Review Article

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It Will Flood Again: Infectious Disease Lessons from the 2025 Hat Yai Flood: A Narrative Review

Nonthanat Tongsengkee, M.D., Khachornsakdi Silpapojakul, M.D.

Department of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand.

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Abstract:

Floods are among the most frequent natural disasters globally and are recognized as drivers of infectious disease outbreaks. Knowledge of local endemic disease patterns may help anticipate post-flood risks. This narrative review examines how flooding may amplify these risks, drawing on the 2025 Hat Yai flood to identify clinical and public health preparedness priorities.

Potential mechanisms include pathogen mobilization, vector breeding, host susceptibility, and healthcare system disruption. During the 2025 flood, approximately 1,300 millimetres of rainfall were recorded, with floodwaters peaking between 22 and 25 November. Five of six major hospitals became inoperable, leaving Songklanagarind Hospital as the sole functioning facility for over 700,000 people. Routine surveillance data are presented descriptively. Reported leptospirosis cases peaked one to two weeks after the flood, while dengue, melioidosis, and diarrheal disease showed differing temporal patterns. Higher rates of carbapenem-resistant organism detection and central line-associated bloodstream infection were reported in November and December than in the preceding months, coinciding with staffing shortages, intensive care unit (ICU) expansion, and increased patient transfers. However, these temporal patterns do not establish causation. Surveillance disruption may have affected reporting completeness and accuracy, limiting interpretation.

Preparedness priorities informed by local endemic disease patterns include maintaining clinical awareness of flood-associated infections, preventing healthcare-associated infections, establishing contingency plans for healthcare disruption, and strengthening surveillance through automation. The 2025 Hat Yai experience underscores the need to integrate these priorities into preparedness for future floods.

Keywords: antimicrobial resistance, flood, infectious diseases, leptospirosis, melioidosis, nosocomial infection

This paper is part of the "Hat Yai Flooding 2025" collection

Contact: Nonthanat Tongsengkee, M.D.
Department of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand.
E-mail: tnonthanat@gmail.com

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Introduction

Floods are among the most frequent and consequential natural disasters worldwide, accounting for 35–40% of all natural disasters, and disproportionately affecting low- and middle-income countries in tropical and subtropical regions, placing substantial burdens on public health systems[1,2].

Hat Yai, the largest city in Songkhla Province and the commercial hub of Southern Thailand, exemplifies this burden. Situated in the humid tropics of the Malay Peninsula, Hat Yai has experienced recurrent severe flooding driven by monsoon rainfall, river overflow, and urban drainage constraints, with major events recorded in 1988, 2000, 2010–2011, and most recently in 2025[3]. The 2025 flood was notable not only for its scale but for its substantial disruption of the regional healthcare system, including the inundation of Hat Yai Hospital, one of the primary tertiary referral centers for the lower South[4].

Beyond their immediate physical impacts, floods are well recognized as drivers of infectious disease outbreaks[5,6]. Understanding how local endemic disease patterns and flood-related disruptions shape infectious disease risks may help guide clinical and public health preparedness in flood-prone settings.

We aim to discuss potential mechanisms through which flooding may amplify endemic infectious disease risks and identify preparedness priorities for future flood events in Southern Thailand. Community and hospital surveillance data are presented descriptively to illustrate local disease patterns and inform the discussion.

Review approach and data sources

This narrative review integrates published literature on flood-associated infectious diseases with routinely collected community and hospital surveillance data to contextualize the 2025 Hat Yai flood. Community surveillance data were obtained from the Department of Disease Control's Digital Disease Surveillance System (DDS) for Hat Yai District, covering the period from epidemiological week 36 of 2025 to week 10 of 2026. Hospital data were obtained from Songklanagarind Hospital and included operational indicators for November–December 2025, laboratory-based multidrug-resistant organism surveillance for May 2025–February 2026, and healthcare-associated infection surveillance for September–December 2025. Data are presented descriptively as reported case counts and rates over time; no inferential statistical analyses were performed. Surveillance methods and case definitions are described in the relevant sections below.

How floods amplify endemic diseases

This section discusses environmental, vector-related, host, and health-system factors that may link flooding to changes in endemic infectious disease risk.

