



Rapid-onset Gastrointestinal Illness Following a Funeral Ceremony in Northern Thailand: A Staphylococcal Food Poisoning Outbreak Investigation, June 2025

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Received: 10 Feb 2026; Revised: 28 Aug 2026; Accepted: 5 Sep 2026
<https://doi.org/10.59096/osir.v19i3.280369>

Abstract

Objectives: On 15 Jun 2025, a cluster of acute gastrointestinal illness cases was reported among attendees of a funeral ceremony in Phayao Province, Thailand. We conducted an investigation to identify the etiology and describe the epidemiological characteristics of the outbreak, determine associated risk factors, and recommend prevention and control measures.

Methods: A suspected case was defined as any person who attended the funeral or consumed food served at the event and developed at least one gastrointestinal symptom during 15–17 Jun 2025. An active case finding together with interviews, medical record reviews, environmental assessments and laboratory testing of clinical, food handler, and food specimens were conducted. A retrospective cohort study was conducted. Multivariable logistic regression was used to estimate adjusted odds ratios (AORs) with 95% confidence intervals (CIs).



Results: Among 311 participants, 188 cases were identified (60.5%). Common symptoms were nausea (89.9%), vomiting (83.5%), abdominal pain (71.3%), and diarrhea (53.2%). The shortest incubation period was one hour, and the median was four hours (interquartile range 3–5 hours). All cases reported consumption of red pork with rice, with no illness among unexposed participants. In multivariable analysis, rice (AOR 21.34; 95% CI 3.19–142.75) and boiled eggs (AOR 3.10; 95% CI 1.08–8.92) were associated with illness. Methicillin-susceptible *Staphylococcus aureus* was isolated from vomitus, food samples, and a food handler's hand swab. Environmental assessment identified prolonged storage of food at room temperature, inadequate hand hygiene practices, reuse of ice, and low residual free chlorine levels.

Public Health Recommendations: Findings supported staphylococcal food poisoning associated with contaminated food. Proper hand hygiene, prevention of cross-contamination, safe food storage, temperature control, strengthened food safety training, and improved catering supervision are recommended.

Keywords: *Staphylococcus aureus*, staphylococcal food poisoning, foodborne outbreak, outbreak investigation

Introduction

Foodborne illness remains an important public health concern worldwide. Communal events and large social gatherings often create conditions that facilitate foodborne outbreaks. During 2025 to 2026, food poisoning cases in Thailand remained consistently above the five-year median of 1,300 to 2,600 cases per week, with about 2,000 to 5,000 cases reported per week.¹

Among the pathogens responsible for foodborne illness, *Staphylococcus aureus* is one of the leading causes worldwide. *S. aureus* commonly colonizes the skin and anterior nares of healthy people; about 15% of the population are persistent nasal carriers.² Although usually harmless on intact skin, the organism can contaminate food through direct contact during preparation and handling, and under inadequate temperature control, can multiply and produce heat stable enterotoxins that cause illness.³

Staphylococcal food poisoning results from the ingestion of preformed staphylococcal enterotoxins produced by enterotoxigenic strains of *S. aureus*. These include the classical enterotoxins, staphylococcal enterotoxins A-E (SEA-SEE), and more recently described enterotoxins H-O (SEH-SEO).^{4,5} Acting as superantigens, they cause rapid onset of nausea, vomiting, and abdominal pain, and sometimes diarrhea, with symptoms usually appearing within 30 minutes to eight hours and an average incubation period of about three hours.⁶ Because these enterotoxins are heat stable and resistant to acids and digestive enzymes, reheating contaminated food may not prevent illness once the toxin has formed.⁷

In Thailand, staphylococcal food poisoning outbreaks recur at large communal gatherings such as funerals, school activities, and community events.^{8–11} Investigations have repeatedly identified the same

risk factors, including unsafe preparation, prolonged storage of cooked food at room temperature, inadequate temperature control, and poor hand hygiene among food handlers. Previous outbreaks in Lampang Province in 2022 and Rayong Province in 2024 detected enterotoxigenic *S. aureus* in patient specimens, contaminated food, and food handlers, which points to persistent gaps in food hygiene, food safety, and environmental sanitation.^{8–10} Communal events involving large scale food preparation therefore remain vulnerable to these outbreaks.

