The Effects of Opening a Restaurant During a Pandemic*

Wen Ma, Reem Alasadi, Rachael Lam, Tim Stephens

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Abstract

In May and June of 2021, a random selection of Toronto restaurants were selected to open during the COVID-19 pandemic. ***this needs more***

*Code and data are available at: https://github.com/wenmade/2178Paper2.git.

Contents

1 Introduction

The COVID-19 pandemic has induced global action and, in some instances, inaction, that has affected millions of people. With over 100 million confirmed cases and 2.4 million total deaths, the pandemic has caused suffering and distress for countless people (BBC 2021). In other instances, it has brought immense fortune - Jeff Bezos's wealth increased $92 billion between March and August of 2020 (Oxfam 2020). It is estimated that he could give all his 876,000 employees a $105,000 bonus and still be as wealthy as he was before the outbreak of COVID-19 (Oxfam 2020). Unfortunately, this has been a fantasy for the majority of global citizens - and Canada is no exception.

At the beginning of the pandemic, nearly a sixth of all Canadians applied for emergency benefits (Harris 2020). This has had enormous effects on the population's mental health with 48% rating their mental health as eight or higher on a ten point scale in 2020 compared to 73% in 2018 (Canada 2020). Concurrently, the COVID-19 pandemic has also caused disruptions in numerous industries, but with some of the most detrimental ones occurring in the consumer-facing service sector (Canada 2020). Before the pandemic, the restaurant industry generated one out of every fifteen jobs, paying Canadians nearly $30 billion in wages and benefits (Restaurants 2020). It also contributed $31 billion to Canada's GDP annually, proving its economic value (Restaurants 2020). Unfortunately, the epidemic has generated massive unemployment and many restaurants have been shut down and will never reopen (Larue 2020).

In an effort to avoid further devastation to the restaurant community, Petit Poll has collaborated with the Ontario Government to examine the effects of COVID-19 on restaurants in Toronto and understand what provisions can be made. In this study, we reopened randomly selected restaurants in the Greater Toronto Area (GTA). The segment included restaurants of varying price points and those who had previously offered dine-in services. We then released a survey and compared the results to restaurants who did not have the opportunity to open and instead, remained closed. All restaurants were able to continue curb-side pickup and delivery services.

This paper will first explore....

2 Data

2.1 Description of Study

At the time of this study, it was assumed that all restaurants in the GTA were closed due to COVID-19. However, restaurants could continue to prepare food for curb-side pickup and delivery so their businesses could generate some income. This study looks at the effects of the lockdown on the restaurant industry and inspects the benefits of re-opening a business for a short amount of time during the pandemic. Keeping the restaurant business afloat in Toronto will be a monumental and expensive task. If risk can be mitigated, it could be justifiable to allow some restaurants to (temporarily) re-open. If so, they could generate enough income to survive the pandemic. Otherwise, the government could be looking at subsidies for each business – and with the sheer number of foodservice establishments in the GTA, this could add up quickly.

There are many foodservice establishments in Toronto, and it would be ideal to re-open everything. However, this is not a realistic option. Due to the nature of how COVID-19 spreads, it is still crucial that we limit the number of interactions people have with one another during the day. Therefore, we had to take a subsample from the larger foodservice establishment population. Since "dine-in" restaurants have had minimal opportunity to generate revenue during the pandemic, they were selected as the frame for this

study. Foodservice establishments listed as "restaurant" in the City of Toronto's Dinesafe dataset (Toronto 2021b) were considered.

The eligible businesses were then contacted by the Ontario Government via email or phone and were asked if they would like to participate in a trial re-opening. If they answered yes, they were added to a list. If they decided against the re-opening, or did not respond, they were not included in the study. After contacting the different businesses, the "yes" list was randomly subsampled into 2 groups, with a 50:50 chance to be placed in each group. The first group had the opportunity to re-open their business for a period of 2 months: May – June 2021. The other group was asked to remain closed to act as a control group. Participants who could re-open their business were issued a certification sticker that must have been visible from the street. At the end of the two months, a survey was released to the participants to gain information about their business, how it had been affected by the COVID-19 pandemic, and how much re-opening helped.

To entice the control group to complete the survey at the end of June, we initially discussed providing financial compensation. However, with over 7,000 eager-to-open restaurants in the GTA (Toronto 2021b) this number would quickly escalate to an unrealistic proportion. Therefore, the Ontario Government has allowed the control group to re-open their business for two months as well – if they completed the survey (as compensation for participating). Those in the control group who completed the survey could open for the months of July and August (2021), but would no longer be part of the study. For more information on the survey (including a detailed description and screenshots of the questions), see the Appendix. Because of the way this study has been structured, the cost remained relatively low – just a payment to Petit Poll for their work.

After completion of the study, Petit Poll analyzed the survey responses and presented them to the Ontario Government. Those restaurants who responded to the survey were considered part of the sample. Ultimately, the government must make the final decision if it is worth the risk to re-open businesses during the COVID-19 pandemic. Further studies may be needed to decide how many businesses should be allowed to open, and for how long.

2.2 Dataset

This dataset was pulled from the City of Toronto's Open Data Portal – Dinesafe (Toronto 2021b). The Open Data Portal is a regularly updated and open-sourced data delivery tool which allows users to "generate insights, analyses, and/or... develop web/mobile applications" (Toronto (2021a), Toronto (2021c)). The dataset was analyzed using `R` (R Core Team 2020). Various packages were used to analyze the data. First, `opendatatoronto` (Gelfand 2020) and `sf` (Pebesma (2018)) were used to get the dataset from the open data portal. Next, the `here` package (Müller 2020) was used for easily saving and locating files. The `tidyverse` package (Wickham et al. 2019) was used for general analysis of the dataset. `Ggplot2` (Wickham 2016), `knitr` (Xie 2020b), `kableExtra` (Zhu 2021), and `gridExtra` (Auguie (2017)) were used to create plots, tables, and figures. `Float` (Schmidt (2020)) was used to lock tables in place. `Ggmap` (Kahle and Wickham (2013)) and `mapview` (Appelhans et al. (2020)) were used to create a map of the GTA and its respective restaurants. The `generator` package (Hendricks 2015) was used to help simulate data. The `stringi` (Gagolewski 2020) package was used to process strings in the dataset. The `janitor` package (Firke 2021) was used to clean the dataset. `TinyTex` (Xie 2021) was used to help write the output to PDF. Finally, `bookdown` (Xie 2020a) was used to build the pdf and `bibtex` (Francois 2020) was used to create references.

