemic. Although, it may have been useful to inquire further as if they had used those services and how frequently before the start of Covid-19, to determine if that has caused some people to start using it. It will certainly be a topic of interest to see what becomes of online delivery services after Covid-19.

Most of the current restaurant precautions to combat Covid-19 are seen as productive as none of the options received a lack of votes, showing that they are believed to be effective at this time. An interesting note is that around 5% of the respondents said that they would prefer the rules to return to pre-Covid-19 at the time of this survey, which was taken at a time where cases were relatively high in the state (November 2020). The reasons for this can be numerous, but it does show that some people do just desire normalcy, or a return to such a state if possible. Restaurants and bars have implemented a number of practices to reduce the spread of Covid-19.

Approximately 5% of our respondents did not feel that these practices were necessary (Figure 5). However 72% of respondents viewed these precautions favorably (Figure 4) even though these safety precautions compromise, to various degrees, the overall dining experience.

As convenient as it would be to analyze and draw some conclusions or hypotheses from our restaurant worker survey, having only nine participants finish the survey is rather discouraging from going that route. This survey was much more specific than the other which would make it result in less participants, looking back it might have been more useful to only have a handful of participants, but rather interview them than survey them, as that would give us a lot more detail to process and draw conclusions from there. The only thing that can really be said is just like the other survey, most people are satisfied with restaurants' responses to Covid-19 at 89% of respondents claiming to be at least somewhat satisfied with their response. This does align with the customer survey, showing that in general people approve of how restaurants are proceeding with the pandemic.

## **Discussion**

Although the inherent unpredictability of research ventures such as these is part of what makes them worthy ventures in the first place, our results were a pleasant mix of the expected and the unexpected. In general terms, our research indicates that there is a trend of increased amounts of waste in the restaurant scene of downtown Madison, and there exists a general consensus that this trend in resource usage and waste accumulation is not worth the environmental risks (Figure 2). As we predicted beforehand, a sizable portion of the increased waste comes from single-use disposable plastic products, many of which are designed to mitigate

the spread of the virus that causes Covid-19. Examples of this we found are take out bags, PPE, barricades, or other protective measures. Our interview findings, in particular those from our conversation with Mr. McElvanna, further corroborate this prediction. The one area that we seem to be wrong in our prediction is the lack of food waste. It certainly does not seem to be as large of a proportional component of Madison's waste streams as we initially anticipated, according to our interviews with Mr. Johnson and Ms. Reece, as the increased levels of disposable plastics was generally more noticeable.

Furthermore, those that are most familiar with the topic anticipate the pandemic will have lasting imprints upon waste patterns, whether they be in Madison or elsewhere, for the foreseeable future, even after the threat of Covid-19 is eliminated. Because our Literature Review primarily concerned large-scale observations, often at the worldwide or countrywide level, we anticipated our research could very well differ from the establishment knowledge that already has been published about our topic. In some ways, our data has a benefit over the establishment literature in that being more focused and at a smaller scale, it allows for deeper, often more individualized research. However, we must recognize that all research has inherent limitations, and our work here is all but a snapshot of the general topic at hand. Nevertheless, we believe that our work laid out in this paper has succeeded in providing a localized context of a global issue, which was one of our primary goals at the beginning of our research process. While our findings do not outright confirm or refute the existing material, they do act as a testament to the importance of scale when performing any sort of geographic research.

As with any scholarly research, it is vital to acknowledge the necessary limitations that dictate the scope of both our data collection and our results. Though our main research question

is intentionally designed to be broad and left for further interpretation, it would be quite shortsighted to ignore how such a general question could be interpreted in countless ways depending on the researcher. Our work is our own, but we cannot, and do not, claim to have found the decisive be all and end all information on the topic at hand. Perhaps a geographer would interpret our question from a feminist perspective, and their research could factor in the gender roles in the restaurant industry. An economic geographer could look to find explicit linkages between the financial trends at restaurants, the price fluctuations in recyclable materials, and other economic aspects of our topic. Although our work here aims to be a summative compilation of our geographic educations, we hope that it can and will provide a solid body of investigation that encourages geographers of all subdisciplines to analyze, question, and even challenge our findings in whatever ways they deem appropriate and/or worthy of their time and effort.

## **Conclusion**

Based on our comprehensive research process over the course of the semester, we have concluded that Covid-19 restrictions in the city of Madison, Wisconsin have given rise to an overall increase in waste levels in the foodservice industry in the campus area surrounding UW-Madison. This increase can be attributed in part to higher use of disposable plastic products, a common observation among our survey respondents, whose increased usage has become a necessity for many businesses during Covid-19. Although we discovered in our interview with Mr. Johnson that a greater proportion of overall waste comes from residential sources, this is simply a shift in proportions, and each sector has seen waste level increases, including

foodservice. We also discovered via our conversation with Mr. McElvanna that restaurants may make changes to their core business operations, such as amending the menu or bringing in third-party delivery services, to maintain profitable business operations, and although we were unable to interview any other restaurant owners, we suspect that these actions are somewhat commonplace among Madison's restaurant operators. Then again, further research would be required to substantiate such a claim.

We have arrived at this conclusion after extensively analyzing both current scholarly literature on the topic and the perspectives and experiences of the local populace of Madison, through both surveys and interviews. Although we do believe our research is sufficient enough to justify such a conclusion in this context, we also acknowledge the broadness of our concluding statement itself, and its applicability at a relatively small geographic scale. Although this may appear to be contradictory at first glance, we trust that our findings comprise an extensive body of research that can and should be expanded upon from a different angle, and we welcome any other geographers to challenge our work here and carry out their own research on our topic. We think our work here is just scratching the surface of the Covid-19 pandemic's involvement in waste streams at smaller geographic scales, and we would be delighted to see any form of additional scholarly work on the topic at a similar level.

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### **Appendix/Notes**

1. All interview subjects were provided with a privacy statement, which they read and agreed to prior to each conversation.
2. All graphics created for this paper were done using Google Sheets.
3. All text in quotes in this section is taken directly from the interview conversation, and abridged for content and grammar where necessary.
4. Calculations made using chi-square test for independence calculator from [libretexts.org](http://libretexts.org), using data derived from our Qualtrics survey.