TITLE*

SUBTITLE

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Abstract

Four sentences. 1) what was done, 2) what was found, and 3) why this matters (all at a high level). Top level finding

1 Introduction

The COVID-19 pandemic has presented challenges that continue to test our resilience, creativity, and ability to recover. From online learning to curbside shopping, the changes are tangible on a local level. To better understand the impact of intermittent lockdowns on restaurant businesses specifically, and to provide the Ontario Ministry of Economic Development, Job Creation and Trade with evidence-based advice, Petit Poll conducted a comprehensive study of over 1,200 restaurants in 12 regions of Ontario. This report describes the experiment design and rationale, measurement strategies, data characteristics, main findings, recommendations, limitations, and broader implications. Importantly, the intervention revealed three key effects of closures: (1) closures had a negative impact on revenues and employment counts, (2) closures had a stronger negative impact on dine-in only restaurants, and (3) closures had a stronger negative impact on Indigenous or visible minority-owned businesses. These findings provide more detail to an already stark picture: while the health of Ontarians has to be prioritized, and the transmission of COVID-19 has to be aggressively contained, it is impossible to ignore the economic consequences of prolonged business closures. In particular, support for Indigenous and visible minority-owned businesses is imperative, as these populations continue to bear the brunt of systemic inequalities. Preparing and supporting dine-in establishments to transition to takeout only, and providing furloughed workers with vital financial support, must be equally prioritized.

2 Data

Analysis for this report uses the R statistical programming language (R Core Team 2020), and more specifically, the tidyverse package for data manipulation (Wickham et al. 2019). To facilitate a reproducible workflow, here is used to reference file locations (Müller 2020). Graphs and tables use features from cowplot, finalfit, gridExtra, and kableExtra (Wilke 2020) (Harrison, Drake, and Ots 2020) (Auguie 2017) (Zhu 2020). Finally, bookdown is used to format the report (Xie 2020).

In addition to survey data collected by Petit Poll, this report relies on publicly available federal census data ("Census Profile, 2016 Census" 2017) and data from provincial public health departments(Canada 2020).

This section presents details on the data collection approach and methods, and the steps taken to ensure accuracy.

*Code and data are available at: github.com/amycfarrow/ontariorestaurantclosuresexperiment.

Table 1: Cluster sample randomly selecting Local Health Authorities from strata based on population size

Group	Large	Medium	Small
Treatment	Hamilton	Haliburton, Kawartha, Pine Ridge District	Algoma
	Simcoe Muskoka	Windsor-Essex County	Timiskaming
Control	Durham Region	Southwestern Ontario	Brant County
	Region of Waterloo	Sudbury and Districts	Northwestern Health

2.1 Methodology

This experiment used two-stage stratified cluster sampling for survey data collection, a process by which a population is divided into groups, or stata, and subsequently divided into clusters. A random sample is drawn from each stratum and each cluster (al. 2016).

The population was all restaurants in Ontario.

A list of Ontario local health authorities (LHAs) was used to identify units that carry out food inspections of restaurants. Using census data from 2016, these LHAs were sorted by population size, and the list was stratified into equally sized strata: small LHAs (population of less than 150,000), medium LHAs (population of 150,000 to 400,000), and large LHAs (population of more than 400,000). The stratified LHAs produced the frame, or list of units of interest from which to draw a sample, at the cluster level.

From each stratum, two LHAs were randomly sampled to participate in the treatment, and two LHAs were randomly selected to participate in the control. This was the sample at the cluster level. This sample is shown in Table 1.

The clusters were used because pandemic shutdowns operated based on LHA, and the goal was to recreate the effect as closely as possible.

The stratification was used because there were very differently sized LHAs, and randomly selecting only 12 LHAs from a list of 33 left too high a likelihood of nonequivalent treatment and control groups. Given the limitations of cluster sampling, stratifying the clusters by size helped ensure the experiment would be representative of Ontario.

#TO DO: ADD STUFF ABOUT STATISTICAL PROPERTIES OF CLUSTER AND STRATIFIED SAMPLING. CITE TEXTBOOK READING

Once the treatment and control LHAs were selected, each corresponding Food Inspection unit was contacted, and a list of all registered restaurants in each LHA was obtained. Each restaurant was listed by name and address. Once collected into one dataframe, this was the frame at the unit level. A sample of this frame is shown in Table 2.

A simple random sample of 15% of the treatment list and 15% of the control list was randomly selected to be surveyed. This was the sample at the unit level.

This selection was used to create a panel, so the same restaurants would be surveyed for the first survey and the second survey. Attempting to sample only 15% of the restaurants allowed time and money to be spent on follow-up and multiple methods of data collecting, reducing the non-response bias.

The randomly sampled restaurants were all assigned ID numbers in a random order.