Environmental mechanisms

Floodwaters act as vectors of concentration and redistribution. Pathogen-laden soil, animal feces, sewage, and organic debris are suspended and carried across wide areas, bringing infectious material into direct contact with human populations well beyond the original source[5]. Zoonotic pathogens such as *Leptospira interrogans*, which contaminates soil and water[7] and maintains its reservoir in rodents across agricultural and forest environments[8], are mobilized by floodwaters and carried into urban and peri-urban areas, transforming what is ordinarily a localized occupational hazard into a community-wide threat. A mathematical modeling study from Thailand demonstrated that the extent of the flooded area, more than rainfall itself, was the single most important parameter driving human leptospirosis transmission[9].

A similar environmental mechanism operates for *Burkholderia pseudomallei*, the causative agent of melioidosis. A ubiquitous soil organism in Southeast Asian agricultural soils[10], it is mobilized by floodwaters, increasing the risk of infection through percutaneous inoculation

via skin contact with contaminated water and mud, or through ingestion of contaminated water. In Songkhla and Phatthalung provinces, 76.4% of melioidosis cases occurred during the rainy season, and monthly case counts were positively correlated with rainfall. Higher case counts in 2016 and 2017 coincided with major flooding events[11].

Vector-mediated amplification

Residual standing water creates favorable conditions for Aedes and Anopheles mosquito breeding, directly amplifying dengue and malaria transmission. A scoping review of 131 studies spanning seven decades found that dengue incidence typically decreased in the first month after flooding, attributed to the flushing of *Aedes aegypti* container breeding sites, before increasing significantly over the subsequent one to four months[12].

Host susceptibility

Flood-exposed populations face increased susceptibility through multiple simultaneous pathways: breach of the skin barrier from wound contamination and prolonged water exposure, nutritional stress and physical exhaustion, psychological stress with associated immune modulation, and disruption of preventive health behaviors and access to medications[13]. These factors interact with the increased pathogen exposure described above to compound overall infection risk.

Social and systems disruption

Flooding disrupts the social and institutional systems that ordinarily contain infectious disease. Population displacement concentrates people in emergency shelters where overcrowding facilitates respiratory and enteric pathogen transmission[14]. Damage to water treatment and sewage infrastructure recreates fecal-oral transmission pathways for organisms ordinarily controlled by routine sanitation, including cholera, typhoid, hepatitis A and E, and norovirus[14]. Simultaneously, flooding damages or renders inaccessible healthcare facilities, interrupts medication supply chains, suspends vector-control and vaccination programs, and overwhelms surge capacity at hospitals that remain operational. Each of these disruptions independently elevates infectious disease risk[5]; their simultaneous occurrence in the acute flood period creates compound vulnerability. A large multicountry time-series study of six countries, including Thailand, confirmed that flood exposure was associated with significantly increased hospitalization risks across all major infectious disease categories, including waterborne, airborne, skin and mucous-membrane infections, persisting for up to 26 weeks after flooding[13].

Together, these mechanisms highlight the importance of considering the local endemic disease profile when assessing infectious disease risks after flooding. Table 1 summarizes selected outbreak reports following major flood events across different geographic settings, including Southern Thailand, illustrating how these risks vary by local context.

The 2025 Hat Yai flood

Flood characteristics and healthcare system disruption

Between 19 and 21 November 2025, Hat Yai received 630 millimetres of rainfall over 72 hours, including 335 mm on 21 November alone, the heaviest single-day rainfall in 300 years according to the Royal Irrigation Department. Total rainfall during the flood period reached approximately 1,300 mm, equivalent to 50% of the 2025 annual total (Figure 1). This volume surpassed the capacity of both the Khlong U-Taphao and Khlong Phuminat Damri drainage systems, which were overwhelmed by simultaneous inflow from three tributary basins[3]. Floodwaters peaked between 22 and 25 November, reaching depths of up to 2.5 metres in urban areas, with the city entering recovery only by 1 December 2025[20]. The flood killed at least 162 people

Table 1 Representative reports of infectious disease outbreaks following flood events across different geographic settings

