A Statistical Comparison of Restaurant Infractions Between Toronto and Vancouver

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ABSTRACT

Background: Across Canada, restaurant inspections are conducted to ensure that the food served to the public in almost all public eating facilities, is safe to consume and sell. The ratings and infractions correspond with the standards a restaurant is operating in compliance with legislation. There have been indications in the past of restaurants in different regions or serving specific types of food, receiving lower ratings than others. Currently, there is a lack of knowledge and research on the difference between major cities in Canada, regarding restaurant infractions. By focussing on Vancouver and Toronto restaurants, this research may provide insight into the different legislation of the two regions, highlight different Environmental Health Officers (EHOs) practices and ultimately provide information for knowledge translation into policies that these regions follow.

Methods: This research focused on "sit-down" restaurants located in the Vancouver downtown area and the Toronto downtown area. Only "routine" inspection report information was examined. There were a total of 200 restaurant inspection reports analyzed from 200 different restaurants, a 100 from each region. The study focused on two types of infractions from each region. Toronto: Crucial infractions and Minor infractions. Vancouver: Critical and Non-critical. Three, two-sample T-tests were conducted to compare the difference between the number of infractions. Data was collected from online restaurant inspection reports of each region.

Results: A total of three, two sample T-tests were conducted. This research found that: 1) there is a significant difference between the number of combined restaurant infractions in Toronto and the number of combined restaurant infractions in Vancouver, (P= 0.000). 2) there is a significant difference between the number of Crucial restaurant infractions in Toronto and the number of Critical restaurant infractions in Vancouver, (P= 0.000). 3) there is a significant difference between the number of Minor restaurant infractions in Toronto and the number of Non-critical restaurant infractions in Vancouver, (P= 0.001).

Conclusion: The findings of this study determined that Vancouver restaurants had a significantly higher number of infractions (Combined, Critical, and Non-critical) when compared to Toronto restaurants. Although a statistically significant difference was found, further research is needed to discover the specific differences across Canada and even within cities. With this information, the method in which EHOs are taught and conduct their inspections, may need to be revised in the future.

Keywords: inspections, infractions, food safety, restaurants, critical, non-critical, minor, crucial, sit-down, reports, comparison, Vancouver, Toronto, DineSafe, Vancouver Coastal Health, public health, Environmental Health Officer

Introduction

Across Canada, restaurant inspections are conducted to ensure that the food served to the public in almost all public eating facilities, is safe to consume and sell, (Medu et al., 2016). These inspections identify any health hazards that may be associated with foodborne illnesses to eliminate possible foodborne outbreaks that may occur, (Besharah, 2015). According to the British Columbia (B.C.) *Public Health Act*, a health hazard is defined as, "a condition, a thing, or an activity that endangers…public health." (Public Health Act, 2020).

During an online lecture, a member of the British Columbia Centre for Disease Control (BCCDC) raised the question of whether there are any discrepancies or similarities between Toronto and Vancouver, regarding health code infractions identified at local restaurants, during inspections. Toronto and Vancouver are on opposite sides of Canada and in some areas, there are completely different restaurants, ethnicities, culture, and legislation. Therefore, this research could unravel any differences in Environmental Health Officer (EHO) training, inspection focal points and overall attitudes towards identifying infractions during inspections, in respective health regions. All Environmental Health Officers (EHOs) in Vancouver enforce the B.C. *Public Health Act* and EHOs in Toronto enforce Ontario's *Health Protection and Promotion Act*, which gives the EHOs, also considered inspectors, in respective regions the power to invoke orders pertaining to specific infractions. This research may be able to highlight the gaps in training for EHOs inspecting restaurants, provide insight into the different legislation of the two regions, highlight different industry practices and ultimately provide valuable information for knowledge translation into policies that these regions follow and abide by. This study will aim to answer the question: Are there any significant differences in the number of restaurant infractions between Toronto and Vancouver?

Literature Review

Toronto Restaurant Inspections

The city of Toronto uses an inspection system called "DineSafe" which conducts restaurant inspections based on the *Ontario Food Premises Regulation (*493/17*),* as well as municipal by-laws, (City of Toronto, 2020). Prior to "DineSafe", Toronto Public Health was criticized for not closing dirty restaurants and not identify food safety violations that may have led to serious

illness, (Winsam 2011). In 2014, a research study by Besharah (2014) was conducted to analyze the success and efficacy of "DineSafe". This study concluded that there was no significant difference of violation reductions since "DineSafe" was introduced. This study's result raises the question of whether Vancouver's inspection training and enforcement, pertaining to food safety, may be more successful than Toronto's in terms of reducing violations after an inspection and therefore, a system such as "DineSafe" was not successful.