The Dinesafe dataset was published by Toronto Public Health. Its main purpose is to record the number of inspections, infractions, and legal histories of different foodservice businesses in the GTA. In addition, it also

holds basic information on all registered Torono foodservice establishments. After conducting an inspection of a respective foodservice location, a record of what was done or found is created and eventually transferred to a CSV file. Unregistered restaurants are not included in the dataset.

For the purposes of this study, we kept information about the business' name, location, and type. Location included street address, latitude, and longitude. Information about inspections was removed from the dataset, as it fell outside the scope of this analysis. There were many variables from the survey that were added to the dataset. First, the restaurant ID was added, starting at 1 and increasing incrementally. The rest of the variables were randomly generating in R (R Core Team 2020). Those variables were: Phone number 1, phone number 2, email, website, number of years in operation, franchise (y/n), own or lease, number of employees before the first lockdown, number of employees at the end of the first lockdown, number of employees during re-opening, the total number of weekly hours the restaurant was open before the lockdown, weekly hours during the lockdown, weekly hours during the temporary re-opening, delivery (y/n), curbside pickup (y/n), dine-in service (y/n), patio service (y/n), type of cuisine, serves alcohol (y/n), target pricepoint (low, average, high), income and profit for the months of May and June in 2019, 2020, 2021 (each with their own column), was the restaurant selected to re-open (y/n), and finally, helpfulness of the re-opening on a scale of 1 to 5.

This dataset has strengths and weaknesses. For positives, this dataset is from a reputable source. It should contain all registered restaurants in the GTA. Nothing should be left out (unless the establishment is running illegally). Additionally, we have real restaurant names and locations to study, although locations were not a main source of interest in this study. In terms of weaknesses, Dinesafe did not specify how they classified different establishments. It is unknown what the differences are between different classes of establishments. For example, what is the specific difference between a "restaurant" and a "cafeteria"? Depending on how (or who) classified the different establishments, it is possible for bias to arise here. There is the possibility that an establishment that should be classified as one thing was classified as another. Another weakness of this dataset was that much of the information was simulated. With so many variables, the potential for error increased. Also, many assumptions were made about different probabilities. It is important to recognize that this study is merely a model developed on randomized data. It has potential to be used in the future on real data.

2.3 When Covid Strikes

A total of 7,221 surveys were collected and analyzed to understand the effects of COVID-19 on the restaurant industry and the potential benefits of reopening for 2 months. Of the businesses that participated in the survey, income substantially decreased for all restaurants in a two month period between 2019 and 2020 by more than 75% (Table 1).

Table 1: Average income and profit for all restaurants in the survey over a two month period between May and June

Income 2019 ($)	Income 2020 ($)	Profit 2019 ($)	Profit 2020 ($)
339104	84215	11092	2770

Table 1 shows the devastating effects of the lockdown on the restaurant industry. For restaurants whose income was less than the mean, these types of losses could quickly result in closure if intervention of subsidies are not put in place. Figure 1 further represents this income reduction.

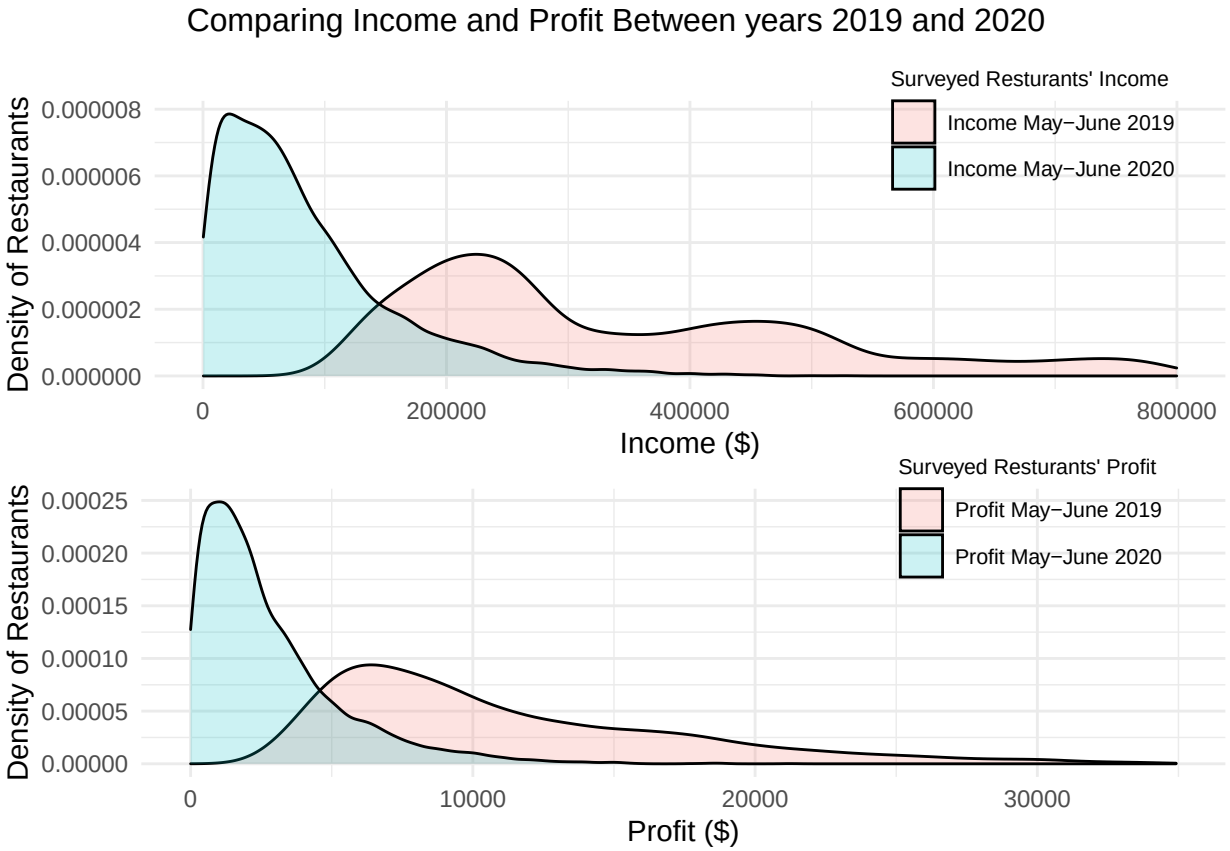


Figure **??** shows that businesses in the months of May and June 2019 (red) saw a distributed income from \$100,000 to \$800,000. In 2020 (blue), these numbers were drastically different. Nearly all restaurants earned less than \$200,000, with most clustering between \$0 and \$100,000. The profit graph shows the same trend. In May and June 2019, restaurants were profiting somewhere between \$5,000 and \$30,000. However, in the same months of 2020, they were profiting close to or less than \$1000 and very few earning more than \$5000. COVID-19 hit the restaurant industry hard.