Country, Author (year)	Flood event	Key finding
Thailand, Pradutkanchana (2003)[15]	Hat Yai urban flood, Nov 2000	N=180 febrile children: dengue 29.4%, leptospirosis 27.2%, leptospirosis–dengue co–infection in 2.8%
Thailand, Silpapojakul and Siripaitoon (2003)[a]	Hat Yai urban flood, Nov 2000	N=725 febrile adults at Songklanagarind Hospital: 26.1% confirmed leptospirosis
Thailand, Kaewrakmuk (2023)[11]	Songkhla/Phatthalung, Seasonal flooding and heavy rainfall, 2014–2020; major flood events 2016–2017	390 melioidosis cases (2014–2020); 76.4% occurred during rainy season; case counts spiked in 2016–2017 coinciding with two major flooding events; Pearson correlation with rainfall was strongest at 1–month lag.
India, Naik (1992)[16]	Kanpur flood contamination of municipal water supply, 1991	Over 79,000 cases of acute hepatitis E linked to river floodwater contamination of piped water supply; attack rate in mixed tap/river–water zones 7.8% vs 1.2% in groundwater–only zones (p–value<0.0001); bimodal epidemic peak traced to two contamination events
Mozambique, Kondo (2002)[17]	Catastrophic Limpopo River floods, Feb–Mar 2000 (700 deaths, 500,000 displaced)	Malaria cases in flood–displaced population increased 1.5–2–fold above pre–flood baseline; combined with cholera and diarrheal disease surge in displacement camps; vector breeding amplified by pervasive standing water across inundated lowlands
Kenya, Nguku (2010)[18]	El Niño–associated flooding, Dec 2006–May 2007	700 suspected cases of Rift Valley fever; 392 met probable or confirmed case definitions; 90 deaths (CFR 26.4% among probable/confirmed cases); cases clustered in flood–prone lowland areas.
USA (Louisiana & Mississippi) Caillouët (2008)[19]	Hurricane Katrina, Aug 2005	West Nile neuroinvasive disease: 2006 incidence >2–fold higher in hurricane–affected parishes vs mean 2002–2005 (Louisiana: 30⟶45 cases/year despite 28% population loss; Mississippi: 23⟶55 cases/year)

[a]=unpublished data, 2003, CFR=case fatality rate, N=number of patients

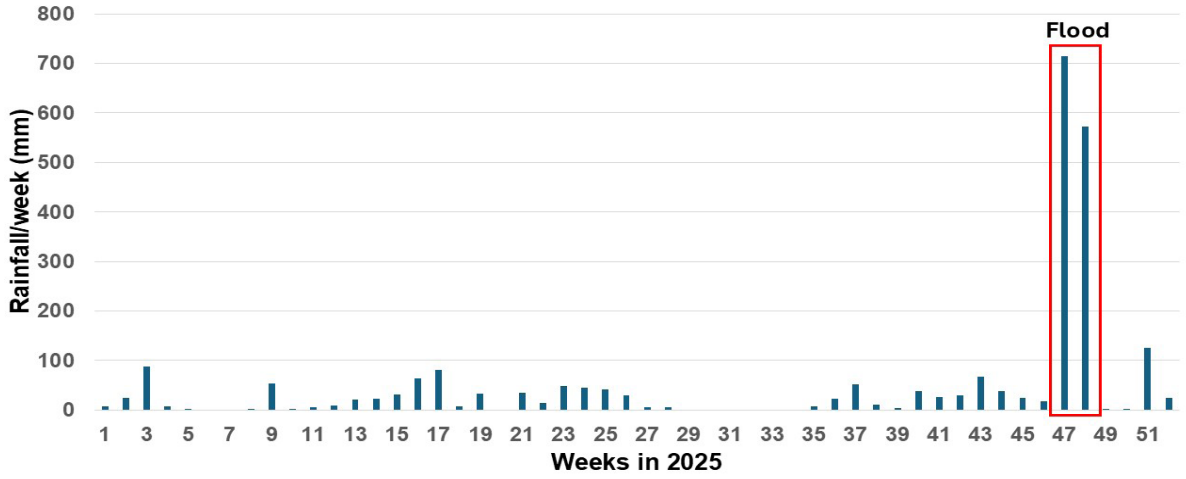


Figure 1 Weekly rainfall in Hat Yai, Songkhla Province, 2025[23], illustrating the discrete rainfall pulse of November 2025 relative to the annual baseline

across eight southern provinces, with Songkhla accounting for 126 deaths, and affected more than 3.8 million people in 1.4 million households. In Hat Yai District alone, over 226,000 households and 406,823 residents were affected, with over 8,000 vehicles submerged, electricity cut to over 176,000 accounts, and tap water restored to only 60% of the network by 1 December[20]. Of Hat Yai's six major hospitals, five became inoperable: Hat Yai Hospital, Bangkok Hospital Hat Yai, Rajyindee Hospital, Mittraphap Samakkhi Hospital, and Sikarin Hat Yai Hospital, together with over 200 private clinics, leaving Songklanagarind Hospital as the sole functioning facility for a population of over 700,000[21]. Hat Yai Hospital sustained floodwaters exceeding 3 metres for five continuous days, and approximately 90 critically ill patients required evacuation, with the first group airlifted by helicopter due to a critical shortage of medical oxygen[22].

