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Trends in Foodborne Illness Outbreaks in Shinjuku City, Tokyo in FY2023 and Public Health Considerations

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Abstract

Background: Foodborne illnesses continue to pose a significant public health challenge in urban areas with active food service industries. Seasonal trends, food handling practices, and dietary behaviors influence outbreak patterns. **Purpose:** This study investigates foodborne illness outbreaks in Shinjuku City, Tokyo, during fiscal year 2023, focusing on causative agents, seasonality, and outbreak settings to inform targeted public health interventions. **Methods:** Outbreak data reported by Shinjuku City in 2023 were analyzed by month, pathogen type, and outbreak location. Administrative responses were also reviewed. All data were anonymized and ethically managed. **Results:** A total of 11 outbreaks involving 37 patients were reported, corresponding to an incidence rate of 10.59 per 100,000 population, the highest in the past five years. The most common causative agent was Campylobacter, followed by norovirus, Anisakis, and natural plant toxins. Most outbreaks occurred in restaurants. A clear seasonal pattern was observed, with peaks in winter and summer. Business suspensions were the most frequent administrative penalty. **Conclusion:** Despite ongoing public health efforts, foodborne illnesses remain a concern in Shinjuku City. Strengthened guidance for food establishments and targeted awareness campaigns, particularly for young singles and recent residents, are recommended. Special attention should be given to hygiene in game meat handling and safe food practices in households.

Keywords: foodborne illnesses, public health, campylobacter

Introduction

Foodborne illnesses occur worldwide, with causative toxins and pathogens spreading widely and not limited by geography [1,2]. The frequency of foodborne illness outbreaks varies according to factors such as the season, dietary habits, and cooking environment. In Japan, the four seasons are distinct, with bacterial food poisoning mainly occurring in summer (June to August) and viral food poisoning more common in winter (November to March) [3]. Bacterial agents include Campylobacter, enterohemorrhagic Escherichia coli (O157), and Salmonella species. Campylobacter is frequently reported to infect people by eating raw or undercooked chicken [3–6]. This bacterium is also known as a preceding infection for Guillain-Barré syndrome, which can have severe health consequences [4]. Norovirus, a representative viral cause, spreads through contact with food handlers or consumption of shellfish [3]. Furthermore, natural toxins (such as poisonous mushrooms or pufferfish) and parasites (such as Anisakis) cause illnesses throughout the year [3].

These trends have also been observed in other Asian countries. For example, in South Korea, outbreaks of norovirus food poisoning in mass-feeding facilities have increased since the 2000s, and are reportedly linked to the use of contaminated groundwater and inadequate hygiene management [7]. Shinjuku City, one of the 23 special wards of Tokyo Metropolis, is administratively designated as a special ward but functions similarly to an independent municipality. It has a population of approximately 359,598(as of May 2025), and covers an area of 18.22 square kilometers.

Shinjuku City is distinguished by its high density of food service establishments and a dynamic population that includes a large number of tourists and young residents active throughout the day and night. These characteristics contribute to a

heightened risk of foodborne illness outbreaks. Given these unique demographic and environmental features, Shinjuku serves as a potentially instructive model for urban food safety management and public health intervention strategies, particularly in densely populated metropolitan areas. Thus, preventing foodborne illnesses is a vital public health issue in cities with a flourishing food service industry.

While annual reports on foodborne illnesses have been consistently issued by governmental agencies in Japan, scholarly investigations into the epidemiological patterns of foodborne illness in urban entertainment districts such as Shinjuku City remain notably scarce. In particular, the impact of urban characteristics, including high population density, a concentration of food service establishments, and substantial inflows of tourists and nighttime visitors, has not been sufficiently explored. This study seeks to address this gap by elucidating the outbreak trends specific to such urban environments, thereby contributing novel insights to the formulation of context-sensitive public health strategies.

This retrospective descriptive study aimed to clarify the trends of foodborne illness outbreaks in Shinjuku City during fiscal year 2023, focusing on seasonality, causative agents, and the types of facilities where outbreaks occurred. It also sought to provide insights into the public health activities conducted by nurses at local public health centers.

Methods

This study is a retrospective descriptive analysis using outbreak data of 2024 published by Shinjuku City (the annual report of Shinjuku City's health and hygiene) [8]. Data validation was performed using cross-referencing with Tokyo Metropolitan statistics. R was used for descriptive analysis.

We aggregated the 2023 data on foodborne illness outbreaks published by Shinjuku City, including the number of incidents, number of patients, causative agents, locations of outbreaks, and administrative penalties. The analysis visualized the trends by month, causative agent, and type of facility where outbreaks occurred.