On 15 Jun 2025, a cluster of acute gastrointestinal illness cases was reported among attendees of a funeral in Khue Wiang Subdistrict, Dok Khamtai District, Phayao Province. The first cases developed symptoms between noon and 1 PM, approximately one hour after eating lunch served in boxes at the cremation ceremony, with many others developing symptoms, including nausea, vomiting, abdominal cramps, and diarrhea. Because of the rapid onset and large number of people affected, a joint investigation team from the Division of Epidemiology, Department of Disease Control, Ministry of Public Health and the Office of Disease Prevention and Control Region 1 Chiang Mai, conducted a field investigation from 17 to 19 Jun 2025 to confirm the outbreak, determine its magnitude and characteristics, identify the contaminated food items and contributing environmental factors, and recommend appropriate measures to prevent similar events in the future.

Methods

Case Descriptions

A suspected case was anyone who attended the funeral held on 15 Jun 2025 in Village 5, Khue Wiang Subdistrict, or ate food served at the event, and then developed at least one gastrointestinal symptom (nausea, vomiting, diarrhea, bloody diarrhea, or

abdominal pain), with or without fever, during 15–17 Jun 2025. A confirmed case was a suspected case with *S. aureus* detected by bacterial culture or reverse transcription-polymerase chain reaction (RT-PCR) from vomitus, stool, or rectal swab. Active case finding included household interviews and a review of electronic medical records at Dok Khamtai Hospital. Outpatient and inpatient records from 15–17 Jun 2025 with the International Classification of Diseases (ICD-10), 10th Revision, codes A05 (Other bacterial foodborne intoxications, not elsewhere classified) and A09 (Other gastroenteritis and colitis of infectious and unspecified origin) were extracted. Village health volunteers interviewed residents in villages 1 to 6, and the funeral host listed attendees living outside the area. Data were collected, face-to-face, with a structured questionnaire covering demographics, type and onset of symptoms, treatment and care seeking, and food history. Medical records were reviewed to verify clinical information. Descriptive analysis characterized the outbreak by person, place, and time, with categorical variables as frequencies and percentages and continuous variables as medians (first quartile [Q1]–third quartile [Q3]). An epidemic curve was created from symptoms onset.

Environmental Study

Environmental assessments were conducted at the food handlers' place of residence and preparation site. Investigators directly observed preparation areas, utensil storage, water sources, and sanitation. They also carried out a walkthrough survey and reviewed the full workflow for the lunch boxes containing red pork with rice, from procurement and marination through cooking, cooling, packing, transport, and distribution. Food handlers were interviewed about purchase sources, storage and cooking practices, glove use, separation of raw and cooked ingredients, handwashing, and utensil cleaning. The location of preparation areas relative to toilets and septic tanks was assessed for contamination risk.

Laboratory Methods

Drinking and domestic water were screened for coliform bacteria using the A-11 test kit.¹² Food, food contact utensils, ice containers, and food handlers' hands were screened for coliform contamination using the SI-2 test kit.¹³ Residual free chlorine in tap water was measured with the O-31 test kit.¹⁴ Multiplex RT-PCR testing for enteric pathogens was performed on 10 rectal swabs from symptomatic patients, four rectal swabs from food handlers, and two hand swabs from food handlers. Bacterial culture was performed on two vomitus

specimens, the same rectal and hand swabs, and food specimens (pork, Chinese sausage, and sauce from lunch boxes and from the cuisine). Rectal and hand swabs were processed at the Bamrasnaradura Infectious Diseases Institute, while vomitus and food specimens were sent to the Department of Medical Sciences. *S. aureus* isolates were tested for methicillin resistance, by RT-PCR targeting *mecA* or *mecC* at Bamrasnaradura and by Kirby-Bauer disk diffusion at the Department of Medical Sciences. Selected *S. aureus* positive specimens were tested by multiplex PCR for the classical enterotoxin genes SEA to SEE.