Impact on community-based infectious diseases

In the DDS[24], participating facilities submit case reports daily through the Report 506 system using ICD-10 diagnosis codes, without distinguishing between clinically suspected and laboratory-confirmed cases. Data are aggregated and released weekly. Figure 2 shows the reported weekly case counts in Hat Yai District for diseases selected for their potential relevance to flooding.

Leptospirosis

Leptospirosis cases increased from the first week following the flood, peaking in the second week, consistent with the median presentation time of ten days observed after the 2000 Hat Yai flood (Silpapojakul K and Siripaitoon P, unpublished data, 2003). A total of 255 cases were recorded during weeks 48 to 52 of 2025, with three deaths reported (case fatality rate 1.2%).

Case numbers remained above the pre-flood baseline through weeks 1 to 4 of 2026, despite cessation of rainfall and the fact that the incubation period of leptospirosis is typically 5–14 days, with a range of 2–30 days[25]. One possible explanation for the prolonged elevation in reported cases is continued exposure to contaminated soil during house-cleaning. Delays in restoring the tap water supply may have postponed cleaning activities, extending potential exposure beyond the period of active flooding. Clinicians should therefore elicit a history of flood cleanup activities, not only direct floodwater exposure, when evaluating febrile patients in the post-flood period.

Accordingly, for individuals in whom doxycycline chemoprophylaxis is indicated[26], its duration should account for ongoing exposure during house-cleaning. We suggest continuing enhanced surveillance for at least one month after the last potential exposure, including exposure during cleanup, based on the reported maximum incubation period of 30 days[25], rather than using the date floodwaters recede as the starting point.

Melioidosis

Reported melioidosis case numbers increased relative to the pre-flood baseline; however, reporting was incomplete, with laboratory-confirmed cases missing from the DDS, as described in the following section.

Mosquito-borne diseases

Reported dengue cases increased modestly following the flood but without the sharp early peak observed in leptospirosis, a pattern that may reflect differences in transmission biology. Dengue cases may peak one to two months after a flood event, potentially reflecting the time required for *Aedes aegypti* populations to expand in residual standing water. Delayed increases in dengue following flooding have been described in a scoping review of 131 studies spanning seven decades[12]. Zika virus infection followed a similar temporal pattern, though case numbers were too low to draw meaningful conclusions.

A key determinant of mosquito-borne disease risk in the post-flood period is the speed of drainage infrastructure restoration. In Hat Yai, floodwater drainage