In addition, restaurants saw a drastic change in the number of working employees. Table 2 shows the dramatic decrease in the number of staff employed.

Table 2: Average number of staff between May and June of 2019 and 2020

Number of Staff 2019	Number of Staff 2020
37	10

Table 2 shows a decrease in staff of more than 70%. These losses indicate mass unemployment in the restaurant industry and the far reaching implications of COVID-19, which will be discussed in depth in Section 3. Figure 2 gives a visual representation of the change in staffing.

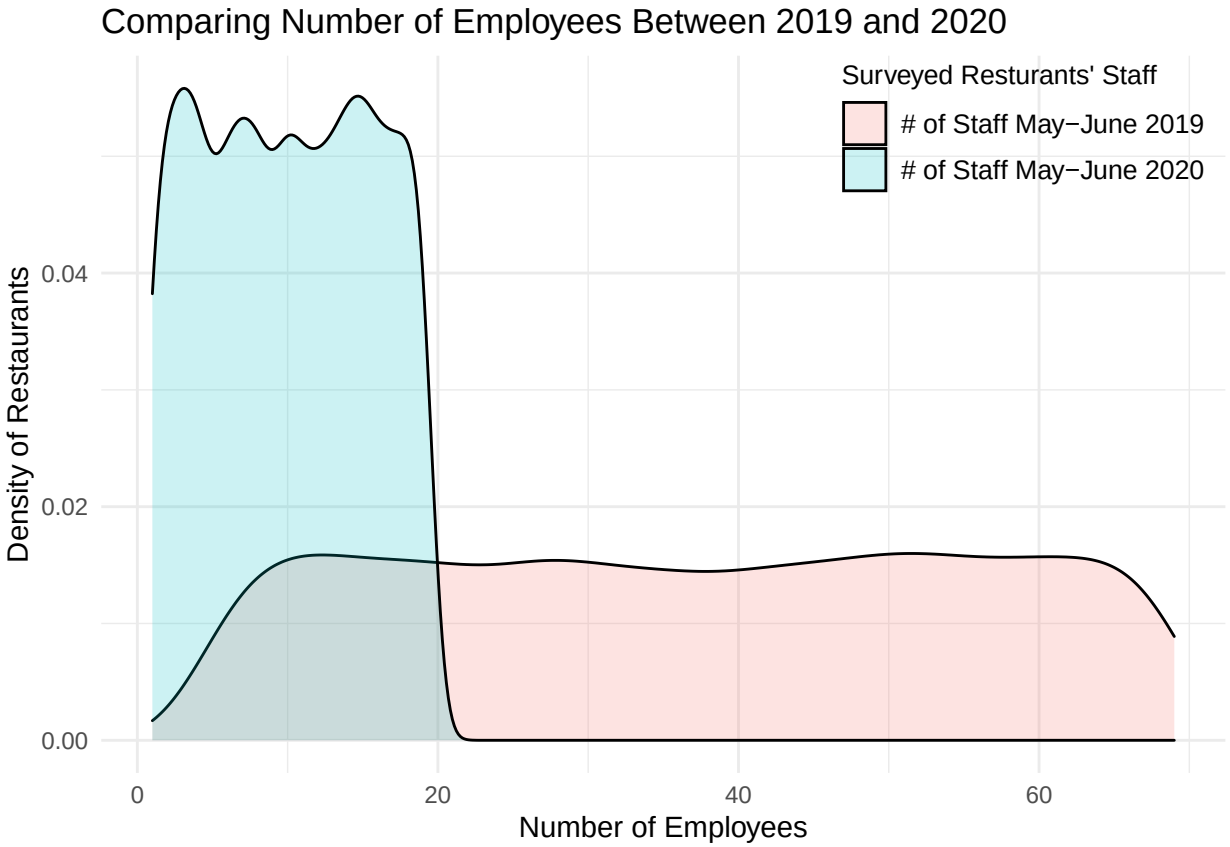


Figure 1: Graph of average number of staff between May and June of 2019 and 2020

Figure 2 shows that in May and June of 2020, nearly all restaurants employed fewer than 20 staff. This is compared to 2019 where there is a greater number of staff employed, with some restaurants employing over 60 people. Not only did COVID-19 affect restaurants income and profit, it also affected the livelihoods of people who worked in the foodservice industry.

To understand the demographics of the surveyed businesses, we pulled information on their type of operation, years of operation, and property ownership. Table 3 compares the number of franchised and non-franchised restaurants in the GTA. Table 4 shows the number of years the business has been operational. Lastly, Table 5 shows the number of restaurants that own their property vs lease it.

Table 3: Number of restaurants franchised

Franchise (Y/N)	Number of Restaurants	Percent of Restaurants
N	4242	0.5874533
Y	2979	0.4125467

Table 4: Number of years in operation

Years in Business	Number of Restaurants	Percent of Restaurants
1-5 years	2655	0.3676776
11-20 years	1414	0.1958178
6-10 years	1049	0.1452707
Over 20 years	705	0.0976319
Under 1 year	1398	0.1936020

Table 5: Number of restaurants who own the property

Restaurant Ownership	Number of Restaurants	Percent of Restaurants
Lease	3650	0.5054702
Lease, want to purchase	726	0.1005401
Own	2845	0.3939898

It is apparent that the majority of businesses were non-franchised, and were operational for less than five years (Table 3, Table 4). [*insert reference to experiences of new businesses*] Furthermore, the majority of properties were leased, creating additional costs that are difficult to maintain with a decrease in income (Table 5). Finally, Table 6 inspects the distribution of restaurants at different price-points. Restaurants were asked to self report their targeted demographic (low-end, average, high-end).