The table for surveys was used to generate 2,006 mailers to be sent to each restaurant on the list. Each mailer was a small envelope containing a sheet that invited the restaurant owner to participate, explained the survey, provided a link to the survey, and provided a QR code that went to the same place as the link. There was also a copy of the survey contained in a mailer envelope and a contact number, allowing restaurant owners to complete the survey by phone or mail if they did not feel able to complete it online. This procedure was

Table 2: Example segment of the unit level sampling frame

name	address	unit	group
17 Restaurant - Restaurant	2-Woodward Ave. Blind River ON P0R 1B0	algoma	treatment
A&W - Restaurant	496 Causley Street Blind River ON P0R 1B0	algoma	treatment
A&W - Restaurant	121 Great Northern Rd Sault Ste. Marie ON P6B 4Y9	algoma	treatment
A&W - Restaurant	659 Great Northern Rd Sault Ste Marie ON P6B 5Y1	algoma	treatment
A&W - Restaurant	201 Highway 17 White River ON P0M 3G0	algoma	treatment
Absolutely Delicious - Restaurant	2200 Queen Street East Sault Ste. Marie ON P6A 7B5	algoma	treatment
Agree Outpost Camp Food - Restaurant	PO Box 624 Wawa ON P0S 1K0	algoma	treatment
Airdale Hunting and Fishing Lodge Kitchen - Restaurant	1 Whitefish Lake Road Maness	algoma	treatment
AlgomaTrad - Restaurant	1249 F&G Line Road Richards Landing ON P0R 1J0	algoma	treatment
Annettes Diner - Restaurant	B-4683-Highway 17 Spragge ON P0R 1K0	algoma	treatment

repeated for Survey 1 and Survey 2. If there was no response within two weeks, the restaurant was contacted by phone, and again five days letter if there was no response.

Each link and paper survey was personalized to the restaurant's ID number. The link lead to the survey, which asked for confirmation of the last three digits of the restaurant's postal code. This was to ensure that no mailing mistakes were made, and to prevent duplicate data collection. Once verified, the survey-taker was given the main survey.

This survey cost $6,711.18. A detailed breakdown of costs can be found on Appendix A.

The data from the survey was tied to the ID number and last three digits of the postal code, but not the restaurant name or address, and the restaurant owner's name was not collected. This was to ensure data privacy. The identifying information was kept in a separate dataframe (Table for Surveys) than the survey answers (Survey 1 Data, Survey 2 Data).

#TODO: MAKE TIMELINE TABLE AND REFERENCE (###)

A project timeline can be found in Table ###.

Survey 1 was conducted June 3rd to 27th 2021, and it asked about the month of May 2021.

Survey 1 Data was used to confirm that the two-stage stratified cluster sampling had created treatment and control groups that were roughly equivalent.

Survey 1 collected the following data:

- Demographic information
  - Disability status: According to the UN Convention on the Rights of Persons with Disabilities, persons with disabilities are described as having "long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others."

  - Indigenous status: According to the Government of Canada, Indigenous people include "First Nations (North American Indian), Métis or Inuit and/or those who reported Registered or Treaty Indian status, that is registered under the Indian Act of Canada, and/or those who reported membership in a First Nation or Indian band."
  - Visible minority (non-Indigenous) status: "Visible minority" is defined by the Government of Canada as "persons, other than aboriginal peoples, who are non-Caucasian in race or non-white in colour."
  - Gender identity
- Type of service provided (dine-in, take-out, or both)
- Revenue in May 2021
- Employees
  - Number of full-time employees (30 hours/week or more)
  - Number of part-time employees (less than 30 hours/week)

The demographic information was collected so that disparate impacts on different communities could be identified. Revenue and number of employees were collected as measures of the restaurant's performance and impact on the local employment levels. These were the primary indicators of interest, due to the Ontario Ministry of Economic Development, Job Creation and Trade's focus on economic stability and employment levels.

After Survey 1 data was collected, on June 28th, shutdowns were announced for the six treatment LHAs. The shutdowns ran from July 1s to July 14th, inclusive. This length of time was considered to be the minimum effective length for a shutdown to stop circulation of the virus. During the shutdown, all restaurants in the treatment LHAs were officially banned from offering dine-in and patio services. Take-out and delivery were permitted. This type of partial shutdown was selected because it has been the mandated type of shutdown during the Grey level, or lockdown, of the provincial COVID-19 response framework (Ontario 2021a).

To date, mandated closure enforcement has included issuing fines from $750 to $100,000 to businesses found in violation of the province of Ontario's emergency orders (Wilson 2020). Additionally, provincial offences officers, including police officers, have the authority to disperse crowds indoors as well as outdoors (Health 2021).

Because it is very difficult for a restaurant to move location in under two weeks, the control and treatment groups were effectively separated.

Survey 2 was conducted August 3rd to 27th 2021, and it asked about the month of July 2021.

Survey 2 followed a similar format as Survey 1, with the addition of a question about closures. It collected the following data:

- Demographic information
  - Disability status
  - Indigenous status
  - Visible minority (non-Indigenous) status
  - Gender identity
- Type of service provided (dine-in, take-out, or both)
- Closures (none, temporary, or permanent)
- Revenue in July 2021
- Employees
  - Number of full-time employees (30 hours/week or more)
  - Number of part-time employees (less than 30 hours/week)

The scope of this experiment required a structured questionnaire that was easy to distribute, easy to answer, cost effective, reliable, and that provided flexibility of mode of response, including online, over the phone, or on paper. With these features in mind, a survey was an appropriate choice. However, due to the rigidity of pre-determined questions, the survey format might lack potential depth, reducing complex circumstances to simple data points that are easier to collect, manage, and analyze. To account for this, the questions were carefully designed to gather, exactly and only, the necessary data for our study.

