INVESTIGATION OF FOOD POISONING OUTBREAK

Fensy Yulfani[1]*, Aulia Fajrin Rahmadani[1], Martini Martini[2], Dwi Sutiningsih[2], Ika Harriyani[3]
[1]Field Epidemiology Training Program, Master of Epidemiology Study Program, Faculty of Public Health, Universitas Diponegoro, Jl. Prof. Jacub Rais, Tembalang, Semarang, Jawa Tengah 50275, Indonesia
[2]Departement of Epidemiology & Tropical Diseases, Faculty of Public Health, Universitas Diponegoro, Jl. Prof. Jacub Rais, Tembalang, Semarang, Jawa Tengah 50275, Indonesia
[3]Dinas Kesehatan Kabupaten Wonogiri, Jl. Jenderal Ahmad Yani, Joho Lor, Giriwono, Wonogiri, Jawa Tengah 57615, Indonesia
*fnsylfni09@gmail.com

ABSTRACT

Food poisoning outbreaks remain a major public health problem, particularly in settings involving mass food preparation and distribution. On 14 January 2026, a suspected food poisoning outbreak was reported in the working area of Ngadirojo Primary Health Center, Wonogiri Regency, following the implementation of the Free Nutritious Meal Program (MBG). This investigation aimed to describe the outbreak by person, place, and time, and to identify the suspected source of exposure and contributing risk factors. A field epidemiological investigation with a descriptive observational design and cross-sectional approach was conducted. A case was defined as any individual who developed symptoms of food poisoning, including nausea, vomiting, diarrhea, abdominal pain, dizziness, or fever after consuming MBG meals on 13 January 2026. Data were collected through active case finding, structured questionnaires, medical record review, environmental health inspections, and laboratory examination of food samples. Descriptive analysis included calculation of the attack rate (AR), case fatality rate (CFR), and construction of an epidemic curve. A total of 604 cases were identified among 3,976 beneficiaries, yielding an attack rate of 15.2% and a CFR of 0%. The majority of cases occurred among junior high school students (49.5%) and males (56.5%). The incubation period ranged from 30 minutes to 36 hours 30 minutes, with a mean of approximately 14 hours 30 minutes. The epidemic curve demonstrated a common-source outbreak with a point-source pattern. Laboratory examinations identified contamination with Escherichia coli and Salmonella spp. in raw vegetables and fresh fruit. Environmental health inspections revealed multiple hygiene and sanitation deficiencies. This investigation confirmed a food poisoning outbreak associated with contaminated MBG food items, most likely caused by Escherichia coli with possible co-contamination by Salmonella spp. Strengthening food hygiene and sanitation practices in mass food provision programs is essential to prevent similar outbreaks.

Keywords: bacterial contamination; free nutritious meal program; food poisoning; outbreak investigation

INTRODUCTION

An outbreak is defined as a condition characterized by a significant increase in morbidity or mortality in a specific area and time period, which may potentially develop into a widespread epidemic if not addressed promptly. Outbreaks may be caused by infectious diseases as well as poisoning events, including food poisoning, which often occur rapidly and involve a large number of people within a short period of time. Therefore, any suspected outbreak requires immediate response through a systematic epidemiological investigation to confirm the occurrence of an outbreak, describe the magnitude of the problem, and identify the source of exposure and risk factors contributing to the event (Ministry of Health of the Republic of Indonesia, 2011; World Health Organization, 2017). Food poisoning remains a major global public health problem. The World Health Organization reports that foodborne diseases cause hundreds of millions of cases of illness each year worldwide, with a greater burden of disease in developing countries due to limitations in food safety systems and public health surveillance (World Health Organization, 2015, 2016). Low- and middle-income countries face additional challenges in food safety control,

including limited infrastructure, regulatory oversight, and human resource capacity, which increase the risk of foodborne diseases (Grace et al., 2024).

In Indonesia, food poisoning continues to be frequently reported and often occurs in the form of outbreaks, both in the general community and in educational institutions, including programs such as the Free Nutritious Meal initiative. Several incidents have demonstrated that mass food preparation and distribution constitute a key contributing factor to the high number of cases occurring within a short period of time (Hamidah et al., 2025; Iskandar et al., 2024). Large-scale food preparation carries a high risk of food poisoning, as errors at any stage of food handling or processing can simultaneously affect a large number of people (Newell et al., 2010).