Analytical Study

A retrospective cohort study was conducted among funeral attendees to identify food items associated with illness. Cases were those who met the suspected or confirmed case definitions, and non-cases were attendees who did not meet the case definitions during 15–17 Jun 2025. Exposure information was obtained by interview regarding food items eaten at lunchtime on 15 Jun 2025. The sample size was estimated from a previous staphylococcal food poisoning outbreak, assuming a type I error of 5%, power of 80%, illness in 39.5% of exposed and 5.0% of unexposed, and an adjusted risk ratio of 7.88, giving a minimum of 23 exposed and 23 unexposed participants by the Kelsey method.⁸ Crude risk ratios with 95% confidence intervals (CIs) were calculated and variables with *p*-value below 0.20 or epidemiological relevance were entered into a multivariable logistic regression model. Adjusted odds ratios (AORs) with 95% CI were reported, and *p*-values below 0.05 were deemed significant. Analyses used Microsoft Excel and R with the epiR package used for epidemiological analyses.

Results

Setting

The funeral was held at the residence of the deceased in Village 5, Ban Thung Ka Chai, Khue Wiang Subdistrict, Dok Khamtai District, Phayao Province, from 12–15 Jun 2025. Buddhist prayer ceremonies from 12–14 Jun 2025 drew about 15–60 relatives and acquaintances per day, mostly from nearby communities, and the host provided all meals. The cremation on 15 June drew about 500 people from local communities and other provinces, and lunch consisted of red pork with rice, ice cream, drinking yogurt, and water in cups and bottles, prepared by a catering shop in Don Si Chum Subdistrict. Approximately 700 lunch boxes were ordered and, as this exceeded the number of attendees, some were taken away by attendees on leaving the ceremony.

Descriptive Study

The active case finding identified 311 people who completed the questionnaire, representing a response rate of 62.2%. These included 70 people identified through a review of electronic medical records at Dok Khamtai Hospital, of whom 58 had ICD-10 code A05 and 12 had ICD-10 code A09. Of the 311 respondents, 188 met the case definition giving an attack rate of 60.5%, while 123 were non-cases. Among the cases, 2 (1.1%) were confirmed and 186 (98.9%) suspected. The median age was 56.0 years (34.8–66.0) among cases and 55.5 years (42.5–68.0) among non-cases. The male to female ratio was 1:1.4 in both groups. Hypertension was the most common underlying disease. The highest age specific attack rates were found in those aged under 9 years (93.8%) and 10 to 19 years (75.0%), while most

cases were in those aged 60 years and older (n=81) and 50 to 59 years (n=39). A higher proportion of cases than non-cases lived in Khue Wiang Subdistrict (95.7% vs 83.7%, *p*-value 0.001) (Table 1). Clinical features were consistent with acute foodborne illness (Table 2). Among suspected cases, 139 (74.7%) received outpatient care, 8 (4.3%) were hospitalized, 31 (16.7%) self-medicated, and 8 (4.3%) recovered without treatment. The most common symptoms were nausea (89.9%), vomiting (83.5%), abdominal pain (71.3%), and diarrhea (53.2%). Fever and bloody or mucoid diarrhea were uncommon. Figure 1 shows the epidemic curve. Cases rose sharply after food distribution began at about 11 AM on 15 Jun 2025 and peaked between 2 and 6 PM, with no secondary transmission. Among those who ate red pork with rice, the shortest incubation period was approximately one hour with a median of 4.0 hours (3.0–5.0).