Table 3: Summary statistics for treatment and control baselines

		Treatment	Control
		N (%) = 392 (50.0)	N (%) = 392 (50.0)
Service type	dinein	25 (6.4)	23 (5.9)
	both	241 (61.6)	231 (59.1)
	takeout	125 (32.0)	137 (35.0)
Owner has disability	yes	2 (0.5)	2 (0.5)
	no	385 (98.2)	386 (98.5)
	nonanswer	5 (1.3)	4 (1.0)
Owner identifies as woman	yes	59 (15.1)	63 (16.1)
	no	329 (83.9)	327 (83.4)
	nonanswer	4 (1.0)	2 (0.5)
Owner is Indigenous	yes	4 (1.0)	4 (1.0)
	no	386 (99.0)	384 (98.2)
	nonanswer	0 (0.0)	3 (0.8)
Owner is a visible minority (non-Indigenous)	yes	22 (5.6)	30 (7.7)
	no	367 (93.9)	356 (91.5)
	nonanswer	2 (0.5)	3 (0.8)
Revenue	Mean (SD)	70117.3 (38823.8)	69198.2 (33456.7)
Number of full-time employees	Mean (SD)	8.1 (4.5)	8.0 (3.9)
Number of part-time employees	Mean (SD)	4.3 (2.4)	4.3 (2.1)

2.2 Results[1]

Reaching restaurant owners to better understand their businesses, and the impact of closures, was a crucial component of this experiment. Approximately 39% of individuals selected to participate completed or partially completed the surveys. This section provides an overview of the data gathered from each survey.

2.2.1 Survey 1

#TODO: HOW CAN WE PLOT MORE RAW DATA?

The initial survey provided a clear description of the characteristics of the treatment and control groups. As indicated in Table 3, the groups are equivalent, showing no notable differences across any of the variables studied. It was necessary to collect data before the intervention to ensure that the treatment and control groups were in fact comparable.

Survey 1 data was used to effectively establish a baseline for comparison. In addition to the use of random selection of participants and random assignment to either treatment or control, establishing a baseline allows for an accurate estimation of the counterfactual. The counterfactual – or the representation of what would have happened had the intervention not taken place – is essential to measuring, and reporting on, the effect of the mandated restaurant closures.

The baseline for reported revenue, based on information from May 2021, can be found in Figure 1. The baseline for employement of full-time and part-time employees is shown in Figure 2.

2.2.2 Survey 2

#TODO: HOW CAN WE PLOT MORE RAW DATA?

The second survey results showed marked differences between treatment and control groups in most variables. A summary of these results is found in Table 4. Naturally, a salient difference is found in service type, with

[1]More information about the Survey 1 and Survey 2 results can be found in the report *Data for the Ontario Restaurant Closures Experiment*.

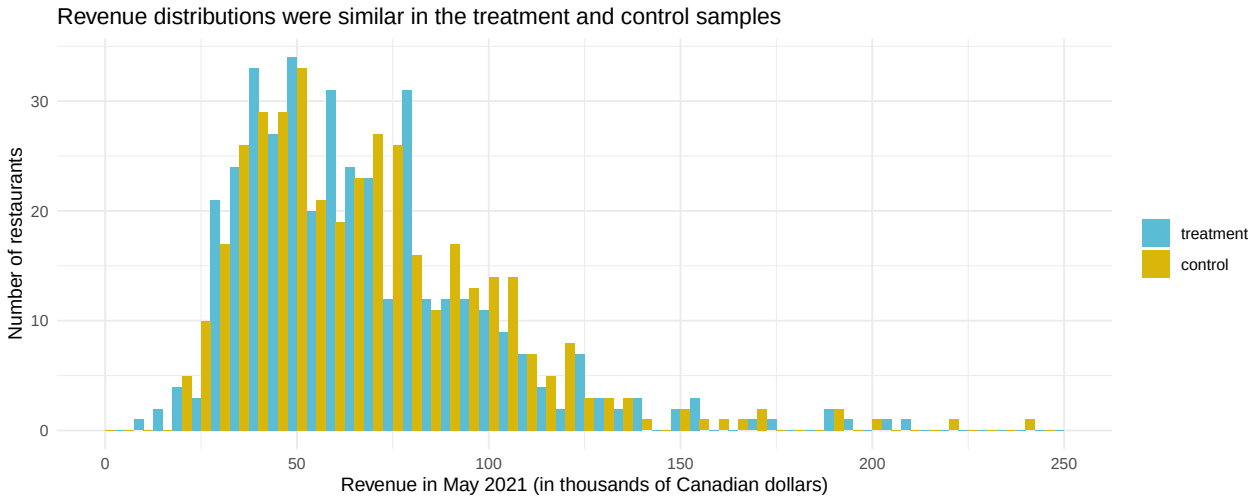

Figure 1: Revenue distribution for treatment and control baselines, from Survey 1

