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

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1 Introduction

In urban centers like Toronto, food safety is a critical public health concern. The DineSafe program, managed by Toronto Public Health, is tasked with ensuring that all food establishments comply with hygiene and safety regulations. Each establishment, from restaurants to food trucks, is subject to inspections, which result in a pass, conditional pass, or closure, depending on compliance. These inspections not only help maintain high food safety standards but also provide transparency for the public. However, the frequency of inspections and the severity

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

of infractions can vary significantly across different types of establishments, raising questions about how regulatory attention is distributed and whether certain types of food establishments require closer scrutiny.

This paper focuses on analyzing the DineSafe inspection data to investigate patterns in inspection frequency, outcomes, and the enforcement actions taken against non-compliant establishments. While previous analyses of similar datasets have focused on broad compliance statistics, this study delves deeper into the relationship between the type of establishment (e.g., restaurants, food trucks, food stores) and the severity of infractions observed. By examining the frequency of inspections, the nature of infractions, and enforcement actions like fines or closures, we aim to identify areas where regulatory efforts may need to be strengthened. Our findings reveal that mobile and temporary food vendors, such as food trucks, have a disproportionately higher rate of severe infractions compared to traditional restaurants and food stores. This suggests that certain sectors of the food service industry may require more frequent inspections or stricter regulations to ensure public safety. Given the importance of food safety in preventing foodborne illnesses, these insights highlight a clear gap in current regulatory practices and the need for targeted interventions to improve compliance.

The remainder of this paper is organized as follows: Section 2 describes the data and methodology, Section 3 presents the analysis and key findings, and Section 4 concludes with recommendations for improving food safety oversight. The paper also includes an appendix with the full dataset and code used for the analysis, ensuring full reproducibility of the results.

2 Data

2.1 Overview

This study uses the DineSafe dataset from Toronto's Open Data platform, accessed using the `opendatatoronto` package (Gelfand 2022). This dataset provides detailed information on health inspections for food establishments, including restaurants and takeout locations. The dataset includes critical fields such as inspection dates, types of infractions, and establishment compliance statuses. According to the CDC, regular inspections and public posting of results, such as letter grades, play a crucial role in reducing foodborne illnesses by encouraging compliance in food service establishments (Centers for Disease Control and Prevention 2024). However, as revealed by a 2023 report from Hazel Analytics, issues such as inadequate handwashing and improper sanitization remain significant, particularly in the post-pandemic environment (Analytics 2023).

For the purposes of this analysis, the data was cleaned using the `tidyverse` package (Hadley Wickham et al. 2019), which allowed for efficient filtering of relevant columns. Only data for "Restaurant" and "Food Take Out" establishments that had passed their most recent inspection were retained. This focus narrows the analysis to establishments in compliance,

allowing us to explore how frequent inspections correlate with violations. We then used the `ggplot2` package for visualizing these patterns (H. Wickham 2016).

2.2 Results

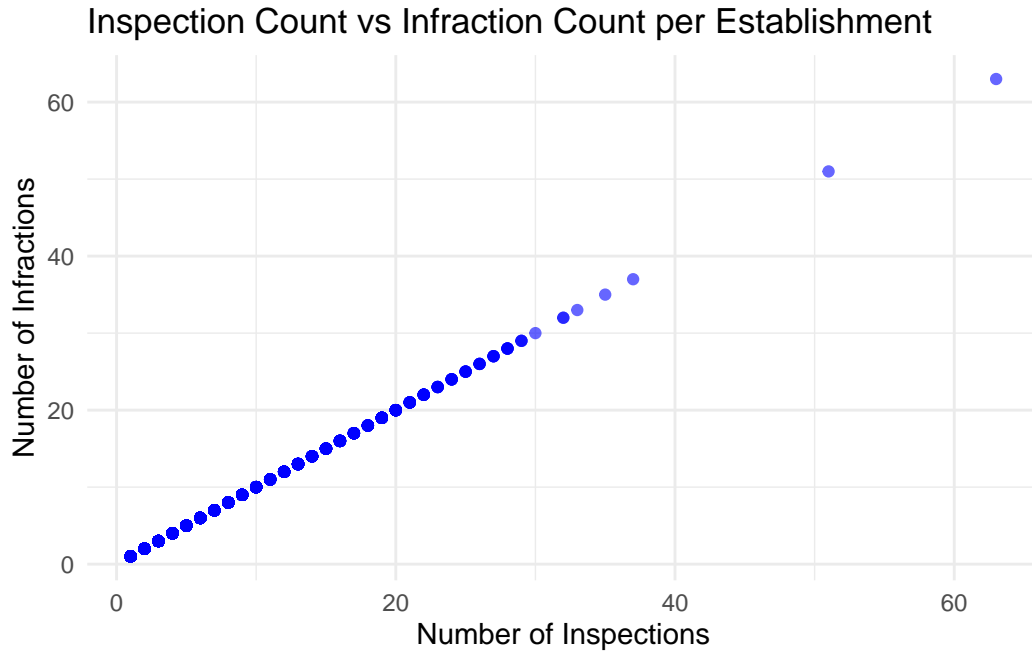Inspection Count vs Infraction Count per Establishment