The Free Nutritious Meal Program (MBG) is a government initiative aimed at improving nutritional status and public health, particularly among school-aged children. The program involves large-scale food production and distribution, making food safety a highly critical component. When hygiene and sanitation principles are not consistently applied, mass food provision programs may become a potential source of food poisoning outbreaks (Iskandar et al., 2025). Failures in the implementation of food hygiene and sanitation, particularly in the handling of fresh food ingredients that do not undergo reheating, increase the risk of microbiological contamination. Unsafe food handling practices, including inadequate hand hygiene, equipment cleanliness, and food preparation environments, have long been identified as major risk factors for foodborne diseases (Ehuwa et al., 2021; Gemeda et al., 2025; Heredia & García, 2018).

Although most food poisoning–related illnesses are self-limiting and resolve without specific treatment, under certain circumstances, they may progress to severe disease and even result in fatal outcomes. More serious impacts are disproportionately observed among vulnerable populations, including children, pregnant women, older adults, and individuals with compromised immune systems (Tood et al., 2014). In addition, severe foodborne illnesses in children may result in impaired physical growth and cognitive development, leading to long-term adverse effects on quality of life (Lee & Yoon, 2021; World Health Organization, 2016). Nutrition is a fundamental human requirement essential for sustaining life. However, the consumption of certain foods may instead trigger health disorders and even lead to fatal outcomes, manifested by symptoms such as diarrhea, nausea, vomiting, headache, abdominal cramps, and other related complaints. Along with increasing globalization and the growing intensity of cross-border food trade, outbreaks of foodborne diseases in recent years have shown a worsening trend worldwide. Although each country implements different regulations to ensure food safety and prevent disease, the incidence of foodborne illnesses continues to rise. Regardless of a country's economic status, foods of animal origin remain a major source of pathogenic bacterial infections, including Escherichia coli, Salmonella, Listeria monocytogenes, Campylobacter, and Staphylococcus aureus (Gupta & Chaudhary, 2022; Heredia & García, 2018).

On 14 January 2026, the Wonogiri District Health Office received a report from Ngadirojo Primary Health Center regarding health complaints among beneficiaries of the Free Nutritious Meal Program. Initial information was obtained after several students, particularly from Dayawangsa Vocational High School, presented to Ngadirojo Primary Health Center with complaints of diarrhea, dizziness, fever, abdominal pain, nausea, and vomiting between 08:00 and 12:00 Western Indonesia Time on the same day. Based on the epidemiological investigation, it was identified that on 13 January 2026, the Ngadirojo SPPG began distributing the MBG menu to schools and

community health posts (posyandu) between 06:30 and 10:00 WIB, with most beneficiaries consuming the meals between 09:00 and 11:00 WIB. At approximately 13:00 WIB, some students began to experience early symptoms, including abdominal pain, nausea, and vomiting, after consuming the MBG meals. Complaints continued to increase over time, with a rise in cases observed during the afternoon to evening hours, consistent with an average incubation period of approximately 15 hours. In response to these reports, the surveillance officers of Ngadirojo Primary Health Center notified the surveillance team of the Wonogiri District Health Office at 12:15 WIB on 14 January 2026, indicating a suspected food poisoning outbreak. During the investigation and data collection process, which was conducted using a self-administered questionnaire via Google Forms, a total of 604 individuals were identified as having experienced clinical symptoms, including diarrhea, dizziness, fever, abdominal pain, nausea, and vomiting. Subsequently, epidemiological investigations and environmental health inspections were carried out to characterize the outbreak and to identify the source and causative agent of the suspected food poisoning event.

Foodborne diseases represent a significant public health problem; however, they are largely preventable and treatable. Therefore, identifying the source of contamination is a critical component of outbreak investigations to ensure that foodborne disease events can be effectively prevented and appropriately managed (Tao et al., 2023). Therefore, an epidemiological investigation is required to confirm the occurrence of an outbreak and to establish a preliminary case definition. The investigation should be conducted as promptly as possible to prevent further case accumulation. Key activities include verification of reported information, collection of available laboratory results, case identification, and detailed case interviews, as well as appropriate collection of clinical specimens and food samples (World Health Organization, 2017).