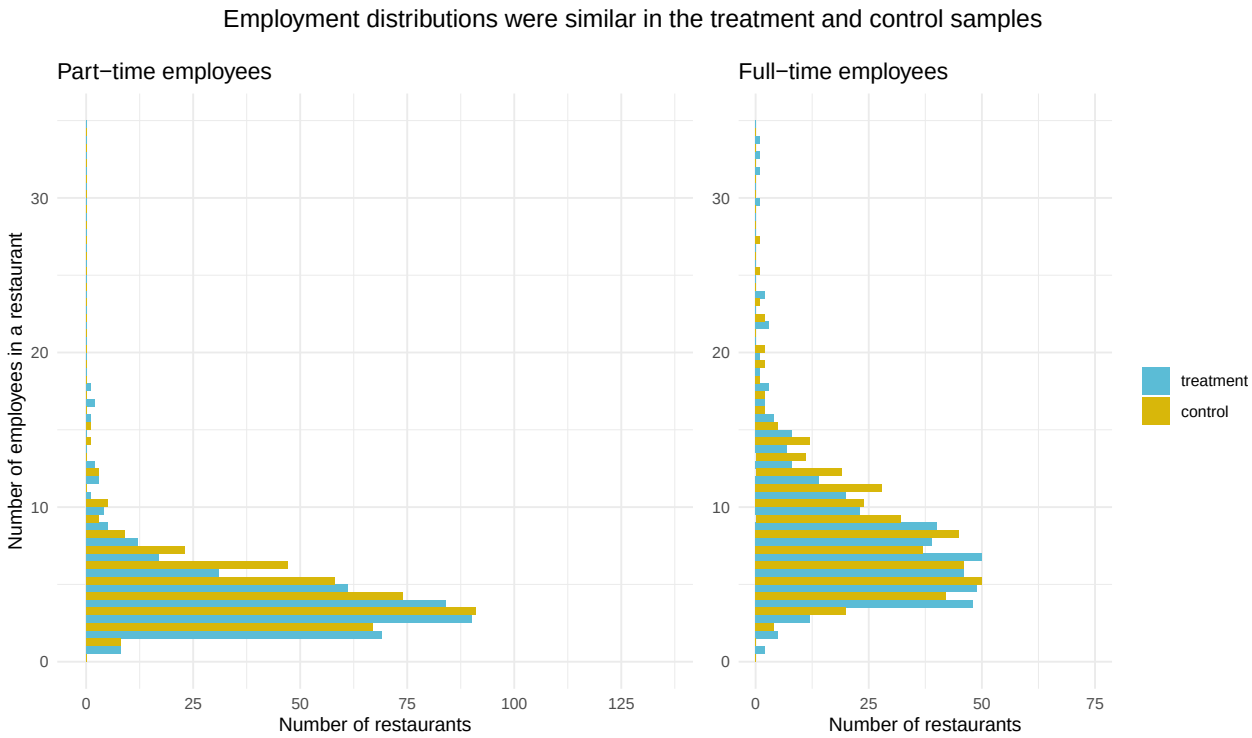

Figure 2: Employment distribution for treatment and control baselines, from Survey 1

Table 4: Summary statistics for treatment and control groups post-treatment

		Treatment	Control
		N (%) = 408 (51.3)	N (%) = 387 (48.7)
Service type	dinein	16 (3.9)	27 (7.0)
	both	258 (63.4)	247 (64.2)
	takeout	133 (32.7)	111 (28.8)
Owner has disability	yes	4 (1.0)	1 (0.3)
	no	399 (98.0)	381 (98.4)
	nonanswer	4 (1.0)	5 (1.3)
Owner identifies as woman	yes	65 (16.0)	58 (15.0)
	no	337 (82.8)	325 (84.2)
	nonanswer	5 (1.2)	3 (0.8)
Owner is Indigenous	yes	4 (1.0)	5 (1.3)
	no	403 (98.8)	376 (97.7)
	nonanswer	1 (0.2)	4 (1.0)
Owner is a visible minority (non-Indigenous)	yes	28 (6.9)	38 (9.9)
	no	377 (93.1)	344 (89.4)
	nonanswer	0 (0.0)	3 (0.8)
Closure	none	235 (57.7)	383 (99.5)
	temporary	172 (42.3)	1 (0.3)
	permanent		1 (0.3)
Revenue	Mean (SD)	45959.6 (28892.6)	70675.6 (35646.6)
Number of full-time employees	Mean (SD)	5.2 (3.3)	8.0 (4.1)
Number of part-time employees	Mean (SD)	3.0 (1.9)	4.7 (2.4)

dine-in restaurants decreasing due to mandated shutdowns – the intervention itself – with 7% of restaurants in the control group providing dine-in service, and only 4% in the treatment group. Similarly, the mean revenue decreases noticeably for the treatment group ($45,959.60) compared to the control group ($70,675.60). The mean numbers of employees, both full-time and part-time, show a decrease as well, from 8 and 5 respectively in the control group, to 5 and 3 for the treatment. A visual representation of the differences between treatment and control groups for revenue and number of employees can be found in Figure 3 and Figure 4 respectively.