However, a study by Serapiglia et al. (2007) also discussed the impact of "DineSafe" on preventing foodborne illnesses. This study had contradicting views to that of the research done by Besharah (2014). Serapiglia et al. (2007), concludes that this inspection program is an effective approach to decrease overall operator non-compliance.

Vancouver Restaurant Inspections

On the other side of Canada near Vancouver, in Surrey, British Columbia Tung (2018), conducted a study to examine whether there is a correlation between critical violations in restaurants and the respective community's median household income. The study concluded that communities with lower median household income had more critical violations in their restaurants. This is important to consider as different cities and areas have different income levels and therefore, it is possible to predict which areas may need more attention, education, and resources to decrease the number of violations.

From the research conducted by Tung (2018), it becomes evident that when conducting research involving comparisons, to avoid bias, the researchers must account for the areas' income level, socio-economic status, and available resources. It is widely known that there is a discrepancy of resource allocation and resource availability throughout Canada, and especially in rural areas, (Pinto et al., 2012).

Types of Restaurants and their Infractions

Other literature on this subject touch on the possibility that certain types of restaurant establishments have more health violations than others. Studies done by Cseke et al. (2014), based in British Columbia, Canada and Menachemi et al. (2012), based in Alabama, United States both examine whether there is any correlation between a specific type of restaurant and the number of violations found during an inspection. Both studies came to similar conclusions that

ethnic restaurants tended to have more violations than any other specific type of restaurant. Ethnic restaurants serve food that is defined as, "foods originating from a heritage and culture of an ethnic group who use their knowledge of local ingredients of plants and/or animal sources." (Kwon, 2015, p.1).

Harris et al. (2015) also researched ethnic specific restaurant inspections and concluded in support of both Cseke et al. (2014) and Menachemi et al. (2012). This study was conducted in many popular tourist areas around the United States and suggested that ethnic restaurants had significantly higher food safety related violations than non-ethnic specific restaurants. With all three studies supporting this claim, it gives this conclusion great validity and something that cannot be ignored. Some cities have more ethnic restaurants than others, and therefore, an assumption can be made that the respective city may have more restaurant infractions than others.

Furthermore, Menachemi et al. (2012) found that specific types of restaurants were prone to specific violations, meaning it is possible to predict whether some areas with a denser population of certain restaurants, may have similar violations. The results of all three of these studies allow further research to be conducted on specific areas and allows informed hypotheses to be made when looking researching specific cities.

In terms of restaurant infractions, Medu et al. (2016) conducted a research study on the correlation between the frequency of restaurant inspections and the compliance of operators. They concluded that increasing the frequency of restaurant inspections would not increase compliance. This outcome suggests that increasing frequencies of inspections may only increase the chance of receiving violations recorded by the health inspectors. Therefore, when conducting research using inspection records this may falsely sway the perception of researchers and the public, regarding that restaurant.

As for comparing Toronto and Vancouver restaurant inspection infractions, there is a lack of reputable literature out there. However, a news article by Griffith-Greene (2014) at CBC news writes about a news series that evaluated a single year's worth of chain restaurant inspection reports within five cities around Canada, including Toronto and Vancouver. They discovered that all the restaurants in the different cities

had repeated infractions pertaining to food safety. Although these findings do not provide significant information on contrasting infractions and inspections, it provides insight into the relatability of infractions across Canada and the universality of what inspectors look for and find. There seems to be a lot of missing information on the direct comparison of Toronto and Vancouver, in terms of restaurant inspections.

Purpose of Study

Overall, the literature on restaurant inspections has been conducted for years on specific aspects of inspections. They have focussed on such things as the comparisons of those inspection aspects, on the comparison of different types of restaurants, and on the frequency of inspections. However, there has been a lack of literature written on the comparison of restaurant inspections and the violations given out, between two major cities, such as Toronto and Vancouver. This study will aim to fill that gap in knowledge and provide insight into restaurant inspection frequency across Canada. The purpose of this study is to find any significant discrepancies in the number of restaurant infractions between Toronto and Vancouver.