The data used in this study were derived from municipal open data that had already been anonymized, making individual identification impossible. Therefore, in accordance with the guidelines established by the Ministry of Health, Labour and Welfare in Japan for "Life Science and Medical Research Involving Human Subjects," this study qualifies as exempt from ethical review.

Results

Table 1 presents the annual number of foodborne illness outbreaks and affected patients in Shinjuku City. In 2023, a total of 11 outbreaks involving 37 patients were reported(10.59 patients per 100,000), marking the highest incidence observed over the past five years.

Table 1. The number of foodborne illness cases and patients

Year	Occurred in Shinjuku City		Occurred in Tokyo	
	Cases	Patients	Cases	Patients
2019	4	32	119	865
2020	6	13	114	3,359
2021	6	12	83	610
2022	7	27	104	519
2023	11	37	137	878

As presented in Table 2, Campylobacter was the most frequently identified causative agent, followed by norovirus, Anisakis, and plant-derived natural toxins such as Amanita mushrooms. The majority of outbreaks occurred in restaurant settings, with private households being the second most common location. Clear seasonal patterns were observed, with a concentration of incidents in the winter months particularly in March and December and additional cases reported during the summer period from June to September. In accordance with conventional meteorological classifications in Japan, the four seasons are defined as follows: winter (December to February), spring (March to May), summer (June to August), and autumn (September to November).

Table 2. Details of foodborne illness occurrences

Date of occurrence	Place of occurrence	Cause Food(including estimation)	Substance of the Cause	Number of the Patient	Where Responsibility	Contents of Penarty
2023.1.30	Patient house	Marinated sardines	Anisakis	1	Household	None
2023.3.19	Patient house	Food eaten on 3/March	Norovirus	6	Restaurant	Business suspention order(4days), Voluntary suspension(3days)
2023.3.27	Patient house	Food eaten on 23/March	Campylobacter	3	Restaurant	Business suspention order(7days)
2023.3.29	Patient house	Seafood sashimi	Anisakis	1	Restaurant	Business suspention order(1day)
2023.5.7	Patient house	Food eaten on 5/May	Campylobacter	3	Restaurant	Business suspention order(7days)
2023.6.18	Patient house	Food eaten on 15/June	Campylobacter	4	Restaurant	Business suspention order(6days), Voluntary suspension(3days)
2023.9.11	Patient house	Seafood for raw consumption	Anisakis	1	Unknown	None
2023.9.18	Patient house	Sauteed mushrooms(panther cap)	Natural botanical poisons	4	Household	None
2023.10.1	Patient house	Seafood for raw consumption	Anisakis	1	Unknown	None
2023.12.22	Patient house	Course Dinner including raw oysters	Norovirus	8	Restaurant	Business suspention order(3day)
2023.12.26	Patient house	Food eaten on 23/December	Campylobacter	5	Restaurant	Business suspention order(3days), Voluntary suspension(1day)

Discussion

Shinjuku's foodborne illness trends in 2023 display clear seasonality and location-based characteristics. The winter increase is likely related to group norovirus infections coinciding with periods when social gatherings (year-end and New Year's parties) are common.

In summer, Campylobacter infections were pronounced, which was attributed to undercooked chicken and cross-contamination from cooking utensils. Regarding facilities, most incidents occurred in restaurants, which are likely connected to Shinjuku's identity as a bustling nightlife area. Even after the introduction of the Hazard Analysis and Critical Control Point (HACCP) system, sanitary controls may not be thoroughly enforced in restaurants, indicating the need for ongoing administrative oversight and guidance[9].This might be attributed to the fact that HACCP compliance is often left to the discretion of individual restaurants and food handlers. Particularly during peak periods such as the year-end and New Year holidays, lapses in hygiene management are frequently observed, which may result in increased incidences of foodborne illness.

Household outbreaks of Anisakis and natural toxins stem from consumer misidentification or lack of knowledge. Especially with Anisakis, the risk rises due to Japan's culture of eating raw seafood. Recently, game meat (wild animal meat hunted to protect crops) has become increasingly popular in Japan[10,11]. As opportunities to purchase raw game meat and cook it at home or in restaurants increase, food poisoning risks from enterohemorrhagic E. coli and hepatitis E virus have surged. Not only should local governments but also game meat vendors raise awareness at the point of sale about the risks and precautions for safe preparation.

A feature of Shinjuku residents is the presence of many young single people such as university students and recent graduates. Previous research on university students' food hygiene habits found that participants experienced foodborne illnesses due to the use of poorly washed or disinfected wooden cutting boards, consuming unwashed fruit, and defrosting meat at room temperature [12].