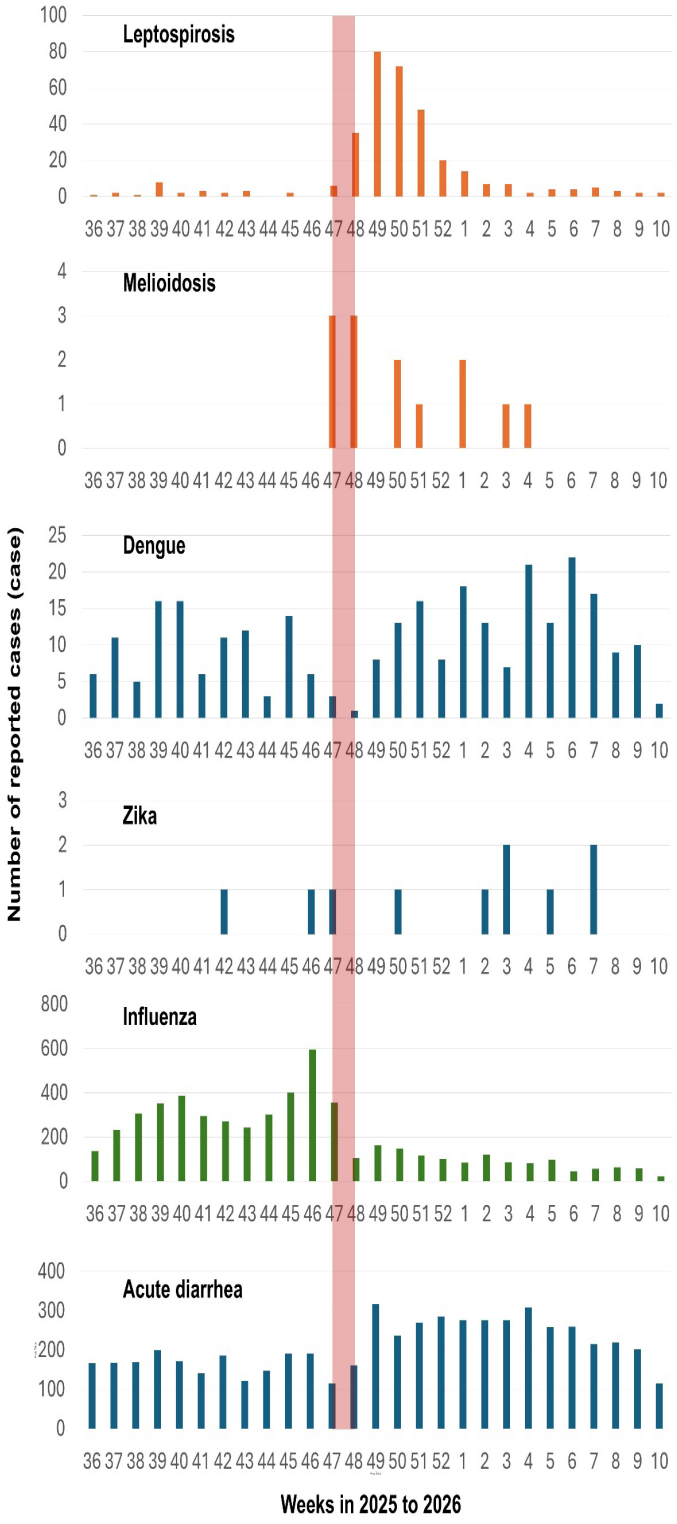


Figure 2 Weekly epidemic curves of notifiable infectious diseases in Hat Yai District, Songkhla Province, derived from the Digital Disease Surveillance System (DDS), weeks 36/2025 to 10/2026. The shaded area (weeks 47 to 48) indicates the period of active flooding

channels remained blocked by debris and mud, with some covers dislodged and left open through February 2026, as documented in Figure 3. These conditions may have provided persistent mosquito breeding habitat well beyond the flood itself. We therefore suggest that the duration of enhanced mosquito-borne disease surveillance should be guided by local vector control progress rather than a fixed post-flood interval; in this event, active entomological surveillance and targeted larval control could have been considered through at least the first quarter of 2026.

Acute diarrhea/food poisoning

Reported cases of acute diarrhea and food poisoning increased immediately following the flood, concurrent with the onset of flooding rather than lagging behind it, potentially reflecting disruption of water treatment and sanitation infrastructure. The Hat Yai water treatment plant was inundated, cutting the piped water supply across the city[27]. Unable to cook at home for one to two weeks, residents depended on donated meals distributed from centralized preparation sites, potentially introducing additional food safety risks from extended transit times between preparation and consumption[28].

Minimizing the interval between food preparation and consumption is therefore a critical logistical consideration in flood relief operations. Decentralized food preparation at multiple sites closer to the affected populations, combined with cold chain maintenance where feasible[28], may help reduce this risk in future events.

Wound infections

Trauma-associated wound infections represent a component of the flood-related infectious disease burden that the 2025 event did not systematically capture. Experience from the 2004 tsunami in Southern Thailand demonstrated that wound infections occurred in more than



Figure 3 Drainage infrastructure in Hat Yai following the November 2025 flood, February 2026. (A) Uncovered drainage chamber with debris accumulation, creating open stagnant water habitat suitable for Aedes mosquito breeding. (B) Displaced drainage cover with exposed grating, illustrating incomplete restoration of drainage infrastructure three months after the flood event.

66% of traumatic wounds, with polymicrobial Gram-negative flora including *Aeromonas species*, *Klebsiella pneumoniae*, and *Escherichia coli* predominating, and *Burkholderia pseudomallei* identified as an additional pathogen of concern in this region[29,30]. Although the hydrodynamic mechanisms of tsunami and flood injuries differ, the shared characteristic of wound contamination with soil, sewage, and organic debris suggests that these microbiological findings may be relevant to flood-related wound infections. No surveillance protocol for trauma-associated wound infections was activated during the 2025 Hat Yai flood, leaving this burden unquantified. Future preparedness plans should include wound infection surveillance as a standard component of post-flood response. Findings from this surveillance could help inform empirical antibiotic selection, with attention to Gram-negative bacilli and the potential relevance of *B. pseudomallei* in this endemic setting.