Methods and Materials

Materials Used

This research involved finding inspection reports by using restaurant inspection report data from the "Restaurant and food safety" section of the Vancouver Coastal Health website and the "DineSafe" section of the City of Toronto website, (Vancouver Coastal Health, 2020; City of Toronto, 2020). This information is available online for the public to view. Using Microsoft Excel, data sheets (Appendix A) were formed by recording the number of infractions in specific Vancouver and Toronto areas. An analysis of the data retrieved was done by using Number Cruncher for Statistical Systems (NCSS), and for this study, two-sample T tests was conducted to compare differences between the types of Vancouver and Toronto infractions, (NCSS Statistical Software, 2020).

Methods

This research focused on "sit-down" restaurants located in the Vancouver downtown area and the Toronto downtown area. The term "sit-down" refers to a restaurant where customers are seated at a table and are waited by a server who brings them their food, (Mealey, 2019). To determine if a restaurant was indeed a "sit-down" restaurant, the location's menu and website were searched to determine if it matched the "sit-down" restaurant definition. The Vancouver downtown area is defined as the southeastern part of the peninsula in Vancouver which includes Yaletown and Gastown, according to The City of Vancouver (2020) and the area is approximately 4km². The Toronto downtown area is situated within "Old Toronto" and is approximately 17km² in area. Figures 1 and 2 depict the exact area where the "sit-down" restaurants were chosen for the study.

There was a total of 200 restaurant inspection reports analyzed from 200 different restaurants. This consisted of 100 restaurants from the Vancouver downtown area and 100 restaurants from the Toronto downtown area.

Figure 1: *The Vancouver downtown area*

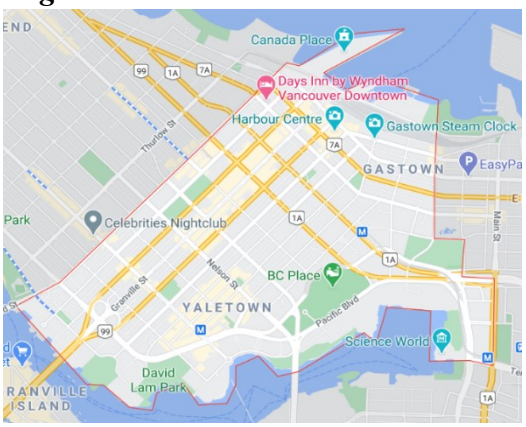
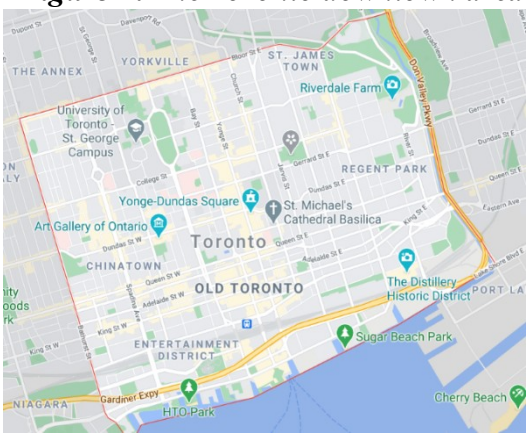


Figure 2: *The Toronto downtown area*



The Toronto Public Health's food safety program, "DineSafe" identifies three types of infractions during an inspection: Crucial, Significant and Minor infractions, (City of Toronto, 2020). Crucial is defined as infractions that must be corrected immediately and the premise may be ordered to close or ordered to eliminate the health hazard immediately. A Significant infraction is defined as an infraction that must be corrected and is subject to re-inspection in 24 to 48 hours. Lastly, a minor infraction refers to an infraction that must be

completed immediately, however the check for compliance will happen at the next scheduled inspection date, (City of Toronto, 2020).

The Health Authority situated in the Vancouver downtown area, known as Vancouver Coastal Health, uses two types of infractions unlike Toronto's three types, (Vancouver Coastal Health, 2020). These two types are Critical and Non-critical infractions. Critical infractions are infractions that are likely to lead to illness and/or injury and may have immediate impact on public health, and these infractions must be corrected immediately. Whereas non-critical infractions are defined as, "an infraction that is in contravention of regulatory requirements but is not a critical infraction." (Vancouver Coastal Health, 2020).

This research study focuses on two types of infractions from each region. For Toronto, the Crucial and Significant infractions were recorded under one type: "Crucial infractions". This was done to coincide with Vancouver Coastal Health's definition of their "Critical infractions". Toronto's second type were Minor infractions. For Vancouver, Critical and Non-critical infractions were recorded. The Minor and Non-critical infractions from the two regions have similar definitions and therefore, considered equivalent in order to compare.