To prevent foodborne illnesses, it is necessary to regularly raise awareness about preventive measures in the home, particularly for new residents or during high-risk seasons. In addition to public campaigns, it is important to promote specific household-level practices that can effectively reduce the risk of foodborne illness. Japanese public health authorities recommend six key measures: (1) purchasing fresh food and checking expiration dates, (2) promptly refrigerating or freezing food after purchase, (3) washing hands and using clean utensils during food preparation, (4) ensuring thorough handwashing and adequate heating during cooking, (5) avoiding prolonged exposure of food to room temperature during meals, and (6) storing leftovers in clean containers and reheating them before consumption. These practices should be emphasized in educational materials and outreach programs, especially targeting young single residents and newcomers.

As part of its ongoing public health initiatives, Shinjuku City has conducted more than 30 food hygiene seminars annually, primarily targeting restaurant operators. In addition, public relations campaigns have been actively employed to raise awareness among residents regarding seasonal risks and preventive measures related to foodborne illnesses (Figure 1 and Figure 2). These efforts reflect a localized strategy that may serve as a reference for other urban areas with similar demographic and epidemiological profiles. Despite these activities, foodborne illnesses continue to occur; therefore, ongoing daily awareness-raising efforts for both restaurants and the general public remain essential.

Figure 1. Summer Foodborne Illness Alert in Public Relations in Shinjuku

Figure 2. Winter Foodborne Illness Alert in Public Relations in Shinjuku

Globally, the burden of foodborne illness remains significant in Southeast Asia [13,14,15] and similar regions, especially regarding the establishment of sanitary control systems for school lunches [17]. While standard precautions, such as consumer handwashing, are important, building sanitary water and sewage infrastructure and ensuring food safety through HACCP implementation by food handlers are urgent issues [9,17].

Limitations

A limitation of this study is that individual-level data were not analyzed. Specifically, the absence of variables such as age, gender, and comorbidities limited our ability to perform risk stratification and to explore causal relationships between demographic or behavioral factors and the occurrence of foodborne illness. This constraint may affect the internal validity of the study and restrict the generalizability of the findings to specific subpopulations. Future research incorporating individual-level data is needed to enable more

precise epidemiological analysis and targeted public health interventions.

Future research is needed to analyze the factors that cause foodborne illness outbreaks and to examine individuals' knowledge, awareness, attitudes, and behaviors related to food safety. Specifically, community-based surveys targeting high-risk populations such as young single residents and university students could be conducted to assess food handling practices and hygiene awareness.

Contribution to global nursing practice

For nurses practicing in public health, we believe that this study can contribute to providing reminders and guidance to the citizens and restaurant operators in the prevention of foodborne illnesses. In particular, we believe that this study will be useful for nurses in Southeast Asian countries, where food stalls and street vendors are often used for restaurant business.

Conclusion

The foodborne illness outbreaks in Shinjuku City in FY2023 demonstrated distinct patterns in terms of seasonality, causative agents, and types of facilities involved. Given that 60% of outbreaks occurred in restaurants, targeted reinforcement of HACCP compliance and hygiene management is essential. Moving forward, stronger regulatory guidance for food service establishments, along with continuous public education and awareness-raising efforts, will be critical to reducing the incidence of foodborne illnesses in urban settings.

Based on the seasonal and facility-based trends identified in this study, we recommend implementing seasonally adjusted public health messaging—for example, intensified norovirus prevention campaigns during winter months and targeted Campylobacter awareness efforts in summer. Additionally, focused inspections and hygiene guidance for restaurants during high-risk periods, such as year-end and summer holidays, may help reduce outbreak incidence. These data-driven strategies can enhance the effectiveness of local public health interventions.

The findings from Shinjuku City highlight the need for seasonally adjusted public health messaging and targeted hygiene inspections, particularly during high-risk periods such as winter and summer. Strengthening food safety guidance for restaurants and enhancing awareness among residents are essential for reducing the incidence of foodborne illness in urban entertainment districts.

Establishing standard food safety management systems and implementing thorough hygiene education remain critical public health priorities in Southeast Asia. The findings from Shinjuku City may serve as a potential model for urban food safety strategies in this region, particularly in cities with similar demographic profiles, such as high population density and widespread reliance on small-scale food service establishments. While regulatory frameworks differ, the challenges observed in Shinjuku—especially those related to hygiene practices and consumer behavior—offer valuable insights that can inform context-specific interventions in Southeast Asian urban settings.

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Conflict of interest

The author declares no conflict of interest.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author contributions

The author contributed to the conception, design, data collection, analysis, interpretation, and writing of this manuscript.

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