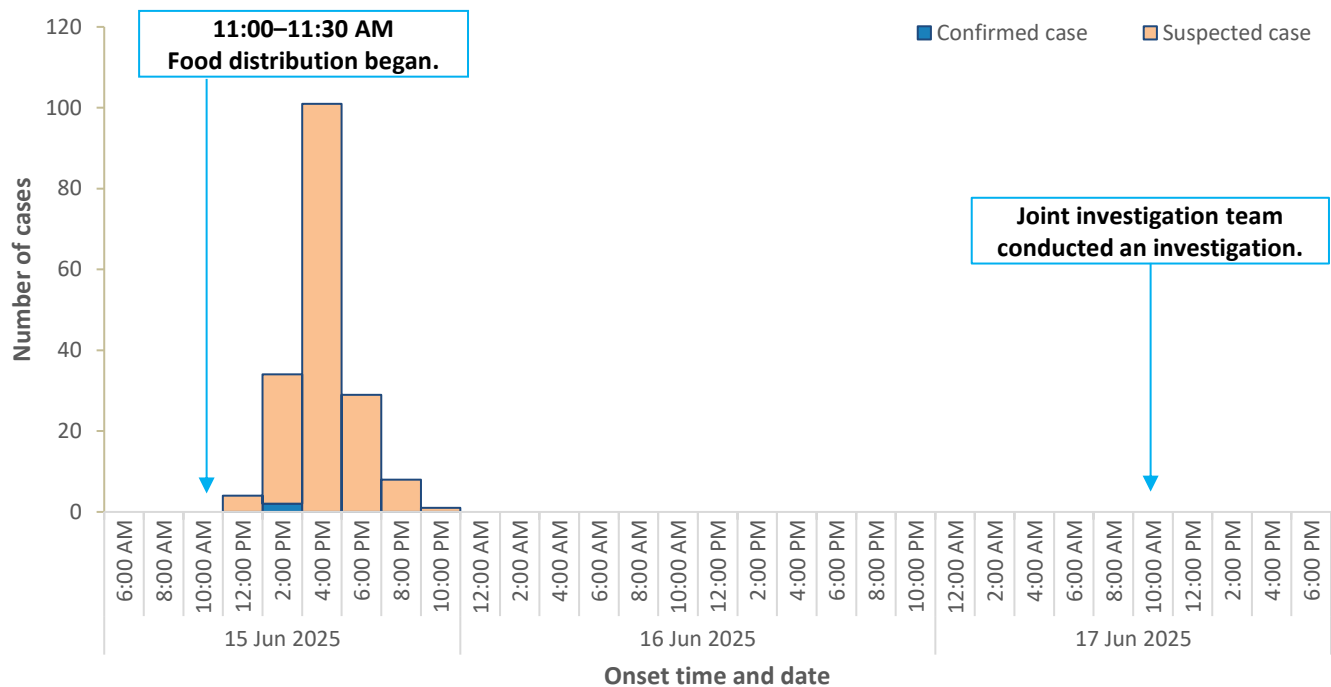
Table 1. Demographic characteristics, underlying diseases, and age-specific attack rates among participants in a funeral-associated foodborne outbreak, Phayao Province, Thailand, June 2025 (n=311).

Variables	Non-case (n, %) (n=123)	Case (n, %) (n=188)	P-value
Age (years)*	55.50 (42.5, 68.0)	56.00 (34.8, 66.0)	0.470
Gender			
Female (n=183)	72 (58.5)	111 (59.0)	1.000
Male (n=128)	51 (41.5)	77 (41.0)	
Underlying disease			
Hypertension (n=53)	20 (16.3)	33 (17.6)	0.887
Diabetes mellitus (n=19)	12 (9.8)	7 (3.7)	0.054
Dyslipidemia (n=16)	5 (4.1)	11 (5.9)	0.664
Respiratory disease (n=6)	4 (3.3)	2 (1.1)	0.342
Gout (n=4)	0 (0.0)	4 (2.1)	0.265
Other diseases (n=21)	4 (3.3)	17 (9.0)	0.079
Residential area			
District			
Dok Khamtai (n=301)	116 (94.3)	185 (98.4)	0.094
Other (n=10)	7 (5.7)	3 (1.6)	
Subdistrict			
Khue Wiang (n=283)	103 (83.7)	180 (95.7)	0.001
Others (n=28)	20 (16.3)	8 (4.3)	
Age group (years)	Non-case (n)	Case (n)	Specific attack rate (%)
0–9 (n=16)	1	15	93.8
10–19 (n=24)	6	18	75.0
20–29 (n=13)	8	5	38.5
30–39 (n=21)	8	13	61.9
40–49 (n=39)	22	17	43.6
50–59 (n=63)	24	39	61.9
≥60 (n=132)	51	81	61.4

*Age is presented as median (Q1, Q3). Q1: first quartile. Q3: third quartile.

Table 2. Healthcare utilization and clinical manifestations among confirmed and suspected cases in a funeral-associated foodborne outbreak, Phayao Province, Thailand, June 2025.