Three, two-sample T-tests were conducted to compare the difference between the number of infractions. The T-tests allowed the comparison of Crucial infractions in Toronto downtown with Critical infractions in Vancouver downtown, Minor infractions in Toronto downtown with Non-critical infractions in Vancouver downtown, and the combined sum of both types of infractions (Combined infractions) between the two regions.

Inclusion and Exclusion Criteria

This study only considered data from routine inspections for each restaurant and excluded follow-up or initial inspections. This is done to capture a true representation of how a restaurant operates on a regular basis. All inspection reports that were included in this study, had been conducted "pre-COVID-19", which is defined as before March 2020, days before, "every Canadian province and territory had declared a state of emergency, with gradually tightening restrictions." (Bronca, 2020). Only "sit-down" restaurant inspection reports were collected to decrease any bias and error

based on types of restaurant variations. Using the maps provided by the "Restaurant and food safety" section of the Vancouver Coastal Health website and the "DineSafe" section of the City of Toronto website, the restaurants were selected. Furthermore, a cross-reference with the restaurant's website and/or menu was conducted to validate a designation of a "sit-down" restaurant.

Ethical Considerations

The data that was collected in this study is readily available for the public to view, therefore the ethical concerns about the privacy of this data is minimal, (Kong et al., 2020). To avoid any negative implications towards a restaurant or person(s), the names and addresses of the restaurants involved in the analyses were not shared. Also, the names of the restaurant were not important to the validity of the study. (Cseke et al., 2014).

Statistical Analyses and Results

Description of Data Collected

The type of data that was collected and analyzed from the "Restaurant and food safety" section of the Vancouver Coastal Health website and the "DineSafe" section of the City of Toronto website, was numerical data consisting of the number of Crucial infractions, the number of Critical infractions, the number of Minor infractions, and the number of Non-critical infractions. This data was collected from inspection reports from their respective websites.

Out of the 100 restaurant inspection reports analyzed in Vancouver, there were 442 combined infractions (275 Non-critical infractions and 167 Critical infractions). Out of the 100 restaurants inspection reports analyzed in Toronto, there were 189 combined infractions (68 Minor infractions and 121 Crucial infractions). This information is displayed in Table 1.

Table 1: *Number of Infractions in Each Region*

	Combined	Critical/Crucial	Non-critical/Minor
Vancouver	442	275	167
Toronto	189	68	121

*100 restaurant inspection reports in each region

Descriptive Statistics

NCSS was used on the data collected from the restaurant inspection reports. The analysis was done three times to compare the two different types of inspection results, as well as the types of inspections combined. Tables 2, 3 and 4 show the descriptive statistics. The results from Table 2 indicate that the mean of the number of combined infractions in Vancouver are much higher.

The same can be said in Table 3 which pertains to Critical and Crucial infractions. However, in Table 4 when comparing Non-critical and Minor infractions, the results indicate a less significant difference.

Table 2: *Vancouver and Toronto Combined Infraction Descriptive*

Variable	Statistics				
	Count	Sum	Mean	Minimum	Maximum
Vancouver_Combined	100	442	4.42	0	10
Toronto_Combined	100	189	1.89	0	10

Table 3: *Vancouver and Toronto Critical and Crucial Infraction Descriptive Statistics*

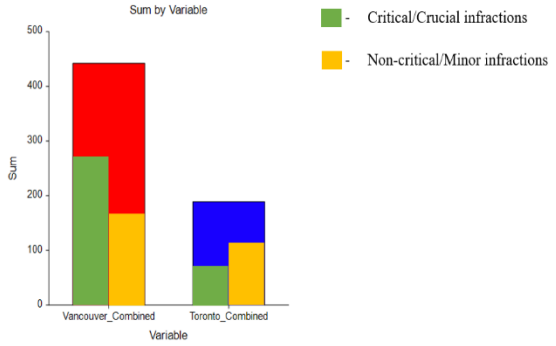
Variable	Statistics				
	Count	Sum	Mean	Minimum	Maximum
Vancouver_Critical	100	275	2.75	0	8
Toronto_Crucial	100	68	0.68	0	6

Table 4: *Vancouver and Toronto Non-critical and Minor Infraction Descriptive Statistics*

Variable	Statistics				
	Count	Sum	Mean	Minimum	Maximum
Vancouver_NonCritical	100	167	1.67	0	7
Toronto_Minor	100	121	1.21	0	7

The following graph (Graph 1) shows the type and the number of infractions in each region.