Influenza

Influenza was the most frequently reported infectious disease in Hat Yai before the flood occurred. During the acute flood period, reported case numbers declined sharply, possibly reflecting two concurrent factors: reduced person-to-person contact as residents were confined to their homes and under-reporting as the surveillance system was disrupted and access to the sole functioning hospital was severely limited. Case numbers rebounded within one to two weeks (Figure 2). Overcrowding in emergency shelters[31], including the Songklanagarind Hospital campus, which housed more than 8,000 flood evacuees[32], and the convergence of rescue personnel arriving from across the country[33] may have contributed to this increase. Reported post-flood case counts did not reach the peak recorded one week before the flood and declined gradually in parallel with the national trend[24].

This pattern carries important clinical and preparedness implications. A temporary decline in reported influenza cases during flooding should not be interpreted as evidence that community transmission has ceased. Clinicians evaluating febrile patients in the post-flood period must maintain influenza in the differential diagnosis alongside flood-amplified diseases such as leptospirosis and dengue. From a public health standpoint, shelter design should incorporate designated isolation areas for febrile residents, and respiratory-precaution supplies, including masks and alcohol-based hand rub[34], should be distributed alongside food and clothing as a standard component of relief operations.

Surveillance during and after the flood

The completeness and accuracy of routine surveillance may have been compromised during the acute crisis period. With five of six Hat Yai hospitals inoperable, clinical resources were concentrated on acute care, potentially limiting the capacity of clinicians and surveillance officers to ensure accurate ICD-10 coding and data verification. Report 506 captures both clinically suspected and laboratory-confirmed cases without distinction, and final diagnoses may not have been updated after submission when confirmatory testing was deferred or not performed. These conditions could have contributed to both the under-reporting and over-reporting of specific diagnoses, limiting the reliability of surveillance data when they were most needed.

Evidence of under-reporting is illustrated by melioidosis: 11 cases were microbiologically confirmed at Songklanagarind Hospital during weeks 49 to 52 of 2025, yet none had a corresponding entry in the DDS. Given the high case fatality rate of melioidosis in this region[11], the omission of these confirmed cases highlights a surveillance gap that could affect the assessment of disease burden and response priorities.

Resilient surveillance under crisis conditions requires structural solutions rather than reliance on individual effort. Automated ICD-10 code extraction from electronic medical records and direct laboratory-to-surveillance system linkage

may reduce manual reporting demands and improve reporting completeness. AI-assisted coding verification may also support coding accuracy[35], although its performance in disaster-related surveillance requires evaluation. These capabilities should be developed and tested before the next flood, not improvised during it.

Impact on nosocomial infections

Previously described risks of healthcare-associated infections (HAIs) following direct hospital inundation by blackwater include environmental mold contamination, Legionella proliferation in compromised water systems, and nontuberculous mycobacterial pseudo-outbreaks[36]. The 2025 Hat Yai flood presented a different context: five of six Hat Yai hospitals became inoperable, with 69 emergency air transfers (documented in hospital records) from Hat Yai Hospital to Songklanagarind Hospital alone.

Songklanagarind Hospital absorbed both the direct transfer burden and a subsequent surge in ambulatory patients as floodwaters receded and residents were able to leave their homes. As illustrated in Figure 4, daily emergency department visits rose sharply in the days following the onset of flooding, peaking at 417 visits on 27 November 2025, more than 3.5 times the pre-flood baseline. Intensive care unit (ICU) bed occupancy reached 100% on six consecutive days (27 November to 2 December), and flood-expanded beds were activated, at their peak providing additional capacity equivalent to 43.75% of normal ICU capacity. Compounding this demand, nursing staff shortages were most severe at the onset of the crisis as staff were unable to reach the hospital during active flooding, with mean shortfalls across all shifts reaching 18.3% and 20.6% on 25 and 26 November, respectively. Nursing students were deployed to supplement ward staffing at a rate of 35 to 50 individuals per day throughout the peak period.

Multidrug-resistant organisms (MDROs) were monitored throughout the flood period through an automated surveillance programme directly linked to laboratory reports. Only the first detection per admission was counted, without distinguishing between infection and colonization. Cases were classified by specimen collection date as community-onset if specimens were collected on admission days 1–3