Characteristic	Confirmed case (n=2)	Suspected case (n=186)	Total (n=188)
Healthcare utilization			
Outpatient department	1 (50.0)	139 (74.7)	140 (74.5)
Inpatient department	1 (50.0)	8 (4.3)	9 (4.8)
Self-medication	0 (0.0)	31 (16.7)	31 (16.5)
Self-recovered without treatment	0 (0.0)	8 (4.3)	8 (4.3)
Clinical manifestations			
Nausea	2 (100.0)	167 (89.8)	169 (89.9)
Vomiting	2 (100.0)	155 (83.3)	157 (83.5)
Abdominal pain	1 (50.0)	133 (71.5)	134 (71.3)
Diarrhea	0 (0.0)	100 (53.8)	100 (53.2)
Fever	0 (0.0)	22 (11.8)	22 (11.7)
Bloody/mucoid diarrhea	0 (0.0)	5 (2.7)	5 (2.7)

**Figure 1. Number of cases by date and time of symptom onset among participants in the funeral-associated foodborne outbreak, Phayao Province, Thailand, June 2025 (n=188).**

Environmental Study

An unlicensed catering service prepared the food consisting of red pork with rice, Chinese sausage, boiled eggs, rice, sauce, and vegetables. Investigators found drinking water containers placed on the floor, a toilet about three meters from the preparation area whose door did not open directly into the kitchen, and preparation tables raised at least 60 centimeters above the ground.¹⁵ Ingredients were bought at local markets on 14 June. The pork was stored in an ice container from the afternoon of 14 June, removed for cutting and marination, placed in plastic bags, and

returned to the same container. The ice was reused from the previous day. Preparation began at about 2 AM on 15 June and included roasting and slicing the pork, cooking the rice, making the sauce, frying the Chinese sausage, boiling the eggs, and preparing the vegetables. Packing took place from about 4 AM to 9:30 AM, after which the boxes were taken to the venue and held until distribution at about 11 AM. The cooked food and prepared ingredients were kept at room temperature for about six to seven hours before distribution. Food handlers used tap water to wash the ingredients and separate cutting boards for raw

and cooked food. They also wore gloves but changed them only when torn. Dishwashing liquid was provided for handwashing.

Laboratory Study

Screening showed widespread contamination of water, food contact surfaces, and hands. The A-11 kit found coliforms in an opened drinking water container and in tap water from dishwashing and hose faucets. The SI-2 kit found coliforms on utensils, including the raw pork cutting tray, cooked pork slicing knife, cooked pork chopping board, and ice container, on both food handlers' hands, and on the toilet water sprayer and doorknob. Residual free chlorine from the taps was

below 0.1 parts per million (ppm), which is under the recommended level of 0.2 ppm.¹⁶ On multiplex RT-PCR (Table 3), enteropathogenic *Escherichia coli* (EPEC) was detected in 4 of 10 case rectal swabs and EPEC with enteroaggregative *E. coli* (EAEC) in one, EPEC was found in one of four handler swabs, and no other enteric pathogens were identified. On bacterial culture (Table 3), both vomitus specimens yielded methicillin-susceptible *S. aureus* (MSSA), 1 of 10 case rectal swabs yielded *Salmonella* serotype O16, one of two handler hand swabs yielded MSSA while all four handler rectal swabs were negative. MSSA was isolated from pork and Chinese sausage samples from both the lunch boxes and the cuisine, while the sauce tested negative.

Table 3. Laboratory investigation results from symptomatic cases, asymptomatic food handlers, lunch boxes, and catering cuisine during a funeral-associated foodborne outbreak, Phayao Province, Thailand, June 2025.