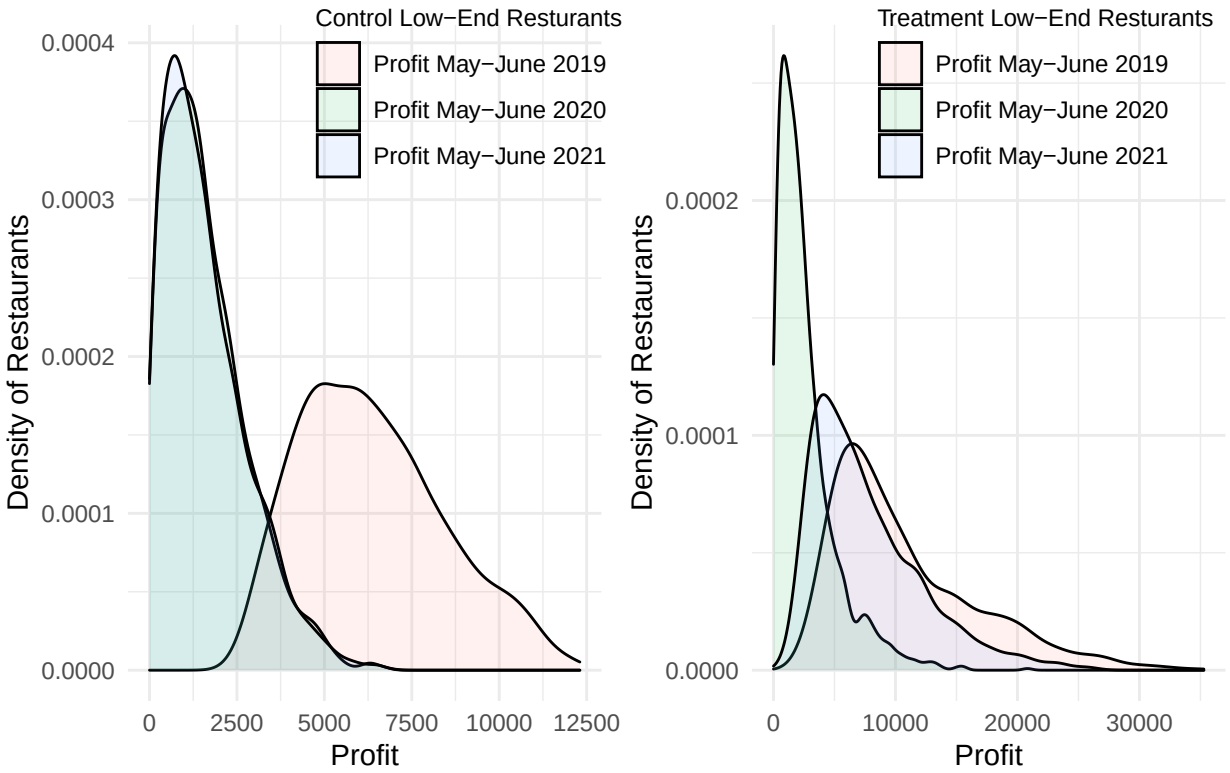
Table 6: Price-point of restaurants

Price-Point	Number of Restaurants	Percent of Restaurants
Average	2905	0.4022989
High-end	1453	0.2012187
Low-end	2863	0.3964825

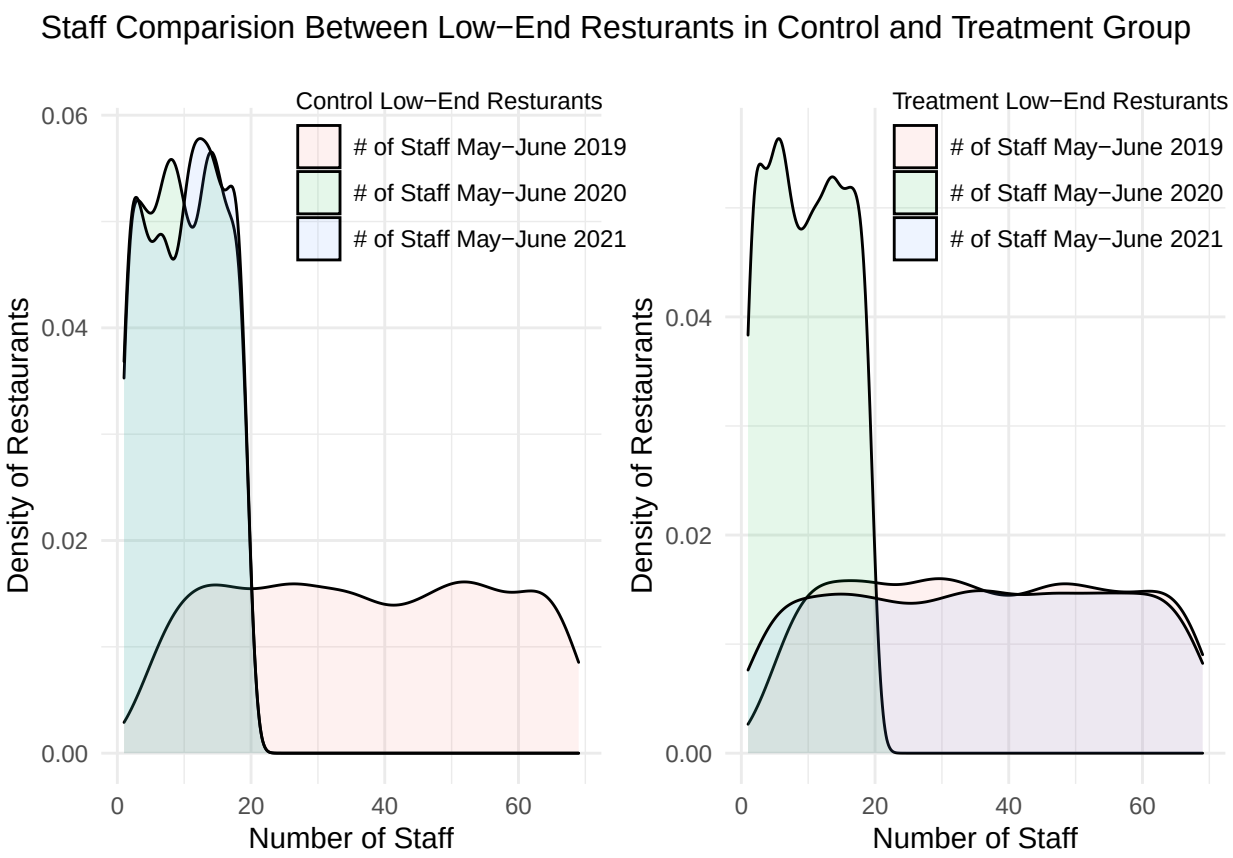
Of the businesses that completed the survey, 41.03% of restaurants were classified as low-end, 39.16% were classified as average, and 19.8% were classified as high-end (Table 6). These restaurants were categorized accordingly to have an accurate comparison between the control and sample groups during the temporary re-opening. The sample group were the restaurants which reopened and the control group were the ones which remained closed. Included in the next 3 sections are comparisons of profit generated and staff employed during the temporary re-opening. Income is not included as this study looks to determine if the two month period where the restaurant was allowed to open generated enough profit to allow the restaurant to survive the pandemic.