METHOD AND DISCUSSION

This investigation employed a descriptive observational design with a cross-sectional approach in response to a suspected food poisoning outbreak associated with the Free Nutritious Meal Program in the working area of Ngadirojo Primary Health Center. Meals were distributed by SPPG Ngadirojo, Foundation X, on 13 January 2026 to 3,976 beneficiaries from schools and community health posts (posyandu). A case was defined as any individual who developed one or more symptoms of food poisoning, including nausea, vomiting, diarrhea, abdominal pain, dizziness, fever, or weakness after consuming the meal on the same date, and all individuals meeting the case definition were included.

The investigation commenced with outbreak confirmation through field visits to affected schools and posyandu, followed by the collection of suspected food samples for laboratory analysis at the Wonogiri District Health Office, which are commonly observed in food poisoning cases. Laboratory, in accordance with national and international outbreak response guidelines. Epidemiological data were collected cross-sectionally after the event without a comparison group, a method commonly used in outbreak investigations to describe event magnitude and characteristics (Tao et al., 2023). Data sources included active case finding, self-administered online questionnaires (Google Forms) completed by beneficiaries or their parents/guardians, and review of health service records at Ngadirojo Primary Health Center. An environmental health inspection was conducted through direct observation of food hygiene and sanitation practices at the Ngadirojo Nutrition Service Unit (SPPG) as part of the outbreak investigation. Data analysis followed a descriptive field epidemiology approach, including analysis by person, place, and time,

symptom distribution, calculation of attack rate (AR) and case fatality rate (CFR), and construction of an epidemic curve to describe the outbreak pattern and incubation period (Centers for Disease Control and Prevention, 2022).

RESULT

Based on administrative records from the SPPG, a total of 3,976 beneficiaries received the Free Nutritious Meal (MBG) on 13 January 2026, which was distributed by SPPG Foundation X to several schools and community health posts (posyandu). Of these, 604 individuals were identified as having clinical symptoms consistent with food poisoning. The attack rate for this incident was 15.2%, and no deaths were reported (case fatality rate = 0%). The distribution of clinical symptoms identified during the food poisoning outbreak investigation is presented in Table 1 below:

Table 1.
Distribution of Clinical Symptoms (n=604)

Clinical Symptoms	f	%
Abdominal pain	331	54,80
Vomiting	302	50,00
Dizziness	282	46,69
Nausea	280	46,35
Diarrhea	266	44,04
Fever	14	2,32

Based on the table 1, the most frequently reported clinical symptom of food poisoning was abdominal pain, affecting 331 individuals (54.80%), followed by vomiting in 302 individuals (50.00%), dizziness in 282 individuals (46.69%), nausea in 280 individuals (46.35%), and diarrhea in 266 individuals (44.04%). Fever was reported in a smaller proportion of cases, affecting 14 individuals (2.32%). These findings indicate that most students experienced disturbances of the lower gastrointestinal system, which are commonly observed in food poisoning cases and are likely associated with bacterial contamination of the consumed food. The epidemic curve of this food poisoning outbreak is presented as follows:

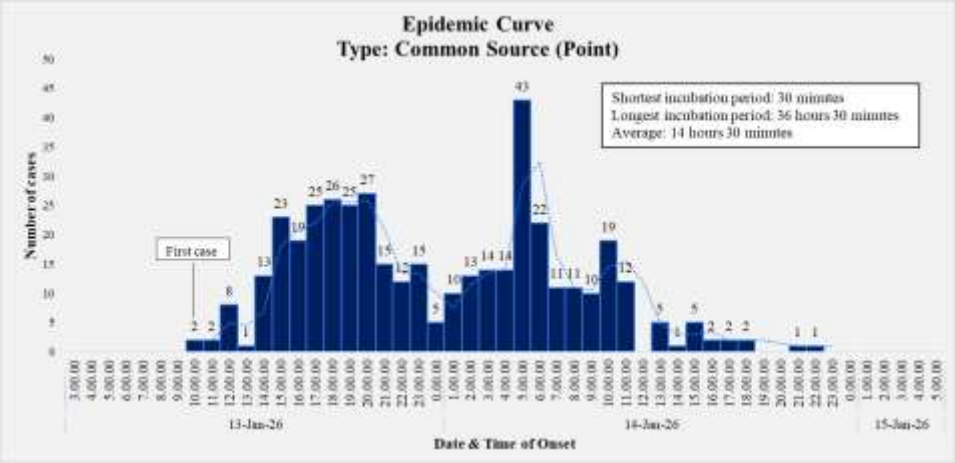

Figure 1. Epidemic Curve

The shortest incubation period observed in this outbreak was 30 minutes, while the longest incubation period reached 36 hours and 30 minutes, with a mean incubation period of 14 hours and 30 minutes. The majority of cases occurred within an incubation period of approximately 14–16 hours after exposure, as indicated by the highest concentration of cases during this time interval. Based on the epidemic curve shown in the figure above, the outbreak exhibited a common-source

pattern. A common-source outbreak occurs when individuals are exposed to the same source, either over a brief or a defined period. In this event, the outbreak was classified as a point-source outbreak, characterized by a relatively short exposure period in which all cases occurred within a single incubation period. This pattern is consistent with food poisoning resulting from a single exposure to a contaminated food source (Scallan et al., 2011; Yang et al., 2025).

The distribution of cases by sex is presented in the following table:

Table 2.
Distribution of Cases by Sex (n=604)

Sex	f	%
Male	341	56,46
Female	263	43,54

Based on the demographic characteristics of the investigation, suspected food poisoning cases were more frequent among males (56.46%) than females (43.54%).

Table 3.
Distribution of Cases by Location

School/Posyandu	f	%
Kindergarten & Early Childhood Education	2	0,33
Kindergarten	3	0,50
Primary School	181	29,97
Junior High School	299	49,50
Senior High School	97	16,06
Posyandu	22	3,64

The distribution of cases by location showed that the majority of cases originated from the junior high school level, with 299 cases (49.50%).

Identification of Risk Factors for a Food Poisoning Outbreak
Attack Rate

Table 4.
Attack Rate of Food Poisoning

$$\text{Attack Rate} = \frac{\text{Number of Food Poisoning Cases}}{\text{Total Population}} \times 100\% = \frac{604}{3976} \times 100\% = 15{,}20\ \%$$

Based on the table above, the attack rate of food poisoning was 15.20%, as 604 individuals developed symptoms out of a total of 3,976 MBG beneficiaries. However, this estimate should be interpreted with caution, as it does not account for individuals who did not report symptoms or did not complete the questionnaire, nor does it fully reflect the actual number of individuals who consumed the meals, which may differ from the registered number of beneficiaries.

Case Fatality Rate (CFR)

Table 5.
Case Fatality Rate of Food Poisoning

$$\text{Case Fatality Rate} = \frac{\text{Number of Deaths}}{\text{Total Number of Cases}} \times 100\% = \frac{0}{604} \times 100\% = 0\ \%$$

Based on the table 5, the case fatality rate (CFR) was 0%, as no deaths were reported among the 604 food poisoning cases.

Table 6.
Distribution of Food Poisoning Cases by Suspected Food Items

Food Item	Consumed (N)	Not Consumed /Did Not Respond (N)
Rice	355	75
Fried Chicken	358	73
Tempe Goreng	182	247
Vegetables	157	178
Mixed Fruit	253	447

The table 6 shows that the most frequently consumed food items among the cases were fried chicken, rice, and mixed fruit.