#TODO: ADD SENTENCE ABOUT REST OF VARIABLES?

3 Discussion

Petit Poll commends the Ontario Ministry of Economic Development, Job Creation and Trade for its commitment to learn more about the impact of restaurant closures in the province. This study has uncovered three main findings, supplemented in this section by a series of recommendations. Additionally, this section elaborates on relevant ethical considerations, potential biases and limitations. The final section presents some initial thoughts for future related research.

3.1 Overview

Understanding the impact of COVID-19 closures on small businesses can help the Government of Ontario prepare to rebuild once the immediate health threat is contained. In particular, the contributions of restaurant businesses to the local economy have to be studied in terms of employment and revenue generation. According to The Associated Press, there was a 20% decline in employment in the restaurant, hotel, and entertainment sector between November 2019 and November 2020(Alexandra Olson 2020). The National Restaurant Association reports a total loss industry-wide of $120 billion between March and May 2020 alone (Jones 2020). Although these figures are based on United States data, the findings from our experiment show a

similarly concerning reality in Ontario.

The experiment, which consisted of an initial survey, a two-week restaurant closure intervention, and a second survey, revealed that the impact of closures is not distributed equally across service types, nor across restaurant owner demographics. Swift action to protect and uplift the local economy, particularly dine-in restaurants and restaurants owned by Indigenous peoples or members of visible minority groups, will be crucial in the upcoming months.

3.2 Findings

To prevent a misleading estimate of the counterfactual in this experiment, the effects of the intervention are not evaluated by comparing the survey results before and after the intervention, but rather by comparing the treatment and control groups after the intervention. The following subsections provide further detail on each of the main findings.

3.2.1 Closures had a negative impact on revenues and employment counts

As noted in the results from survey 2, the intervention led to a noticeable difference in reported revenues. The mean reported revenue for the treatment group was $45,959.60 and $70,675.60 for the control. The revenue distribution for both groups is show in Figure 3.

The mean number of employees, both full-time and part-time, show a decrease as well, from 8 and 5 respectively in the control group, to 5 and 3 for the treatment. Figure 4 shows further detail of this finding.

With these effects in mind, Petit Poll supports the Government of Ontario's programs in benefit of small businesses: the Ontario Small Business Support Grant, the Personal Protective Equipment Relief Grant, and the current Property Tax and Energy Rebate Grants (Ontario 2021b). Additionally, based on the evidence shown in this report, it is important to consider developing provincial financial support programs for furloughed employees, in addition to standing federal programs like Employment Insurance, that directly address the negative impact of COVID-19 closures. Ensuring the protection of workers in the restaurant industry specifically, not only physically as the spread of the virus is contained, but economically with financial aid will be crucial to the success of mandated closures.

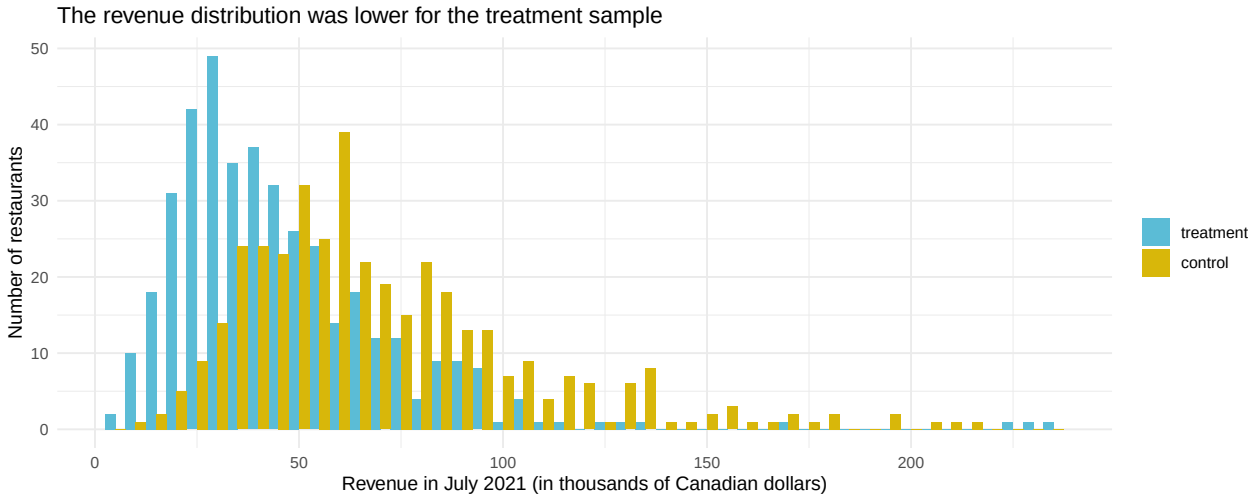

Figure 3: Revenue distribution for treatment and control groups, from Survey 2

3.2.2 Closures had a stronger negative impact on dine-in only restaurant

#TODO: ADD MEANS (###)