2.4 Low-End Restaurants

Within the low-end restaurants, reopening for a two month period showed significant improvements. Figure **??** shows the effect of reopening on these businesses.



Restaurants in the treatment group earned roughly 188% more than the control (Figure **??**), proving that re-opening was extremely beneficial. Employment had an even more significant trend, showed in Figure **??**.



Employment showed an almost 247% increase in staff (Figure **??**). Employment was almost back to 2019 levels when restaurant re-opened. However, in the end, treated restaurants were torn on the helpfulness scale, shown in Table 7.

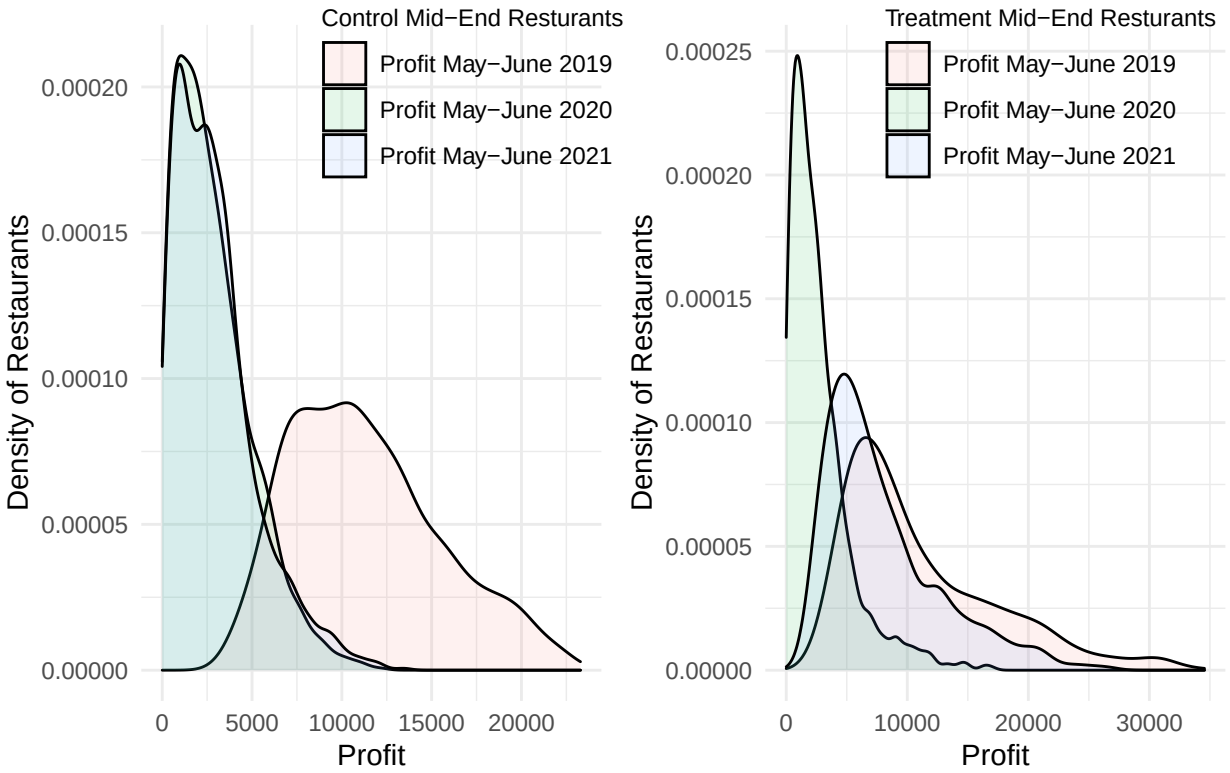
Table 7: Low-end restaurant responses to helpfulness on a 5-point scale

Helpfulness on 5-Point Scale	Number of Restaurants	Percent of Restaurants
1	310	0.2143845
2	148	0.1023513
3	235	0.1625173
4	261	0.1804979
5	492	0.3402490

Table 7 shows an average response of 3.36. Although 34% of respondents scored a five, 21% still scored a one. This could be due to the effort that it takes to prepare a restaurant to open for a two month period, especially in the wake of COVID-19. The amount of personal protective equipment (PPE), training and sanitizing equipment needed could outweigh the benefits of opening.

2.5 Middle-End Restaurants

Middle-end restaurants experienced fairly similar profit outcomes compared to low-end restaurants, as seen in Figure **??**.



Restaurants in the treatment group saw a 179% increase in profit in contrast to the control group (Figure **??**). This was very similar to the low-end group. Employment trends are shown in Figure 2.