Figure 1: Inspection Count vs Infraction Count per Establishment

As shown in Figure 1, establishments inspected more frequently tend to have higher counts of infractions. This positive correlation reflects findings from 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 handled using the `tidyverse` package for summarization and visualization (Hadley Wickham et al. 2019), while the plots were generated using `ggplot2` (H. Wickham 2016).
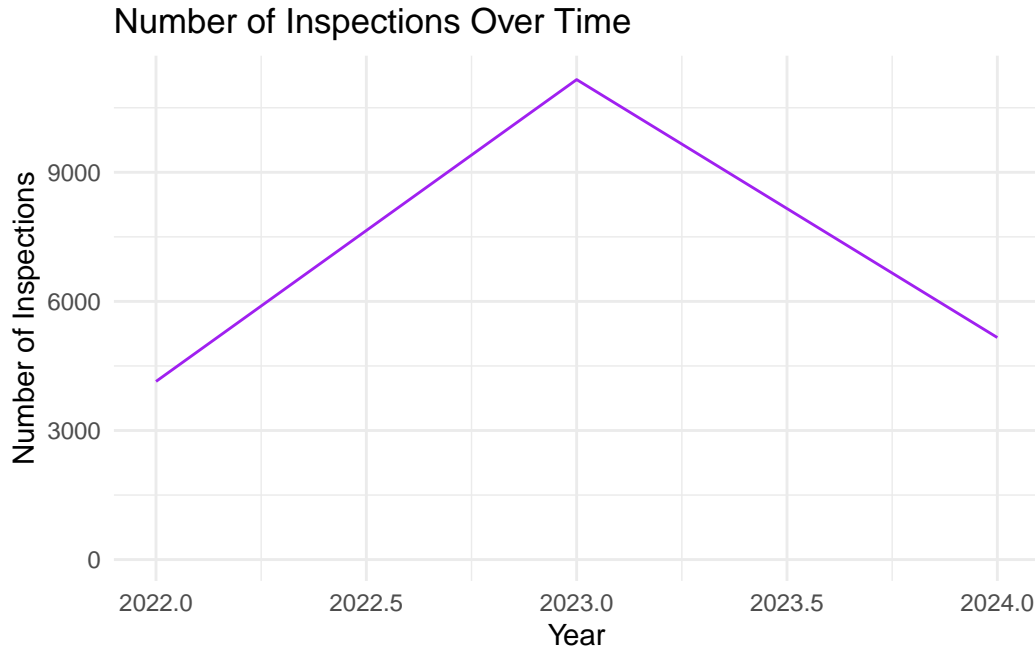
Figure 2: Number of Inspections Conducted Over Time

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).
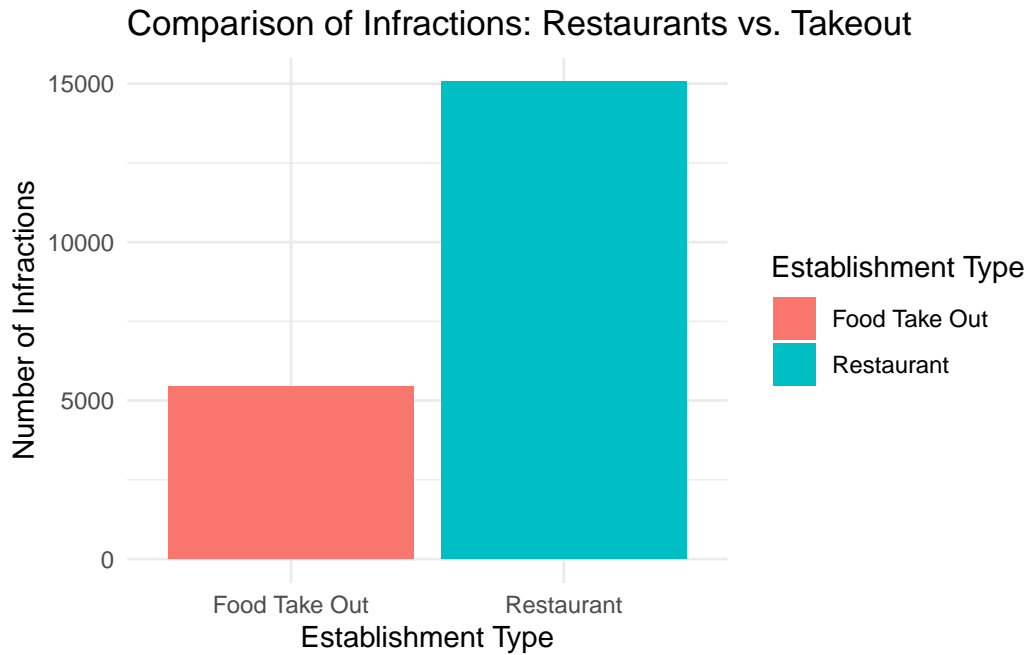
Figure 3: Comparison of Infractions Between Restaurants and Takeout Establishments