Source of isolate	Collection date	Specimen type	Bacterial culture		Multiplex RT-PCR for enteric pathogen [†]	
			Number of isolates (samples)	Pathogen (n)	Number of isolates (samples)	Pathogen (n)
Symptomatic cases	15 Jun 2025	Vomitus	2 (2)	MSSA, no SEA-SEE (2)	-	-
Symptomatic cases	17 Jun 2025	Rectal swab	1 (10)	<i>Salmonella</i> serotype O16 (1)	5 (10)	EPEC (4), EPEC with EAEC (1)
Asymptomatic food handlers	16 Jun 2025	Hand swab	1 (2)	MSSA (1)	0 (2)	Not detected (2)
Asymptomatic food handlers	15–18 Jun 2025	Rectal swab	0 (4)	No enteric pathogen isolated* (4)	1 (4)	EPEC (1)
Lunch boxes	15 Jun 2025	Red pork	1 (1)	MSSA, no SEA-SEE (1)	-	-
Lunch boxes	15 Jun 2025	Chinese sausage	1 (1)	MSSA, no SEA-SEE (1)	-	-
Lunch boxes	15 Jun 2025	Sauce	0 (1)	No enteric pathogen isolated* (1)	-	-
Cuisine	15 Jun 2025	Red pork	1 (1)	MSSA, no SEA-SEE (1)	-	-
Cuisine	15 Jun 2025	Chinese sausage	1 (1)	MSSA, no SEA-SEE (1)	-	-

*Adult enteric pathogens consisted of *Vibrio*, *Salmonella*, *Shigella*, *Aeromonas*, *Plesiomonas*, and *Edwardsiella* species. [†]Multiplex RT-PCR for enteric pathogen includes *Adenovirus F40/F41*, *Astrovirus*, *Norovirus GI/GII*, *Rotavirus A*, *Sapovirus*, *Campylobacter*, *Clostridioides difficile* toxin A/B, *Plesiomonas shigelloides*, *Salmonella*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Vibrio vulnificus*, *Yersinia enterocolitica*, enteroaggregative *Escherichia coli* (EAEC), enteropathogenic *E. coli* (EPEC), enterotoxigenic *E. coli* (ETEC), Shiga toxin-producing *E. coli* (STEC), *E. coli* O157, *Shigella*/enteroinvasive *E. coli* (EIEC), *Cryptosporidium*, *Cyclospora cayentanensis*, *Entamoeba histolytica*, and *Giardia lamblia*. MSSA: methicillin-susceptible *Staphylococcus aureus*.

Analytical Study

In the cohort of 311 attendees, all cases had eaten pork with rice, and no illness occurred among those who did not. In univariable analysis, rice, pork, Chinese sausage, sauce, cucumber, egg, and coriander were associated with an increased risk of illness, whereas

drinking yogurt, bottled water, cup water, and ice cream showed no association (Table 4). In multivariable analysis, rice (AOR 21.34, 95% CI 3.19 to 142.75) and boiled egg (AOR 3.10, 95% CI 1.08 to 8.92) remained associated with higher odds of illness, while coriander was associated with lower odds (AOR 0.34, 95% CI 0.16 to 0.76) (Table 4).

Table 4. Association between food exposures and illness among participants in a funeral-associated foodborne outbreak, Phayao Province, Thailand, June 2025.

Exposure (Food items)	Exposed		Unexposed		Crude RR (95% CI)	AOR (95% CI)
	Case (n, %)	Non-case (n, %)	Case (n, %)	Non-case (n, %)		
Red pork with rice	188 (73.2)	69 (26.9)	0 (0)	54 (100.0)	- [†]	-
Rice	174 (74.7)	59 (25.3)	3 (4.5)	64 (95.5)	16.68 (5.50–50.53)*	21.34 (3.19–142.75)
Red pork	156 (72.9)	58 (27.1)	21 (24.4)	65 (75.6)	2.99 (2.04–4.37)*	0.51 (0.16–1.63)
Chinese sausage	165 (76.0)	52 (24.0)	12 (14.5)	71 (85.5)	5.26 (3.10–8.92)*	2.33 (0.73–7.45)
Sauce	166 (75.5)	54 (24.5)	11 (13.8)	69 (86.2)	5.49 (3.15–9.55)*	1.36 (0.40–4.70)
Cucumber	145 (77.5)	42 (22.5)	32 (28.3)	81 (71.7)	2.74 (2.02–3.71)*	1.87 (0.77–4.56)
Boiled egg	162 (77.5)	47 (22.5)	15 (16.5)	76 (83.5)	4.70 (2.94–7.51)*	3.10 (1.08–8.92)
Coriander	98 (72.6)	37 (27.4)	79 (47.9)	86 (52.1)	1.52 (1.25–1.83)*	0.34 (0.16–0.76)
Drinking yogurt	59 (68.6)	27 (31.4)	129 (57.3)	96 (42.7)	1.20 (1.00–1.44)**	1.18 (0.58–2.38)
Drinking water (bottle)	132 (62.6)	79 (37.4)	56 (56.0)	44 (44.0)	1.12 (0.91–1.37)	-
Drinking water (cup)	29 (63.0)	17 (37.0)	159 (60.0)	106 (40.0)	1.05 (0.82–1.34)	-
Ice cream	69 (67.0)	34 (33.0)	119 (57.2)	89 (42.8)	1.17 (0.98–1.40)*	0.87 (0.45–1.69)