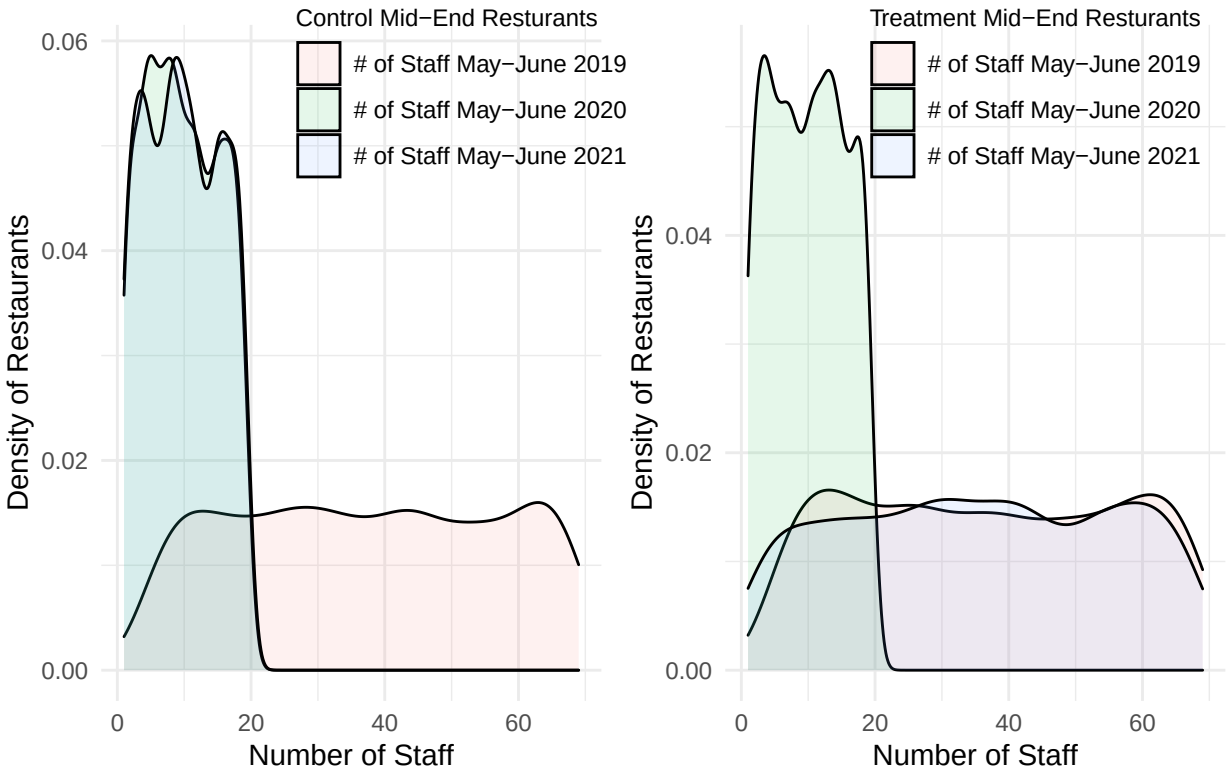


Figure 2: Number of staff of control and treatment groups of middle-end restaurants between May and June of 2021

For restaurants in the mid-range of price-point, employment experienced a 254% increase in staff, which are similar numbers compared to low-end restaurants. Again, staffing levels were almost back to 2019 levels. Table 8 shows reported helpfulness scores.

Table 8: Middle-end restaurant responses to helpfulness on a 5-point scale

Helpfulness on 5-Point Scale	Number of Restaurants	Percent of Restaurants
1	306	0.2091593
2	149	0.1018455
3	215	0.1469583
4	276	0.1886535
5	517	0.3533835

With the improvement in profit and staffing, 38% of the restaurants categorized helpfulness as a five on the five point scale (Table 8). Although an additional 19% of restaurants scored a four, there were still almost 19% that scored a one.

2.6 High-End Restaurants

Finally, high-end restaurants experienced the smallest improvement in earnings, although by a fraction of a difference. Results are shown in Figure 3.

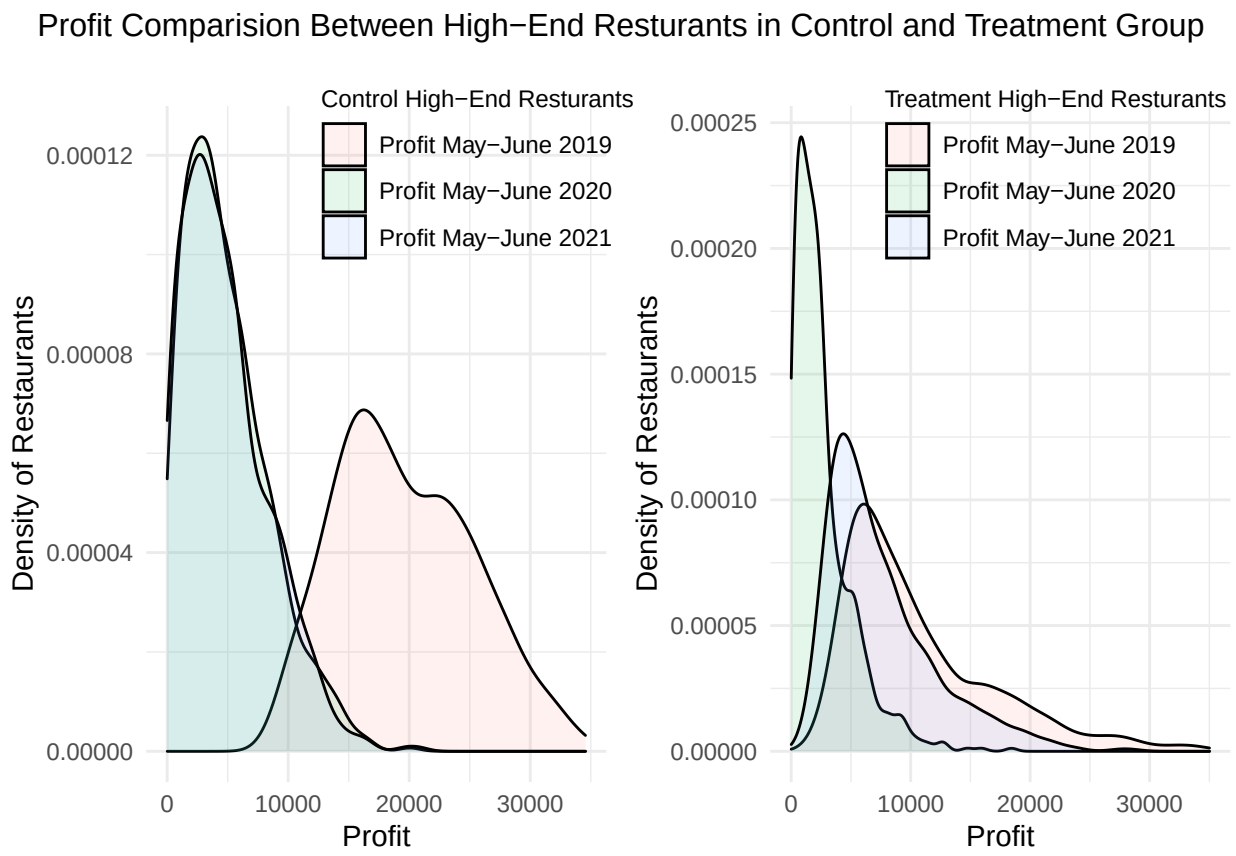


Figure 3: Profit of control and treatment groups of high-end restaurants between May and June of 2021

The treatment group earned 178% more than the control group between May and June. The nature of high-end restaurants offering primarily dine-in service would assume that they would see the greatest positive effects of the reopening, yet they did not see as substantial of an increase as other price brackets. This could be due to lingering hesitance surrounding COVID-19, or the number of people who experienced financial losses at this time. This increase in profit could also be a factor in the increase in staffing - see Figure 4.