Table 7.
Characteristics of Suspected Pathogens and Differential Diagnosis of Food Poisoning

No	Microorganism	Incubation Period	Mean Incubation	Signs and Symptoms
1	*Escherichia coli*	5 – 48 hours, average 10-24 hours	15 Hours	Abdominal pain, nausea, vomiting, fever, chills, headache, muscle pain
2	*Salmonella sp*	6 – 72 hours average 18 – 36 hours		Abdominal cramps, diarrhea, chills, fever, nausea, vomiting, weakness
3	*Bacillus cereus (enteritis)*	8 – 16 hours average 12 hours		Nausea, abdominal cramps, watery diarrhea

Based on table 7, three pathogens were suspected as potential causes of the food poisoning outbreak, namely Escherichia coli, Salmonella spp., and Bacillus cereus (enteritis type). To confirm these suspicions, laboratory testing was required. During the initial investigation, food samples collected included rice, breaded fried chicken, chili sauce, fried tempeh, raw vegetables (sliced cucumber and tomato), and mixed cut fruit (watermelon, melon, and dragon fruit). These food samples were submitted to the Wonogiri District Health Laboratory on Wednesday, 14 January 2026. The samples were analyzed using biochemical testing methods, with test parameters focused on the identification of Escherichia coli and Salmonella spp. The laboratory examination yielded the following results:

Table 8.
Laboratory Examination Results

No	Sample Type	Result		Limit Conditions
		E. Coli	*Salmonella Sp.*	
1	Rice	Negative	Negative	Negative
2	Fried Chicken	Negative	Negative	
3	Tempe goreng	Negative	Negative	
4	Vegetables	Negative	*Positive*	
5	Dragon Fruit	Negative	*Positive*	
6	Watermelon	*Positive*	*Positive*	
7	Melon	Negative	Negative	
8	Terasi	Negative	Negative	

Based on the laboratory examination results, the food items suspected as the sources of food poisoning were watermelon, dragon fruit, and raw vegetables (lalapan), as these items tested positive for pathogenic bacteria, namely Escherichia coli and Salmonella spp. (Gupta & Chaudhary, 2022). These bacterial pathogens are known to cause gastrointestinal symptoms, including diarrhea, nausea, and vomiting, with a relatively short incubation period following consumption. These findings further support the results of the epidemiological investigation and

the questionnaire-based data collected via Google Forms, in which affected individuals reported similar clinical symptoms. The environmental health inspection, based on direct field observation, identified several non-compliances in key food hygiene and sanitation components, including waste management, environmental conditions in the portioning area, equipment functionality, thawing procedures for food ingredients, and water quality.

This investigation confirmed the occurrence of a food poisoning outbreak in the working area of Ngadirojo Primary Health Center on 13 January 2026, with an attack rate of 15.2%. This figure indicates a substantial proportion of the population at risk, as commonly observed in food poisoning incidents involving mass food provision from a single distribution source (Holst et al., 2025). The epidemic curve demonstrated a rapid increase in cases, a single dominant peak, and a gradual decline, which are characteristic features of a common-source outbreak of the point-source type. This pattern suggests that exposure occurred at a specific point in time, with the majority of cases arising within a single incubation period. Outbreaks characterized by a single major peak and a relatively uniform incubation period are typical of food poisoning events resulting from a single exposure source, as reported in previous outbreak investigations (Bennett et al., 2018).

The incubation period in this outbreak ranged from 30 minutes to 36 hours and 30 minutes, with a mean of 14 hours and 30 minutes. This short to moderate incubation period is consistent with the characteristics of foodborne diseases caused by enteric bacteria. Variations in incubation periods among individuals may be influenced by differences in exposure dose, individual health status, and the type of pathogen contaminating the food. The very short incubation period reported in a small number of cases may reflect recall bias or exposure to other food items and should therefore be interpreted with caution. The clinical presentation, predominantly characterized by abdominal pain, nausea, vomiting, dizziness, and diarrhea, further supports the suspicion of food poisoning. Laboratory findings demonstrating contamination with Escherichia coli and Salmonella spp. in raw vegetables and fresh fruit strengthen this differential diagnosis. Findings from the environmental health inspection demonstrated multiple hygiene and sanitation deficiencies during food preparation and handling, which may have contributed to the contamination of fresh food items (Ehuwa et al., 2021). These findings highlight the vulnerability of fresh food items that do not undergo reheating in mass food provision systems.

From a One Health perspective, food poisoning events are influenced by the interactions between humans, animals, and the environment. Therefore, the prevention and control of foodborne diseases require a multisectoral approach across the entire food chain (Silva et al., 2014). Findings from the environmental health inspection revealed several non-compliances in hygiene and sanitation practices during food processing and serving. Inadequate waste management, excessive room humidity, suboptimal performance of storage equipment, and water quality that had not been regularly tested may increase the risk of microbiological contamination of food. These conditions may have increased the risk of microbiological contamination, particularly in fresh food items.