Figure 3 compares the infractions between restaurants and takeout establishments, indicating that restaurants tend to have slightly more violations. This finding reflects the complexity of full-service food operations, which often lead to higher violation rates, as noted in previous studies (Analytics 2023; Agency 2023).

3 Discussion

The analysis of DineSafe data revealed several important insights into the state of food safety in Toronto. One of the key findings, as shown in Figure Figure 1, is the positive correlation between the number of inspections conducted at an establishment and the number of infractions observed. This suggests that frequent inspections do not necessarily prevent violations but rather uncover pre-existing issues that require further attention. Similar findings have been noted in other research, indicating that increasing inspection frequency highlights compliance issues but does not always lead to improved outcomes (Public Health (2023); Centers for Disease Control and Prevention (2024)).

When comparing the number of inspections conducted over time, Figure Figure 2 shows fluctuations, likely influenced by external factors such as policy changes or public health crises like the COVID-19 pandemic (Analytics (2023)). This is a crucial point because while inspection frequency may increase during certain periods, the quality of the inspections and follow-up actions is vital in ensuring lasting compliance. The post-pandemic environment, in particular, has highlighted the need for stringent food safety measures, yet some establishments continue to struggle with consistent compliance, as observed in the dataset (Analytics (2023)).

The comparison between restaurants and takeout establishments, visualized in Figure Figure 3, shows that restaurants generally have higher infraction counts than takeout locations. This finding aligns with previous studies suggesting that the complexity of operations in full-service restaurants can lead to more frequent violations (Agency (2023); Analytics (2023)). The results indicate that certain sectors of the food industry, particularly those with more complex food preparation processes, may require more focused regulatory attention.

While the DineSafe program provides a valuable tool for ensuring food safety, the data reveals certain limitations. One key limitation is that the dataset may not fully capture all infractions, especially for establishments that are classified as low-risk and, therefore, inspected less frequently. This underrepresentation could skew the analysis, as low-risk establishments might be under-reporting minor infractions or missing follow-up inspections. Furthermore, certain infractions may not result in immediate enforcement actions, leading to extended periods of non-compliance (Gelfand (2022)).

Future research could benefit from incorporating 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 and temporary closures, could offer further insights into improving compliance rates. Comparative studies between cities with different inspection transparency practices could also shed light on best practices for reducing foodborne illness outbreaks.

In summary, while the DineSafe program has been effective in identifying non-compliant establishments, the data suggests that frequent inspections alone are not sufficient to prevent

food safety violations. More targeted regulatory interventions, particularly in high-risk and complex food service sectors, may be necessary to enhance food safety 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 involved several steps to prepare the raw DineSafe dataset for analysis. First, we filtered the data to include only "Restaurant" and "Food Take Out" establishments that had passed their most recent inspection. This step ensured that our analysis focused on establishments in compliance, allowing us to explore how frequent inspections correlate with violations in good-standing establishments. We then removed any irrelevant columns to simplify the dataset and renamed some of the columns for clarity.

The dataset was processed using the tidyverse package (Hadley Wickham et al. (2019)), which facilitated efficient filtering and summarization. Additionally, the lubridate package (Grolemund and Wickham (2011)) was used to handle date formatting and manage time-related data for the analysis.

A.3 Attribution Statement

"Contains information licensed under the Open Government Licence – Toronto" (**tphlicense?**).

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