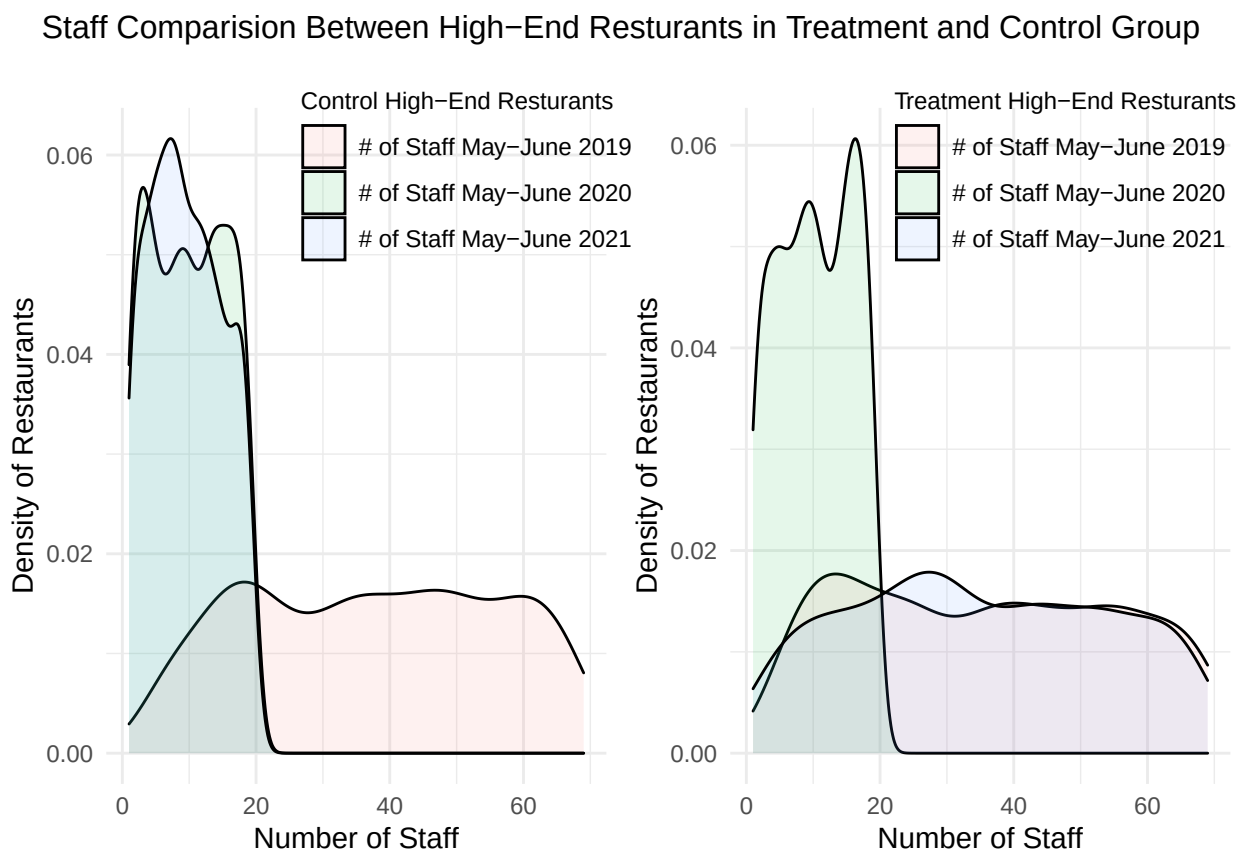


Figure 4: Number of staff of control and treatment groups of high-end restaurants between May and June of 2021

High-end restaurants saw a 251% increase in staff. Expectedly, high-end restaurants saw the lowest positive response to the reopening - shown in Table 9.

Table 9: High-end restaurant esponses to helpfulness on a 5-point scale

Helpfulness on 5-Point Scale	Number of Restaurants	Percent of Restaurants
1	141	0.2005690
2	65	0.0924609
3	115	0.1635846
4	141	0.2005690
5	241	0.3428165

In total, 33% of high-end restaurants scoring a five and over 20% scoring a one.

3 Discussion

4 Conclusion

5 Appendix

5.1 About Dinesafe data

We found a foundational dataset to start our resturant research from Toronto Open Data Catalogue. The Dataset is an xml file that contains the name, health inspection data and coordinates of GTA resturants. However, there is no detailed description on the website regarding the data overview. We attempted to retrieve the dataset and convert the xml to csv in R. However, after many attempts, we found out that the xml parsing did not work directly in RStudio due to most likely the formatting and length the xml file. Through looking at potential solutions on StackOverflow and and troubleshoot the error message with websites in the same nature, we did not discover any working reproducible way to convert the xml file to csv file. The cloest answer that matches our speculation is on stackover by "ChallengeAccepted": "After the 20th page the loop was still running with no urls and hence it started calling read_html with NAs for the other loop iterations.". (https://stackoverflow.com/questions/40230810/webscraping-in-r-does-not-exist-in-current-working-directory-error) Therefore a secondary approach was taken, the xml file was downloaded from the Toronto Open Data Catalogue and converted through an online converter: https://onlinexmltools.com/convert-xml-to-csv. The final result contains the basic information that we need to set up our survey simulation data - resturant counts, names and coordinates. As expected, the inspection part seems to be the issue that blocks R from properly parsing all the data. The inspection data in CSV ends up showing up as "Object". After the online coversion, the The converted csv file was downloaded into dataset/dinesafeCSV.csv. Original xml file was also saved in the location dataset/dine_safe_original.xml

5.2 Survey Description

The survey was released to those businesses who answered "Yes" upon the initial contact from the government. Those who answered the survey were part of the sample for this study. The survey was produced by Petit Poll, a company employed by the Ontario Government, and a link can be found **here**. The survey contained sections about contact information, background and workforce, and performance. The survey looked to generate data about 3 distinct time periods: pre-pandemic, lockdown, and during re-opening.

The first section of the survey is used to gain contact information for the business. Name, address, phone numbers, etc. The second section focuses on background and workforce. This is where we begin to ask about the effects of COVID-19 and re-opening. In this section, we ask about restaurant background, as well as how their number of hours and number of employees has changed due to the pandemic. In the final section, we ask questions about income and profit. We also ask, on a 5-point scale, how helpful it was in the eyes of the business owner to open for a few months.

