

Frequent Inspections Fail to Curb Violations in Toronto’s Good-Standing Food Establishments*

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Table of contents

1	Introduction	1
2	Data	2
2.1	Overview	2
2.2	Results	3
3	Discussion	6
A	Appendix	8
A.1	Dataset and Graph Sketches	8
A.2	Data Cleaning	8
A.3	Attribution Statement	8
	References	9

1 Introduction

In large urban centers like Toronto, ensuring food safety is a critical public health priority. Foodborne illnesses pose significant risks, and the health of the population is closely tied to the hygienic practices of food establishments, including restaurants, food trucks, and take-out locations. To address this, the DineSafe program, managed by Toronto Public Health, enforces health and safety regulations by conducting regular inspections of all food service establishments (Gelfand 2022). These inspections result in outcomes ranging from a pass to a

*Code and data are available at: https://github.com/Jerryx2020/toronto_dinesafe_analysis

conditional pass or even closure, depending on the establishment’s compliance with food safety standards. According to the Centers for Disease Control and Prevention (CDC), frequent and transparent food inspections are instrumental in reducing foodborne illness outbreaks, as public posting of inspection results can encourage better compliance in food service settings (Centers for Disease Control and Prevention 2024). Despite this, significant variations exist in the frequency of inspections and the severity of infractions, raising concerns about whether some establishments, particularly mobile or temporary food vendors, receive adequate regulatory attention (Analytics 2023).

This study focuses on analyzing Toronto’s DineSafe dataset, accessed from Toronto’s Open Data platform, to investigate patterns in inspection frequency and compliance outcomes among different types of food establishments. While previous research has broadly examined compliance across food establishments, this paper goes a step further by exploring the relationships between establishment types—such as traditional restaurants and mobile food vendors—and the severity of infractions identified during inspections. By analyzing the inspection frequency and the nature of infractions, we aim to identify which sectors of the food industry may require closer regulatory scrutiny. Mobile food vendors, such as food trucks, have been shown to have disproportionately higher rates of serious infractions compared to traditional restaurants (Agency 2023). This gap suggests that current regulatory practices may not be sufficiently targeted to address the unique risks posed by these sectors, and that interventions are necessary to improve compliance and enhance public safety.

To address this gap, the DineSafe inspection data for Toronto food establishments was obtained and cleaned as described in Section 2.1. The results, presented in Section 2.2, reveal key trends in the frequency of inspections and the prevalence of infractions across different establishment types. The findings indicate that while mobile food vendors undergo fewer inspections than restaurants, they exhibit a higher rate of severe infractions relative to the number of inspections conducted. These insights, as discussed in Section 3, highlight the need for more frequent inspections or stricter regulations in this sector to ensure public safety.

The remainder of this paper is organized as follows: Section 2.1 provides a detailed overview of the data and the methodology used to clean and analyze the dataset; Section 2.2 presents the key findings of the analysis, including the inspection frequency and infraction severity; and Section 3 concludes with recommendations for improving food safety oversight in Toronto. The appendix includes additional materials, such as code and data, ensuring full reproducibility of the results.

2 Data

2.1 Overview

This analysis utilizes the DineSafe dataset from Toronto’s Open Data platform, accessed using the `opendatatoronto` package (Gelfand 2022). The dataset provides comprehensive informa-

tion on health inspections of food establishments, including restaurants and takeout locations, throughout Toronto. Key variables in the dataset include inspection dates, infraction types, and establishment compliance statuses, which serve as the primary indicators for assessing food safety. These regular inspections are crucial for maintaining food hygiene standards, as highlighted by the CDC, which emphasizes the importance of routine inspections and the public posting of results, such as letter grades, to encourage compliance and reduce foodborne illnesses (Centers for Disease Control and Prevention 2024).

For this study, only the inspection data for “Restaurant” and “Food Take Out” establishments that passed their most recent inspection were retained. This focus allows for an in-depth exploration of the correlation between inspection frequency and the occurrence of infractions in establishments that are deemed to be in compliance. The DineSafe dataset is updated regularly by Toronto Public Health, and is considered open data under Toronto’s Open Data Licence (Section A.3), as long as proper attribution is provided (Toronto 2024).

The data analysis and processing were carried out using the R programming language (R Core Team 2023), employing a range of specialized packages. The `tidyverse` package (Hadley Wickham et al. 2019) was used extensively for filtering, cleaning, and summarizing the data. Additionally, the `ggplot2` package (H. Wickham 2016) was applied to visualize patterns in inspection frequency and the severity of infractions. Date-related data were managed using the `lubridate` package (Grolemund and Wickham 2011) to ensure consistency in handling inspection dates.