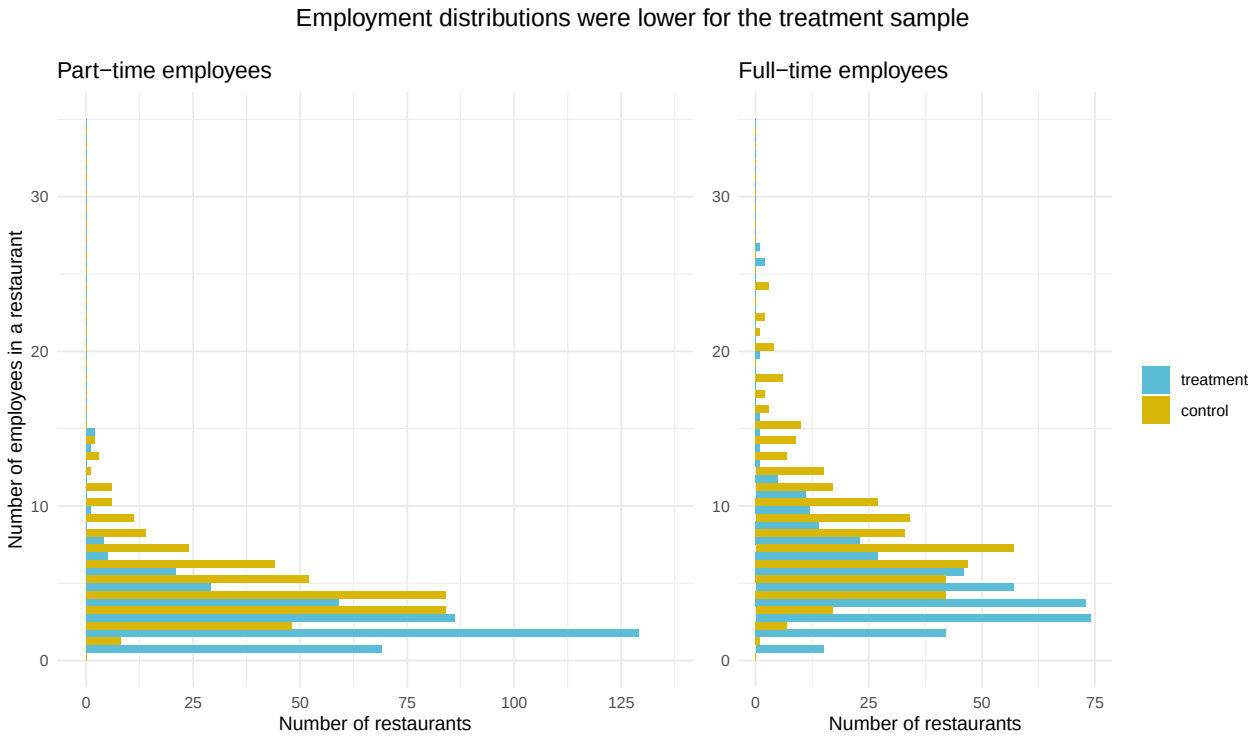

Figure 4: Employment distribution for treatment and control groups, from Survey 2

It is worth noting that the negative impact on revenue was not equally distributed across the three types of establishments. Dine-in restaurants suffered significant losses, with restaurant owners in the treatment group who selected "dine-in" reporting a mean revenue of ###, those who selected "take-out" reporting ###, and "both," ###. The control group reported ###, ###, and ### for dine-in, take-out, and both, respectively. Figure 5 shows a comparison of revenue distributions for restaurants offering dine-in service, take-out, or both.

The effect of mandated closures is attenuated for take-out only restaurants. This indicates that providing restaurant owners with support to transition their regular operations to take-out only service should be considered. The City of Toronto-funded Digital Main Street, created by the Toronto Association of Business Improvement Areas, might serve as an exemplary approach. The program provides businesses with the tools and information to build an online presence. The free program includes an online learning platform, training programs, and dedicated support staff (Street 2021). A parallel provincial program aimed directly at restaurant owners who wish to transition out of dine-in only service might help alleviate the economic pressures of COVID-19 mandated closures, while maintaining the necessary health emergency protocols.

3.2.3 Closures had a stronger negative impact on Indigenous or visible minority-owned businesses

#TODO: ADD MEANS (###)

The negative impact of mandated closures was not distributed equally across restaurant owner demographics either. As indicated in Figure 6 restaurant owners who identified as Indigenous or as members of a visible minority group reported lower revenues in the treatment group than in the control. The mean revenue for those who identified as visible minority or Indigenous in the treatment group was ### and ### for those who did not. In the control group, the mean revenue for those who identified as Indigenous or as members of a visible minority group was ### and ### for those who did not.