As with any survey, there is the possibility of non-responses. If the non-response comes from the control group, then they are not eligible for compensation, which is the opportunity to re-open their business. We believe this to be a strong enough incentive to get a significant response rate from the control group. For the businesses who did open, they will have a period of 2 weeks to complete the survey, with a reminder email and phone call. After 2 weeks of no-response, they will be emailed and phoned daily to try and generate a response from the restaurant owner. If there is still no response at this point, they will be informed that when the COVID-19 pandemic restrictions are lifted, they will be held back from opening for a significant period of time. Hopefully, this is enough to entice the participant to respond.

To ensure participants' privacy, all information from the survey will be collected under the Freedom of Information and Protection of Privacy Act. Their responses of the survey will not be shared with anyone, other than the Ontario Government.

Since financial compensation is not being offered in this study, the cost will be the amount allotted to Petit Poll in the employment contract. However, it is possible that opening dine-in restaurants will increase the number of COVID-19 cases. This could increase cost for the healthcare profession indirectly.

Screenshots of the different survey questions have been attached below.

```
## Warning: package 'here' was built under R version 3.6.3
```

Measuring the Effects of COVID-19 on the Greater Toronto Area's Restaurant Industry

Dear Restaurant Owner,

Thank you for participating in this re-opening study. This trial run will help us gain knowledge to successfully re-open the Greater Toronto Area (GTA) as the COVID-19 pandemic continues. We hope you will participate in this follow-up survey, so we can improve on the experience as we prepare to re-open all businesses safely. If you were not given the opportunity to re-open for the study, completion of this survey is your ticket to open your business for the months of August and September.

This survey was created by Petit Poll, a Canadian surveying company which has been employed by the Ontario Government. It is intended for those who currently own a restaurant in the GTA. Our mission is to understand the effects of COVID-19 on the restaurant market during lockdown.

This survey is an opportunity for you to tell the Ontario Government about your business and how it has been affected by the forced closure. Additionally, we would like to hear about the temporary re-opening of your business (if applicable). Lockdown has been difficult for everyone and we want to re-open the GTA with your company's needs in mind. It is a confidential survey, so please be direct. Petit Poll will analyze the survey results and use the information to aid in a successful reopening of the GTA foodservice industry.

We appreciate your time and thank you for your response. If you have questions or concerns, you can reach us at brp@petitpoll.ca

Please note that you may need tax documents from 2019, 2020, and 2021 to complete the survey.

* Required

Email address *

Your email

Next

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Measuring the Effects of COVID-19 on the Greater Toronto Area's Restaurant Industry

* Required

Contact Information

Business Name *

Your answer

Business Owner(s) *

Your answer

Business Mailing Address *

Your answer

Business Postal Code *

Your answer

Business Phone #1 *

Your answer

Business Phone #2

Your answer

Business Fax

Your answer

Website

Your answer

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Measuring the Effects of COVID-19 on the Greater Toronto Area's Restaurant Industry

* Required

Business Background & Workforce

Were you selected to temporarily re-open your restaurant? *

- ◯ Yes
- ◯ No

How long has your business been in operation? *

Include the length of time at this and any other previous locations.

- ◯ Under 1 year
- ◯ 1 - 5 years
- ◯ 6 - 10 years
- ◯ 11 - 20 years
- ◯ Over 20 years

Does your business own or lease the space in which it is located? *

- ◯ Own
- ◯ Lease
- ◯ Lease, want to purchase
- ◯ Other: _____

Are you a franchise? *

- ◯ Yes
- ◯ No

How many employees did you have before the March 2020 lockdown? *

Your answer

How many employees did you have at the end of May 2020? *

(At the end of the first lockdown)

Your answer

How many employees did you have during the temporary re-opening? *

If you did not have the chance to re-open, please type "NA".

Your answer

What was the total number of hours your business was open per week - before the lockdown? *

e.g. "40".

Your answer

What was the total number of hours your business was open per week during the lockdown? *

e.g. "10" (if take-out options were still operational).

Your answer

What was the total number of hours your business was open per week during the temporary re-opening (if applicable)? *

e.g. "40". If you were not selected to re-open, please type "NA".

Your answer

What type of services do you offer? *

Select all that apply.

- [ ] Dine-in
- [ ] Patio
- [ ] Delivery
- [ ] Pick-up
- [ ] Other:

What type of cuisine does your business offer? *

Select all that apply.

- [ ] American
- [ ] Canadian
- [ ] Chinese
- [ ] French
- [ ] Greek
- [ ] Indian
- [ ] Italian
- [ ] Japanese
- [ ] Mediterranean
- [ ] Mexican
- [ ] Spanish
- [ ] Thai
- [ ] Other: _____

Do you offer alcoholic beverages? *

- ◯ Yes
- ◯ No

Relative to other businesses in your trade, what price point do you target? *

- ◯ Low-end
- ◯ Average
- ◯ High-end

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Measuring the Effects of COVID-19 on the Greater Toronto Area's Restaurant Industry

* Required

Business Performance

In this section, we would like you to tell us about your business performance in the past 3 years. We are looking to compare business performance during the pandemic vs pre-pandemic. We will also be comparing revenue generated for those restaurants which re-opened during the study compared to those which did not. Having a dollar value attached to the re-opening will help us make a significant case as to why and how the restaurant business should re-open during the pandemic.

What was your income from May 2019 - June 2019? *

Please enter your income to two decimal places. For example: "89,901.00". The "$" is not required.

Your answer

What was your income from May 2020 - June 2020? *

Please enter your income to two decimal places. For example: "0.00". The "$" is not required.

Your answer

What was your income from May 2021 - June 2021? *

Please enter your income to two decimal places. For example: "40,000.00". The "$" is not required.

Your answer

What was your profit from May 2019 - June 2019 *

Please enter your profit to two decimal places. For example: "20,000.00". The "$" is not required.

Your answer

What was your profit from May 2020 - June 2020 *

Please enter your income to two decimal places. For example: "-10,000.00". The "$" is not required. (-) sign represents a loss.

Your answer

What was your profit from May 2021 - June 2021 *

Please enter your income to two decimal places. For example: "9,000.24". The "$" is not required.

Your answer

Did it help to open for 2 months during the lockdown? *

	1	2	3	4	5	
Not at all	○	○	○	○	○	Yes - It helped tremendously

Is there anything you would like to share?

Your answer

Back Submit

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