This analysis exclusively focuses on data for restaurants and takeout establishments, as these are among the most common food service types in Toronto, and represent a significant portion of the inspections carried out by public health authorities. As described in Section 2.2, the dataset was thoroughly cleaned and prepared for analysis, ensuring that all irrelevant fields were removed and the remaining data was formatted for accurate analysis.

2.2 Results

As shown in Figure 1, the graph now excludes only inspections where “No Infraction” was recorded. The results show that establishments inspected more frequently tend to have higher counts of infractions. This positive correlation reflects findings from the literature that increased inspection frequency does not necessarily reduce violations but instead highlights pre-existing issues (Public Health 2023; Centers for Disease Control and Prevention 2024). The data was processed using the `tidyverse` package for summarization and visualization (Hadley Wickham et al. 2019), while the plots were generated using `ggplot2` (H. Wickham 2016).

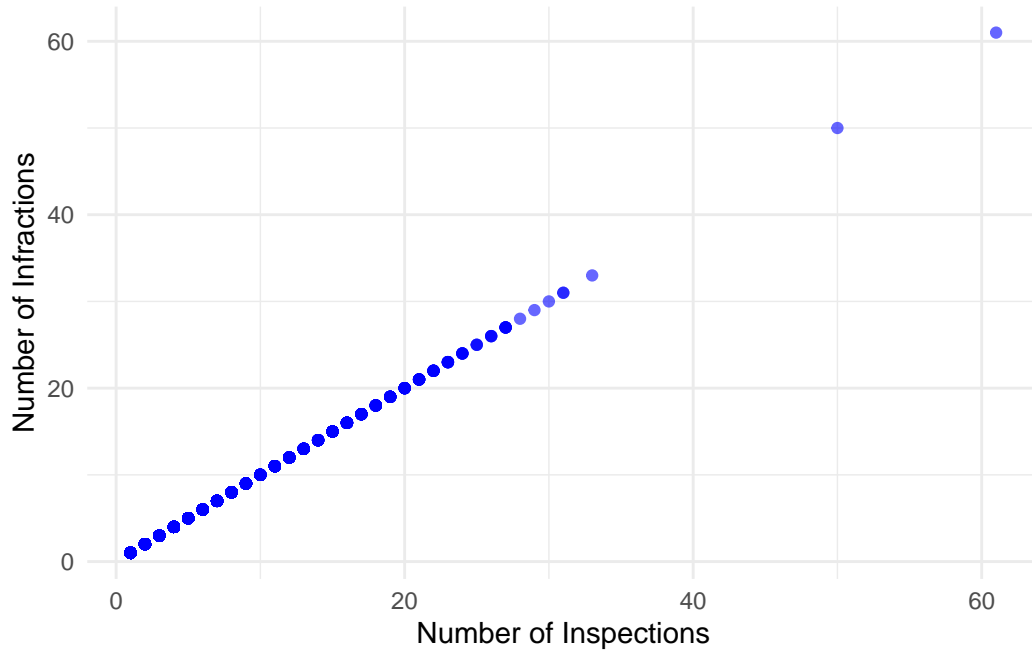


Figure 1: Inspection Count vs Infraction Count per Establishment

As shown in Figure 2, the number of inspections fluctuated across the years. These variations are likely driven by external factors, such as regulatory changes or public health crises, including the COVID-19 pandemic (Analytics 2023). The visualization was created using `ggplot2` (H. Wickham 2016) and time-based grouping was managed via `lubridate` (Grolemund and Wickham 2011).