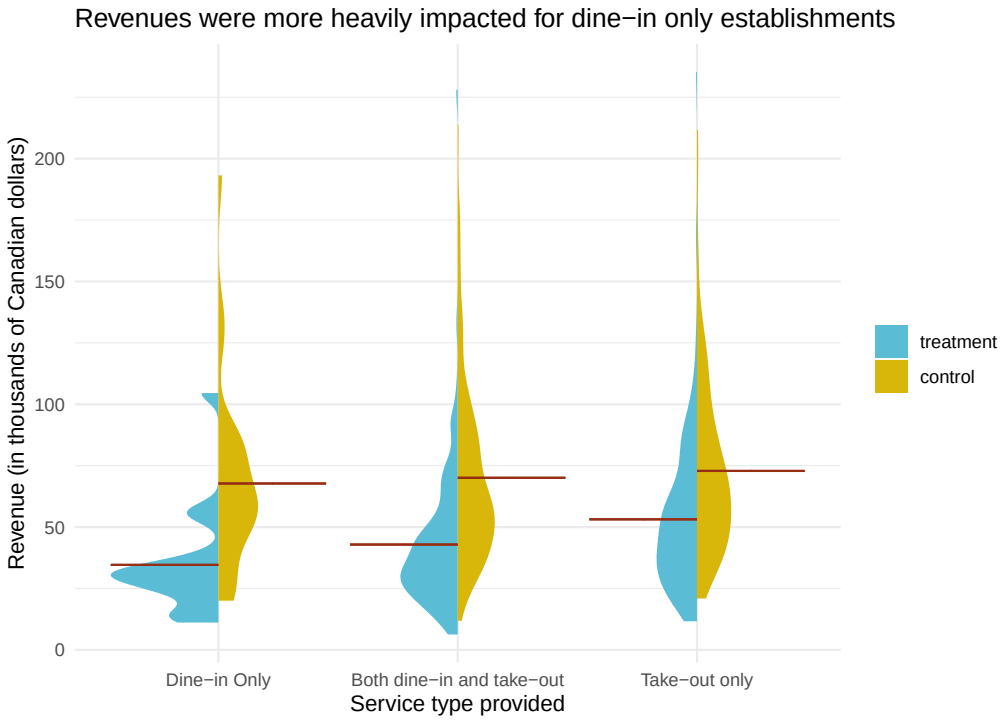

Figure 5: Survey 2 revenue distributions for service types with means marked

Protecting populations that face systemic inequalities is absolutely imperative to the success of any proposed pandemic response. Following the approach of the federal government might be a fruitful start. Currently, the Government of Canada offers interest-free loans and non-repayable contributions to Indigenous-owned businesses (Canada 2021b). Further, the federal government has announced and collected applications to the Black Entrepreneurship Program, an initiative to ensure Black-owned businesses thrive (Canada 2021a). Petit Poll recommends Ontario take similar, yet bolder steps to ensure Indigenous and visible minority owners are not left behind in during the COVID-19 pandemic. To do so, restaurant industry-specific interest-free loans, non-repayable contributions, free educational programming, mentorship, and additional supports should be extended to Indigenous and visible minority restaurant owners across the province.

3.2.4 Implications

##TODO: Talk about broad economic interdependencies: restaurants as a key feature in neighbourhoods, closures impacting the desirability of an area, impacting the real estate market

##TODO: Talk about individual level: gainful employment and psychological wellbeing, especially the role of the service industry in financial independence for oppressed/undereducated/immigrants or otherwise made-vulnerable folks

3.3 Ethics

##TODO: WRITE ABOUT ETHICS AND BIAS, FIRST IN TERMS OF SURVEYS https://www.qualtrics.com/blog/ethical-issues-for-online-surveys/ https://www.statcan.gc.ca/eng/dai/btd/variance_bias

3.4 Limitations

#TODO: TALK ABOUT EXTERNAL VALIDITY AND THE ISSUES WITH CLUSTER SAMPLING. Unavoidable because shutdowns were by health unit for COVID, and we were trying to replicate them. It was ethically unsound to run the experiment on the entire province, so sampling was necessary.