Graph 1: *Restaurant Infraction Histogram*



Inferential Statistics

NCSS was used for two sample, two-tailed T-tests for each inspection type as well as the combined infractions to compare the difference between Vancouver and Toronto restaurants.

To compare the difference between the number of infractions in Vancouver and Toronto, three, two sample T-tests were conducted. The results of non-parametric Mann-Whitney U or Wilcoxon Rank-Sum Tests are summarized in Table 5, as well as in Appendix B. This test was chosen for all three comparisons due to a test of normality rejecting the null hypothesis of normality, which is shown in Appendix B.

Combined Infractions
H_0 = There is no difference between the number of combined restaurant infractions in Toronto and the number of combined restaurant infractions in Vancouver. **H_a** = There is a difference between the number of combined restaurant infractions in Toronto and the number of combined restaurant infractions in Vancouver. **T-Test:** Mann-Whitney U or Wilcoxon Rank-Sum Test **Result:** P = 0.000 **Conclusion:** H_0 for the combined infractions is rejected at $\alpha = 0.050$ and therefore, we can conclude that there is a significant difference between the number of combined restaurant infractions in Toronto and the number of combined restaurant infractions in Vancouver.
Critical/Crucial Infractions
H_0 = There is no difference between the number of Crucial restaurant infractions in Toronto and the number of Critical restaurant infractions in Vancouver. **H_a** = There is a difference between the number of Crucial restaurant infractions in Toronto and the number of Critical restaurant infractions in Vancouver.

T-Test: Mann-Whitney U or Wilcoxon Rank-Sum Test

Result: P = 0.000

Conclusion: H_0 for the Critical and Crucial infractions is rejected at $\alpha = 0.050$ and therefore, we can conclude that there is a significant difference between the number of Crucial restaurant infractions in Toronto and the number of Critical restaurant infractions in Vancouver.

Non-critical/Minor Infractions

H_0 = There is no difference between the number of Minor restaurant infractions in Toronto and the number of Non-critical restaurant infractions in Vancouver.
H_a = There is a difference between the number of Minor restaurant infractions in Toronto and the number of Non-critical restaurant infractions in Vancouver.

T-Test: Mann-Whitney U or Wilcoxon Rank-Sum Test

Result: P = 0.001

Conclusion: H_0 for the Non-critical and Minor infractions is rejected at $\alpha = 0.050$ and therefore, we can conclude that there is a significant difference between the number of Minor restaurant infractions in Toronto and the number of Non-critical restaurant infractions in Vancouver.

Discussion

This study compared the number of restaurant infractions in two cities: Vancouver and Toronto. The aim was to discover any differences in the number of restaurant infractions between Toronto and Vancouver. With this information, further assessment may be done to discover why there were differences and eventually, mitigate this problem and bring a consistent approach to giving infractions.

All three comparisons were found to have statistically significant results. Each test produced data that suggested that overall, out of 200 total restaurants analyzed, Vancouver restaurants are given a higher number of infractions compared to Toronto restaurants. This was the case in Combined, Critical and Crucial, and Non-critical and Minor infractions.

Interestingly, Vancouver restaurants had over two times as many Critical/Crucial infractions compared to Toronto restaurants. With Toronto Public Health's food safety program, "DineSafe" differing from Vancouver Coastal Health in terms of communicating restaurant inspection results to the public, there may be a specific factor affecting this result. The situation may be that simply operator compliance is higher in Toronto, or the system's method of infraction delivery creates a greater consequence for operators. "DineSafe" provides restaurants with grades that are associated with a red (closed), yellow (conditional pass), and green (pass) colored signs (Appendix C) that must be displayed to the public at the facility, (City of Toronto, 2020) whereas Vancouver Coastal Health only posts inspection results online, with limited descriptions about the situation and infraction(s).

The signs displayed by "DineSafe" may contribute to increased operator compliance and even hesitancy from EHOs to hand out Crucial infractions that will lead to a yellow or red sign, as it may negatively affect businesses for the long term, (Toronto Public Health, 2017). When considering this factor, an explanation can be given as to why there was such a difference in restaurant infraction numbers between the two cities. Further research should be conducted to understand this variable. A trial run may be done in Vancouver, or a smaller city, where signs similar to those put up by "DineSafe" are required, rather than an online posting of inspection results. If a considerable change is seen in operator compliance and in the number of infractions noted, a permanent change may need to be discussed with Health Authorities in BC and the province of BC pertaining to the posting of signs.