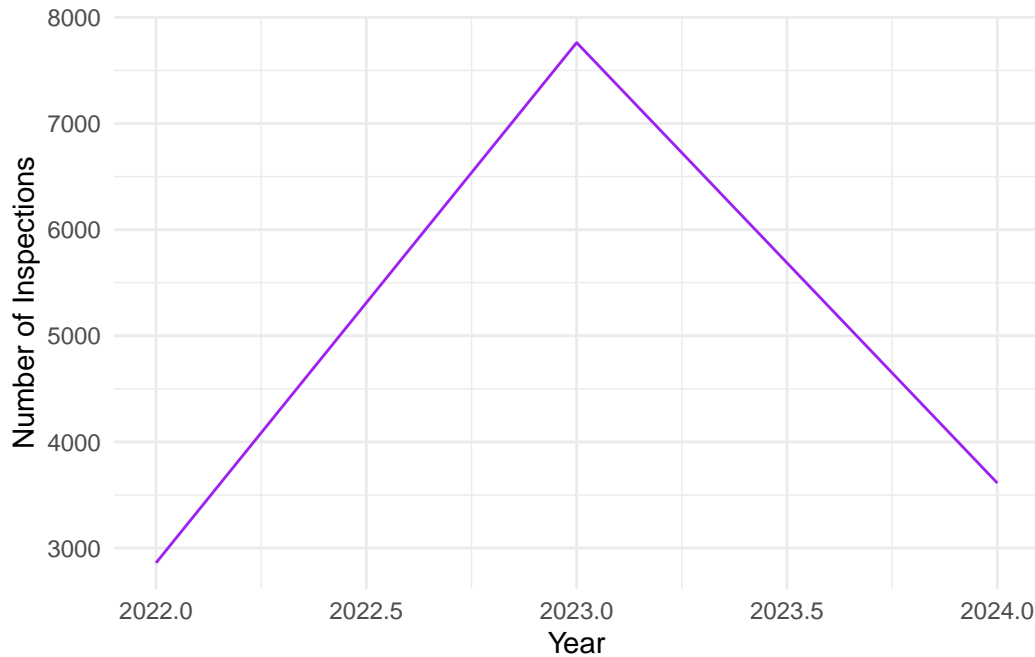


Figure 2: Number of Inspections Conducted Over Time

As shown in Figure 3, the graph compares the percentage of inspections resulting in infractions between restaurants and takeout establishments. While restaurants undergo more total inspections due to their higher numbers, takeout establishments exhibit a higher percentage of inspections that result in infractions. This suggests that takeout establishments may face greater food safety challenges per inspection, indicating a need for more focused regulatory attention. These findings reflect the operational differences between full-service restaurants and takeout locations, where compliance may be more difficult to maintain (Analytics 2023; Agency 2023).

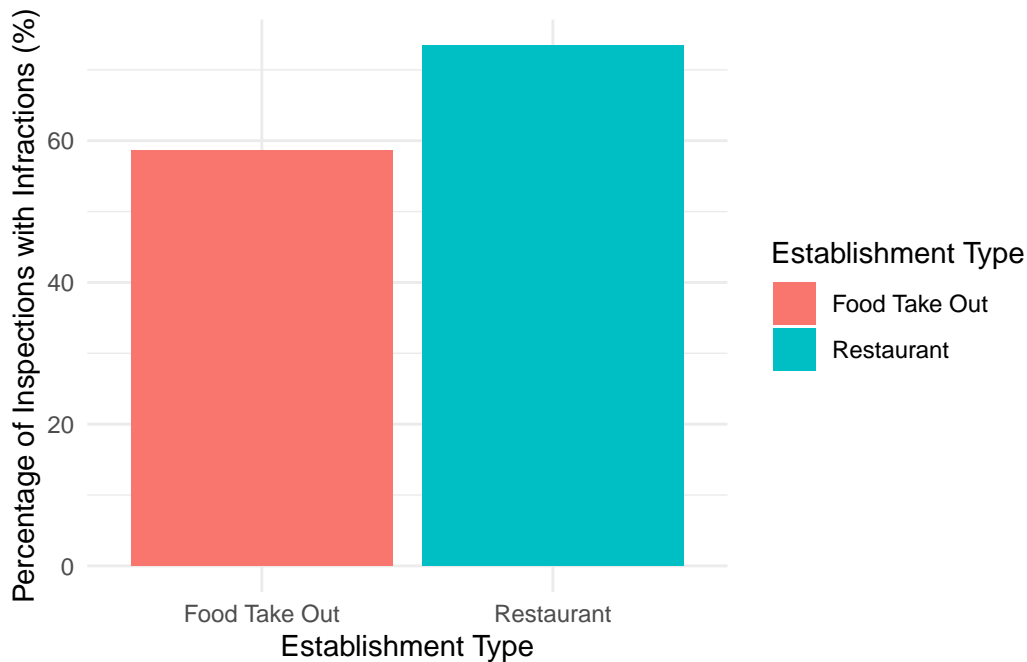


Figure 3: Percentage of Inspections Resulting in Infractions: Restaurants vs. Takeout

3 Discussion

The analysis of the DineSafe data revealed several key insights into food safety practices across Toronto’s restaurants and takeout establishments. One notable observation, as depicted in Figure 1 and discussed in Section 2.2, is the positive correlation between the number of inspections conducted at an establishment and the number of infractions identified. This finding suggests that more frequent inspections tend to uncover more infractions, but it also raises the question of whether these inspections are uncovering ongoing compliance issues rather than promoting a reduction in violations. Similar conclusions have been drawn in previous studies, where increased inspection frequency highlights existing compliance issues rather than leading to improved food safety practices (Public Health 2023; Centers for Disease Control and Prevention 2024).