*Variables with *p*-values <0.20 in the univariable analysis. [†]Crude RR for red pork with rice could not be estimated because no cases occurred among unexposed participants, and this variable was not included in the multivariable logistic regression model because of complete separation.

[‡]The unrounded 95% confidence interval for drinking yogurt was 0.9974–1.4355 and therefore included the null value of 1.00. RR: risk ratio. AOR: adjusted odds ratio. CI: confidence interval.

Actions Taken

Enhanced surveillance for foodborne diseases was set up in the affected area through village health volunteers, subdistrict health promoting hospitals, and Dok Khamtai Hospital to detect and report further cases. Local authorities were engaged to register and oversee food vendors and to reinforce food safety and sanitation at communal events. The local water authority was engaged to monitor water quality, improve disinfection, and maintain residual chlorine levels to reduce further contamination.

Discussion

This outbreak of acute gastrointestinal illness among funeral attendees in Phayao Province was consistent with staphylococcal food poisoning linked to red pork with rice prepared by a local caterer. The short incubation period, the predominance of nausea and vomiting, and the detection of MSSA in vomitus, food, and a food handler's hand swab all supported this conclusion, and every case ate red pork with rice while no illness occurred among the unexposed. Rice and boiled egg also remained associated with illness, but because these items were prepared, handled, and packed together, this likely reflects contamination of several components of the same lunch boxes rather than separate sources. The inverse association observed for coriander was likely attributable to correlation among food components served together rather than a true protective effect.

The clinical and epidemiological evidence from this study favors staphylococcal food poisoning. Symptoms developed quickly, with a median incubation period of 4.0 hours (3.0–5.0), and nausea, vomiting, and abdominal pain predominated while fever and bloody or mucoid diarrhea were uncommon. This matches the usual presentation of the illness, an abrupt onset of nausea and vomiting within one to eight hours of ingesting preformed enterotoxins, often with cramps and occasional diarrhea and little or no fever.¹⁷ Laboratory testing found MSSA in vomitus from confirmed cases and in food from the lunch boxes and cuisine. Together, the presentation, incubation period, and microbiology point to *S. aureus* as the most likely agent.

Salmonella serotype O16, EPEC, and EAEC were found in a few specimens but were not considered the main cause. Non-typhoidal Salmonella usually causes diarrhea, fever, and abdominal pain with an incubation period of about 6 to 72 hours, unlike the nausea and vomiting with a median incubation of four hours seen here, and EPEC and EAEC typically cause diarrheal illness with longer incubation periods, and may also be present in asymptomatic people, especially on multiplex RT-PCR.^{18–21} Overall, the findings support staphylococcal food poisoning better than salmonellosis or diarrheagenic *E. coli* infection.

A food handler was the most plausible source of contamination. MSSA was found on a handler's hand swab, and inadequate hand hygiene practices,

particularly infrequent glove changes during food preparation and packing, could have caused transferal of the organism to cooked food. Residual free chlorine in the water used for preparation and handwashing was below the recommended level of 0.2 ppm.¹⁶ Although the water was not the source of this outbreak, keeping adequate chlorine in the supply can help control *S. aureus* and other organisms and support hygienic preparation, cleaning, and hand hygiene.²²

The long interval between preparation and consumption probably allowed the bacteria to grow and produce toxins. The environmental investigation found that preparation began in the early morning and continued for several hours, after which the cooked food was held at room temperature for about six hours during packing, transport, and distribution. This prolonged holding likely favored *S. aureus* growth and enterotoxin production.²³