Beyond clinical impacts, foodborne diseases impose a substantial public health burden, including healthcare costs and loss of productivity. Recent studies have demonstrated that foodborne illnesses exert a significant economic impact on health systems, especially during outbreaks associated with mass food provision (Grace et al., 2024; Hoffmann et al., 2025). Global changes in food systems, increasing urbanization, and large-scale food distribution have made food poisoning a persistent and evolving public health issue (Davydova et al., 2025; Sun et al., 2025).

CONCLUSION

The food poisoning outbreak that occurred on 13 January 2026 in the working area of Ngadirojo Primary Health Center was classified as a common-source outbreak with point-source exposure, associated with the consumption of the Free Nutritious Meal Program (MBG). The epidemic curve pattern, incubation period range, clinical manifestations, and laboratory findings indicate that this event was most likely caused by bacterial contamination with Escherichia coli, with potential co-contamination by Salmonella spp. in fresh food items. Strengthening the implementation of food hygiene and sanitation practices, particularly in mass food provision settings, is essential to prevent the recurrence of similar outbreaks.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the Wonogiri District Health Office, Ngadirojo Primary Health Center, Wonogiri District Health Laboratory, and all parties involved in the epidemiological investigation and data collection for this event.

REFERENCES

Bennett, S. D., Walsh, K. A., & Gould, L. H. (2018). Foodborne disease outbreaks caused by contaminated food: Characteristics and contributing factors. *Clinical Infectious Diseases*, *67*(5). https://doi.org/10.1093/cid/ciy164

Centers for Disease Control and Prevention. (2022). *Principles of Epidemiology in Public Health Practice* (Vol. 71, Issue 1). https://doi.org/10.15585/mmwr.mm7101a1

Davydova, A., Fastl, C., Mughini-gras, L., Bai, L., Kubota, K., Hoffmann, S., Rachmawati, T., & Pires, S. M. (2025). Source attribution studies of foodborne pathogens, 2010 – 2023 : a review and collection of estimates. *Food Microbiology*, *131*, 104812. https://doi.org/10.1016/j.fm.2025.104812

Ehuwa, O., Jaiswal, A. K., & Jaiswal, S. (2021). Salmonella, Food Safety and Food Handling Practices. *Foods*, *10*(5), 1–16. https://doi.org/10.3390/foods10050907

Gemeda, N., Yazew, T., Moroda, M., & Kuyu, C. G. (2025). *Food safety practices and associated factors among food handlers in food establishments in Adama town, Central Ethiopia*. *January*, 1–13. https://doi.org/10.3389/fsufs.2024.1471429

Grace, D., Bonfoh, B., Barbara, H., Maurer, J. J., Tech, V., & States, U. (2024). *Editorial : Food safety in low- and middle-income countries*. https://doi.org/10.3389/fsufs.2024.1358897

Gupta, A. K., & Chaudhary, A. (2022). Food poisoning: Causes, its effects, and control. *I TECH MAG*, *4*(1), 4–6. https://doi.org/http://doi.org/10.26480/itechmag.04.2022.59.61

Hamidah, L., Zahraa, A., & Hanifatu, I. (2025). Risk factors and characteristics of food poisoning outbreaks in East Java, Indonesia, 2024. *6*, 4143–4155. https://doi.org/https://doi.org/10.31004/jkt.v6i1.42674

Heredia, N., & García, S. (2018). Animals as sources of food-borne pathogens : A review. *Animal Nutrition*, *4*(3), 250–255. https://doi.org/10.1016/j.aninu.2018.04.006

Hoffmann, S., White, A. E., Mcqueen, R. B., Ahn, J., Gunn-sandell, L. B., & Walter, E. J. S. (2025).