When examining the number of inspections conducted over time, as shown in Figure 2, and detailed in Section 2.2, the data indicates fluctuations in inspection activity. These fluctuations are likely influenced by external factors such as regulatory changes, operational adjustments, or public health events like the COVID-19 pandemic (Analytics 2023). The periods of increased inspection activity may correspond to heightened public health concerns, yet the challenge lies in ensuring that these inspections lead to sustained improvements in compliance. Without consistent follow-up and enforcement actions, these temporary spikes in inspections may not be enough to ensure long-term food safety compliance.

Figure 3 in Section 2.2 compares the percentage of inspections that result in infractions between restaurants and takeout establishments. The data reveals that while restaurants are subject to more inspections due to their larger presence, takeout establishments have a higher percentage of inspections resulting in infractions relative to the total number of inspections conducted. This suggests that takeout establishments may face more significant compliance challenges, perhaps due to the operational complexities or reduced oversight typically associated with these types of food services. These findings are consistent with other research that highlights the increased difficulty in maintaining compliance for certain food service sectors, especially those with more transient or smaller-scale operations (Analytics 2023; Agency 2023). This highlights the need for more focused regulatory attention on takeout establishments to address these heightened risks.

Despite the valuable insights gained from this analysis, it is important to acknowledge the limitations of the dataset and the scope of the analysis. As noted in Section 2.2, the DineSafe dataset may not fully capture all infractions, particularly for low-risk establishments that are inspected less frequently. This underrepresentation could result in an incomplete view of food safety compliance across the city. Furthermore, certain infractions may not result in immediate enforcement actions, such as fines or closures, which could allow non-compliance to persist over time. This limitation suggests that additional measures, such as follow-up inspections or the inclusion of a broader range of establishments, may be needed to provide a more comprehensive understanding of food safety compliance in Toronto (Gelfand 2022).

Looking forward, future research could explore the application of machine learning techniques to predict which establishments are most likely to fail inspections based on historical data, thereby allowing regulatory bodies to allocate resources more efficiently (Public Health 2023). Additionally, more detailed investigations into the effectiveness of different types of enforcement actions, such as fines, temporary closures, and mandatory re-inspections, could offer valuable insights into improving food safety compliance rates. Comparative studies between cities with varying levels of inspection transparency, such as public disclosure of inspection scores, could also shed light on best practices for reducing foodborne illness outbreaks and improving overall compliance, as mentioned in Section 3.

In conclusion, while the DineSafe program has proven to be an effective tool for identifying non-compliant establishments, the data analyzed in this paper suggests that frequent inspections alone are insufficient to prevent food safety violations. More targeted regulatory interventions, particularly in high-risk and complex food service sectors like takeout establishments, may be necessary to improve food safety compliance and protect public health in Toronto.

A Appendix

A.1 Dataset and Graph Sketches

Sketches depicting both the desired dataset and the graphs generated in this analysis are available in the GitHub Repository.

A.2 Data Cleaning

The data cleaning process was essential to prepare the raw DineSafe dataset for accurate analysis. Initially, we filtered the data to focus exclusively on “Restaurant” and “Food Take Out” establishments that had passed their most recent inspection. This ensured that our analysis targeted establishments in good standing, allowing us to assess how inspection frequency correlates with violations in compliant establishments.

Next, we removed irrelevant columns to simplify the dataset and enhance clarity. For example, columns unrelated to inspection outcomes or establishment types were excluded. Additionally, we ensured consistency across the dataset by renaming certain columns for clarity and ease of analysis.

To handle date-related data, we utilized the lubridate package (Grolemund and Wickham 2011), which enabled consistent date formatting and facilitated time-based analysis. The entire data cleaning process was carried out using the tidyverse package (Hadley Wickham et al. 2019), which streamlined the filtering, mutating, and summarizing operations essential for preparing the dataset for further exploration.

A.3 Attribution Statement

“Contains information licensed under the Open Government Licence – Toronto” (Toronto 2024).

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