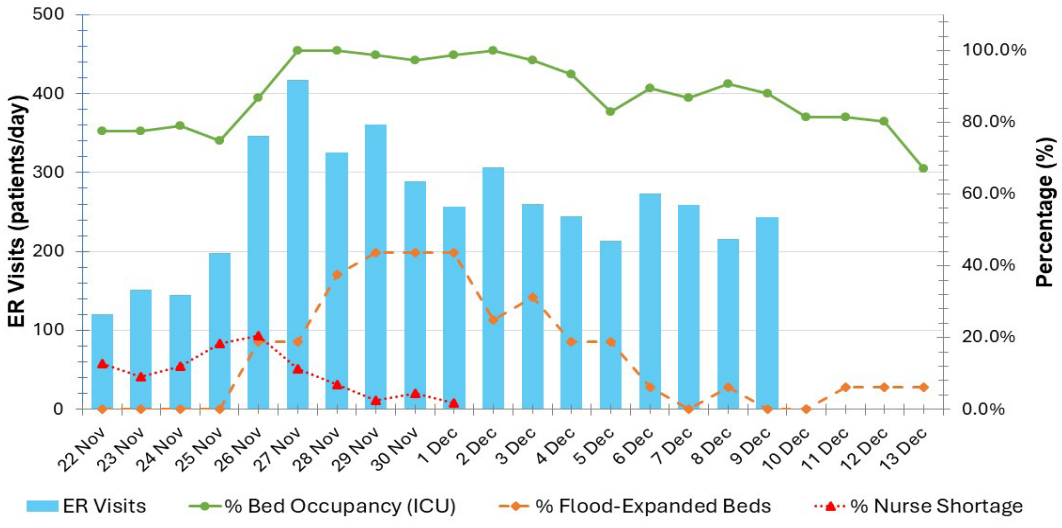


Figure 4 Daily emergency department visits, intensive care unit (ICU) bed occupancy, flood-expanded bed activation, and nursing staff shortfall at Songklanagarind Hospital, November to December 2025

and hospital-onset if specimens were collected after day 3, with the admission date counted as day 1. These categories indicate the timing of detection rather than the confirmed setting of acquisition. Detection rates were expressed per 1,000 patient-days.

Carbapenem-resistant *Acinetobacter baumannii* (CRAB) and carbapenem-resistant *Pseudomonas aeruginosa* (CR-PsA) are the predominant MDROs at Songklanagarind Hospital, collectively accounting for 70–80% of all MDRO isolates. As shown in Figure 5, reported detection rates for both organisms were higher during and after the flood than during the six-month pre-flood period. The CRAB detection rate peaked in December 2025 at 2.0 per 1,000 patient-days before declining in January 2026, while the CR-PsA detection rate peaked earlier in November 2025 before following a similar downward trajectory.

Patterns by onset setting provide context for this increase. Community-onset MDRO detection, including detection among transferred patients, was highest in November, corresponding to the period of peak patient transfer from flood-affected hospitals. Similar MDRO profiles have been reported across hospitals in Thailand[37]. Hospital-onset MDRO detection peaked in the subsequent month, a pattern that may be consistent with secondary transmission from colonized transferred patients to other inpatients. However, the timing of detection alone cannot establish transmission or the setting of acquisition. Broader-spectrum empirical antibiotic use during the crisis period, potentially prompted by incomplete patient histories and limited capacity for thorough clinical assessment under surge conditions, may also have contributed to antibiotic selection pressure[38].

Central line-associated bloodstream infection (CLABSI), ventilator-associated pneumonia (VAP), and catheter-associated urinary tract infection (CAUTI) were identified using NHSN surveillance definitions[39] through manual review by the hospital's infection control team. Rates were expressed per 1,000 corresponding device-days.

Reported VAP and CAUTI rates at Songklanagarind Hospital showed no clear rise during the flood period (Figure 6), remaining broadly comparable to pre-flood levels despite November representing the peak of patient surge, ICU overcrowding, and staffing shortages. These conditions might be expected to increase HAI risk[36]. One possible explanation for the observed pattern is under-