Economic Burden of Foodborne Illnesses Acquired in the United States. *22*(1). https://doi.org/10.1089/fpd.2023.0157

Holst, M. M., Wittry, B. C., Crisp, C., Torres, J., Irving, D. J., & Nicholas, D. (2025). Contributing Factors of Foodborne Illness Outbreaks — National Outbreak Reporting System, United States, 2014 – 2022. *MMWR Surveillance Summaries*, *74*(1), 1–15. https://doi.org/10.15585/mmwr.ss7401a1

Iskandar, S. I., Hertanto, D. A., Aryanto, S., & Satria, B. (2025). E. Coli-caused Foodborne Outbreak in Bantul Regency, Indonesia, 2023: A Retrospective Cohort Study. *The Open Public Health Journal*, *18*, e18749445391790. https://doi.org/10.2174/0118749445391790250428070104

Iskandar, S. I., Janah, M., Aryanto, S., Wiratama, B. S., District, B., Office, H., & Health, P. (2024). Foodborne Outbreak Investigation in Elementary School Students in Bantul, Yogyakarta, 2023. *Media Kesehatan Masyarakat Indonesia*, *20*(3), 124–132. https://doi.org/10.30597/mkmi.v20i3.2024

Lee, H., & Yoon, Y. (2021). Etiological Agents Implicated in Foodborne Illness Worldwide. *Food Science of Animal Resources*, *41*(1), 1–7. https://doi.org/https://doi.org/10.5851/kosfa.2020.e75

Ministry of Health of the Republic of Indonesia. (2011). Guidelines for the Investigation and Control of Outbreaks of Infectious Diseases and Food Poisoning.

Newell, D. G., Koopmans, M., Verhoef, L., Duizer, E., Aidara-kane, A., Sprong, H., Opsteegh, M., Langelaar, M., Threfall, J., Scheutz, F., Giessen, J. van der, & Kruse, H. (2010). International Journal of Food Microbiology Food-borne diseases — The challenges of 20 years ago still persist, while new ones continue to emerge. *International Journal of Food Microbiology*, *139*, S3–S15. https://doi.org/10.1016/j.ijfoodmicro.2010.01.021

Scallan, E., Hoekstra, R. M., Angulo, F. J., Tauxe, R. V, Widdowson, M., Roy, S. L., Jones, J. L., & Griffi, P. M. (2011). *Foodborne Illness Acquired in the United States — Major Pathogens*. *17*(1), 7–15. https://doi.org/10.3201/eid1701.P11101

Silva, C., Calva, E., & Maloy, S. (2014). *One Health and Food-Borne Disease : Salmonella Transmission between Humans, Animals, and Plants*. https://doi.org/10.1128/microbiolspec.OH-0020-2013.Correspondence

Sun, Y., Xu, W., Wu, Y., Zhu, G., Li, P., Jia, J., Song, H., Chen, L., & Lin, Y. (2025). *Descriptive study of foodborne disease outbreaks using monitoring data from foodborne disease outbreak surveillance system (FDOSS) in Jiaxing City, China, 2013 – 2023*. https://doi.org/https://doi.org/10.1186/s12889-025-24287-7

Tao, D., Zhang, D., Hu, R., Rundensteiner, E., & Feng, H. (2023). *Epidemiological Data Mining for Assisting with Foodborne Outbreak Investigation*. *Cdc*, 1–18. https://doi.org/https://doi.org/10.3390/foods12203825

Tood, E., LLC, E. T. C., Okemis, MI, & USA. (2014). Overview of Biological Hazards and Foodborne Diseases. In *Encyclopedia of Food Safety* (Issue January). Elsevier.

https://doi.org/10.1016/B978-0-12-378612-8.00071-8

World Health Organization. (2015). *WHO estimates of the global burden of foodborne diseases*.

World Health Organization. (2016). *Burden of foodborne diseases in the WHO South-East Asia Region*.

World Health Organization. (2017). *Investigating foodborne disease outbreaks: Therefore, identifying the source of contamination is a critical component of Stage One Booklet*. World Health Organization. https://www.who.int/publications/i/item/9789240118607

Yang, Y., Xu, F., Zhou, Y., Hu, L., Lu, W., Zhang, S., Hu, H., & Huang, X. (2025). Epidemiological Characteristics of Foodborne Disease Outbreaks in a Hospital : A 5-Year Retrospective Study. *International Journal of General Medicine*, *18*. https://doi.org/10.2147/IJGM.S496799