As mentioned earlier, these differences may have been attributed to greater operator compliance in Toronto. Although this is a difficult variable to measure, operator compliance is heavily related to the previous point about greater consequences ("DineSafe" signage).

As mentioned earlier, a news article by Griffith-Greene (2014) at CBC news writes about five cities around Canada, including Toronto and Vancouver, and compared their restaurant inspection reports over the year. They concluded that all the restaurants in the different cities had similar and repeated infractions. However, the results of this study differ with Griffith-Greene as it was found that there is a statistically significant difference in restaurant infractions between cities in Canada, Vancouver, and Toronto specifically. Although Griffith-Greene's analysis did not include factors such as only focussing on "sit-down" restaurants, the difference in numbers collected with a large sample size is difficult to ignore and raises the issue that other cities should also be compared.

Limitations

In order to collect data for this study, both the "Restaurant and food safety" section of the Vancouver Coastal Health website and the "DineSafe" section of the City of Toronto website were used. Navigating through over 200 restaurant inspection reports to gather data that fit the criteria of: Routine inspections, "sit-down" restaurants, and only in the downtown area

of both cities took a considerable amount of time.

Furthermore, a larger sample size may have increased the validity and reliability of the study. However, due to time and the specificity of the criteria hindering the possibility of finding more than 100 qualifying restaurants, in the downtown area of each city, the potential for an even larger sample size was limited.

Recommendations

With the time constraint and the specific criteria, it may be useful to broaden the area of interest to be able to capture more restaurants which will result in saving time and potentially increasing the ability to capture a larger sample size.

In terms of methodology, capturing a larger area rather than just a downtown area may prove to provide data that is closer to the reality. For example, Vancouver and Toronto are much larger than just their downtown areas.

Knowledge Translation

The results found in this study could potentially find their way into EHO practice, programs, policy, guidelines, legislation, innovation, and publications. After discovering the large discrepancy between the number of infractions recorded in Vancouver compared to Toronto, the situation seems alarming. Primarily, the policies that Vancouver Coastal Health and Toronto Public Health have in place may need to be changed for there to be similar procedures and ideologies for EHOs across Canada. As previously mentioned, Toronto Public Health's use of color-coded grading to place outside a restaurant may be the cause of the lack of infractions in Toronto. With Vancouver Coastal Health only posting online, where the public may not see it, operators may not experience the same negative consequences that Toronto's restaurant operators do which incentivizes change.

Furthermore, restaurant operator consultations/education from an EHO could tie into the discrepancy. With different Health Authorities (Vancouver) and Public Health offices (Toronto) having their own approach towards operator communication and what their emphasis is, operators may be asked to focus more on certain aspects rather than others. For example, Toronto EHOs may focus more on prevention whereas Vancouver EHOs may focus more on enforcement. With universal policy and focus across Health Authorities and Public

Health offices across Canada, the differences may decrease.

In terms of education, an extreme outcome of the findings from this study could prompt re-evaluation of curriculums for institutions that train and educate EHOs. Although the curriculum is universal across Canada, instructors and EHOs may be interpreting them differently due to the difference in regulation across provinces.

Future Research

Future studies that focus on the comparison of restaurant infraction counts, may include:

- Expand current designated areas to the entire Vancouver and Toronto region, not only downtown.
- Compare other cities around Canada.
- Comparing other variables such as "fast food" restaurants, only chain restaurants, only non-chain restaurants, or specific food places (pizza, steakhouse, or food trucks)
- Compare Health Authorities in British Columbia

Conclusion

Across Canada, EHOs conduct restaurant inspections to identify any health hazards that may be associated with foodborne illnesses to reduce or eliminate any opportunity of an outbreak, (Besharah, 2015). This study was conducted to fill that gap in knowledge and provide information on the standards of restaurant inspections across Canada. The purpose of this study was to find any significant discrepancies in the number of restaurant infractions between Toronto and Vancouver. The findings of this study determined that Vancouver restaurants had a significantly higher number of infractions (Combined, Critical, and Non-critical) when compared to Toronto restaurants. Although a statistically significant difference was found, further research is needed to discover differences across Canada and even within cities. With this information, the method in which EHOs are taught and conduct their inspections, may be revised soon.

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Competing Interests

The authors declare that they have no competing interests.

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