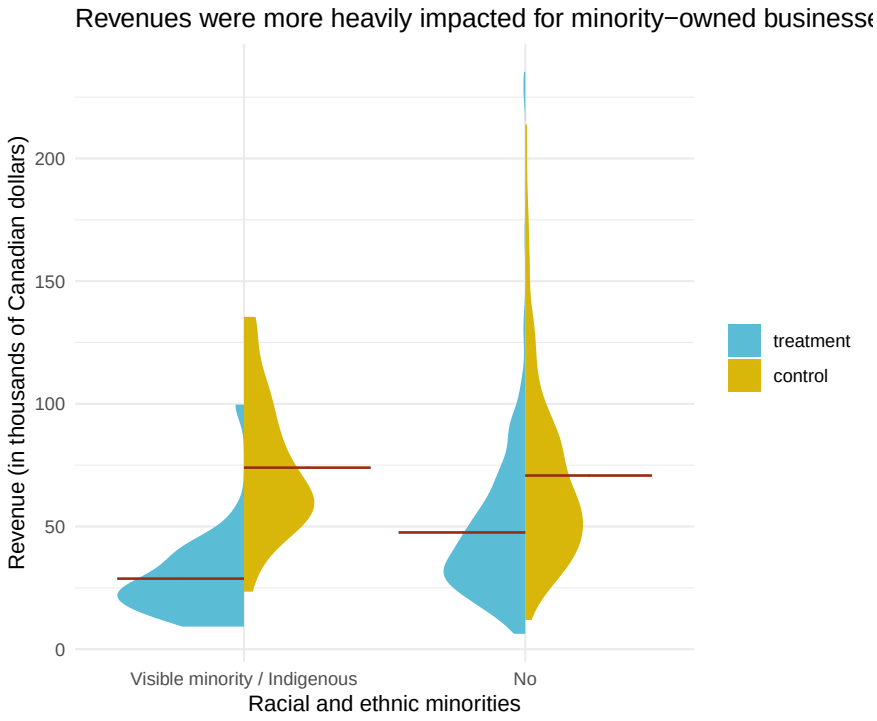

Figure 6: Survey 2 revenue distributions for minority status with means marked

#TODO: TALK ABOUT HOW IT ONLY CATCHES LEGALLY REGISTERED BUSINESSES

#TODO: TALK ABOUT SURVEY NON-RESPONSE AND HOW IT AFFECTS ACCURACY. CITE READINGS. Figure 7

#TODO: TALK ABOUT THE ISSUES WITH SELF-REPORTED INFORMATION. CITE READING.

3.5 Future Directions

#TODO: TALK ABOUT POTENTIALLY USING PROPENSITY SCORE WEIGHTING TO MAKE SURE THAT THE RESULTS REFLECT ONTARIO'S RACIAL DEMOGRAPHICS. SEE DATA_SIMULATION FILE FOR COMPARISON OF ONTARIO, TREATMENT, AND CONTROL. CITE READING.

#TODO: TALK ABOUT RESEARCH INTO HOW TO EFFECTIVELY SUPPORT BUSINESSES

#TODO: talk about research on individual impact (we look at owners and not employees, might be missing key info there)

#TODO: briefly talk about potential unevenness of impact on franchises vs independent businesses. How were they impacted and what does that mean for our findings, are there connected? Are franchises more likely to already have take-out? Or be visible minority-owned?

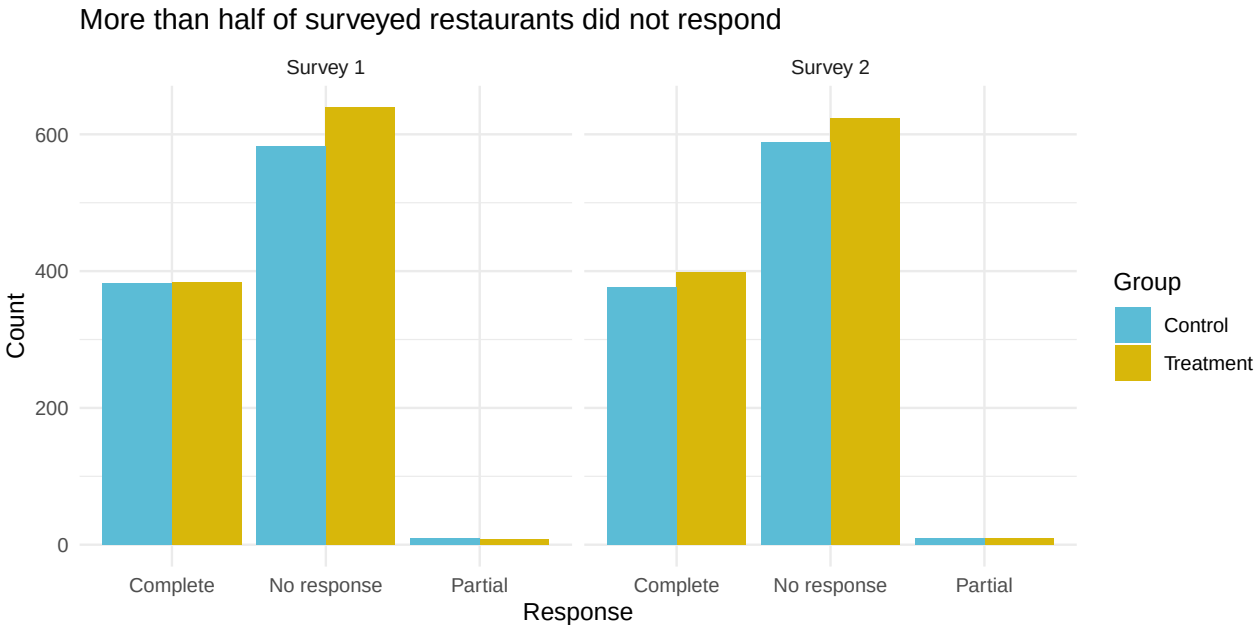

Figure 7: Nonresponse and partial response rates for Survey 1 and 2

Appendix

4 Appendix A

Table 5: 2021 Ontario Restaurant Survey Budget

Item	Cost	Description
Data Management	1300.00	Online survey management account fees
Phone Interviewer Wages	2000.98	1,203 calls (7 minutes on average) at $14.25/hr
Postage	3410.20	4,012 mailers at $0.85/ea
TOTAL	**6711.18**	

5 Appendix B

TODO: ADD A SURVEY SCREENSHOT. REFERENCE IN THE MAIN PAPER.

6 Appendix C

TODO: ADD A COMPLETE LIST OF SURVEY QUESTIONS AND OPTIONS. REFERENCE IN THE MAIN PAPER.

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