Limitations

This investigation has several limitations. Whole genome sequencing was not done, thus the genetic relatedness of the isolates from vomitus, food, and the food handler could not be confirmed. Nasal swabs were not taken from handlers, which limited assessment of *S. aureus* carriage. RT-PCR for the enterotoxin genes SEA to SEE was negative, but the assay covered only the classical genes, thus other enterotoxin genes may have been involved.⁴ The multiplex RT-PCR panel did not include *S. aureus* and culture focused on enteric pathogens, thus some cases may not have been confirmed, and the number of specimens was limited. Environmental swabs from trays, knives, boards, ice containers, and water were not cultured, which restricted assessment of environmental contamination. Finally, not all attendees could be interviewed and people with mild symptoms may not have sought care, thus the true size of the outbreak may have been underestimated.

Public Health Recommendations

Food handlers should follow good hygiene and food preparation practices, including washing hands with soap and water for at least 20 seconds before handling food and before putting on new gloves.²⁴ Handlers with draining wounds, boils, or other infected skin lesions on the hands or wrists should not handle food directly unless the lesion is fully covered with an impermeable dressing and a single use glove is worn over it.²⁵ Gloves should be changed whenever they are torn, contaminated, or dirty, after interruptions, after handling raw meat, and before touching ready to eat

food, and at least every four hours of continuous use.^{25,26} Cooked food not served within two hours should be refrigerated promptly, and before packing or serving should be reheated to at least 74 °C and held at 60 °C or above until served, to limit bacterial growth and toxin production.^{23,24}

Ceremony hosts should use registered caterers and ensure adequate facilities for safe food preparation, storage, and handwashing. Local public health authorities should strengthen registration, inspection, and oversight of caterers serving large community events and provide regular food-safety training. The Provincial Waterworks Authority and relevant local agencies should routinely monitor and maintain residual free chlorine at recommended levels to support food preparation, equipment cleaning, and handwashing.

Conclusion

This funeral-associated outbreak of acute gastrointestinal illness in Phayao Province was most consistent with staphylococcal food poisoning linked to red pork with rice prepared by a local caterer. The rapid onset of predominantly nausea and vomiting, together with the detection of MSSA in patients, food, and a food handler's hand, supported *S. aureus* as the most likely causative agent. Prolonged storage of cooked food at room temperature and inadequate hand hygiene likely contributed to contamination and bacterial growth. Strengthening food-handler hygiene, temperature control, safe food storage, and oversight of caterers serving large community events is essential to prevent similar outbreaks.

Acknowledgements

The authors would like to thank the Office of Disease Prevention and Control Region 1 Chiang Mai; the Phayao Provincial Public Health Office; Dok Khamtai Hospital; Dok Khamtai Subdistrict Health Promoting Hospitals; and the village health volunteers in Dok Khamtai District for their cooperation, field support, and assistance during the outbreak investigation.

Author Contributions

Kogkawe Raruenroeng: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, writing—original draft, writing—review & editing. **Tamonwan Chatngoen:** Conceptualization, data curation, methodology, supervision, visualization, writing—review & editing. **Nuengruethai Srisong:** Data curation, formal analysis, investigation, project

administration. **Oraphan Kanyamee:** Data curation, visualization. **Thanatcha Narunattawattana:** Data curation. **Senee Bumrungsak:** Investigation, methodology. **Kotchamon Chamha:** Data curation, visualization. **Penpuk Yeimkosee:** Data curation. **Teerasak Chuxnum:** Conceptualization, methodology, supervision, writing—review & editing.

Ethical Approval

This investigation was conducted as part of a routine public health outbreak response; therefore, formal ethical approval was not required.

Informed Consent

Informed consent was not required for this investigation because data were collected as part of a routine public health outbreak investigation. All data were analyzed in an aggregated and anonymized manner, and no identifiable personal information was used in this study.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request (kogkawee.r@gmail.com).

Conflicts of Interest

The authors declare that they have no competing interests.

Funding Support

This investigation did not receive any specific funding.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this manuscript, ChatGPT-5 (OpenAI) and Claude (Anthropic) were used to assist with language editing and improving clarity. All content generated or suggested by these tools was critically reviewed, revised, and approved by the authors, who take full responsibility for the accuracy and integrity of the final manuscript.

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