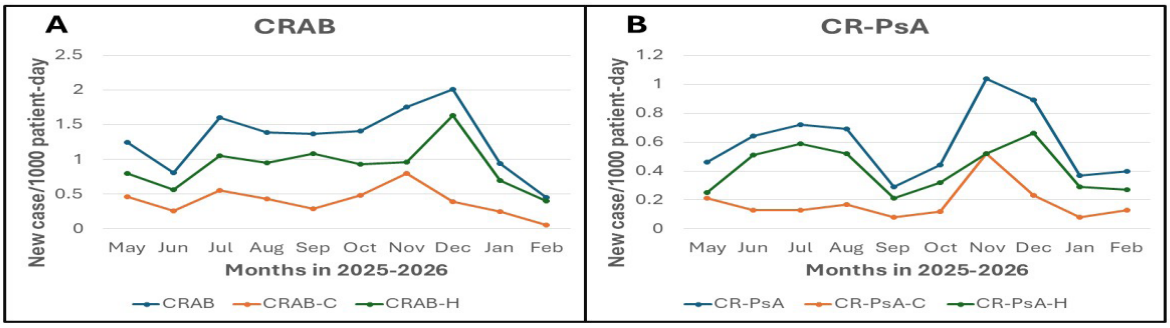
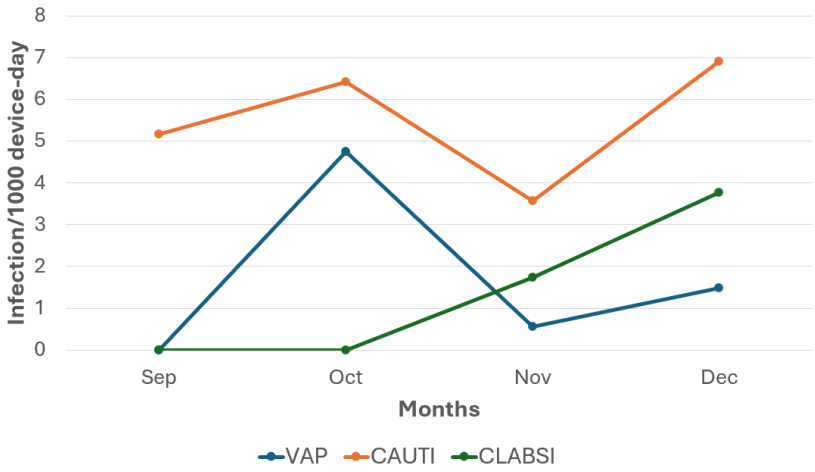


Figure 5 Incidence density of carbapenem-resistant *Acinetobacter baumannii* (CRAB) and carbapenem-resistant *Pseudomonas aeruginosa* (CR-PsA) at Songklanagarind Hospital, May 2025 to February 2026, stratified by onset setting. (A) CRAB incidence density by total (CRAB), community-onset (CRAB-C), and hospital-onset (CRAB-H). (B) CR-PsA incidence density by total (CR-PsA), community-onset (CR-PsA-C), and hospital-onset (CR-PsA-H). Community-onset includes patients transferred from other facilities



CLABSI=central line-associated bloodstream infection, VAP=ventilator-associated pneumonia, CAUTI=catheter-associated urinary tract infection

Figure 6 Healthcare-associated infection rates at Songklanagarind Hospital by infection type (CLABSI, VAP, and CAUTI), expressed as infections per 1,000 device-days, September 2025 to December 2025

ascertainment during the acute crisis period: nosocomial infection surveillance at this institution relies on a dedicated manual review system conducted by only six infection control nurses, and this team was subject to the same flood-related operational constraints as other hospital staff. These constraints may have reduced the completeness and accuracy of case ascertainment as patient volumes increased, although the extent of any under-ascertainment was not assessed.

In contrast to VAP and CAUTI, reported CLABSI rates increased during and after the flood. No cases were reported in September or October, whereas rates reached 1.74 infections per 1,000 central line-days in November and 3.76 in December (Figure 6). CLABSI surveillance has a clear laboratory trigger in the form of a positive blood culture, followed by assessment of central line eligibility and exclusion of secondary bloodstream infection, according to NHSN criteria[39]. This may facilitate case identification during periods of operational disruption, although whether CLABSI ascertainment was less affected than VAP or CAUTI ascertainment in this setting was not evaluated. Potential contributing factors to the observed increase included the possibility that transferred patients had central lines inserted under crisis conditions, expansion of ICU capacity into areas not configured for routine central line care, and nursing shortfalls of 18–21% that may have compromised adherence to daily line-care bundles. However, the contribution of these factors was not directly assessed.

The observed increases in reported MDRO detection and CLABSI rates are consistent with the previously described links between healthcare overcrowding, resource constraints, and hospital-acquired infection risk[36]. These observations highlight the need to maintain HAI prevention measures during flood-related patient surges and strengthen surveillance through automated identification of potential cases and reporting support, with infection control team review.

Preparing for future floods in Southern Thailand

Southern Thailand faces recurrent flood risk. The infectious disease risks that follow can be partly anticipated from the local endemic disease profile, including leptospirosis, melioidosis, dengue, and diarrheal illness associated with disrupted sanitation. Preparedness should therefore be continuous, not reactive.

Pre-flood priorities include maintaining clinical familiarity with flood-associated diagnoses year-round, sustained urban rodent control, hospital load-sharing agreements, pre-positioned critical supplies at facilities outside the flood-prone zone, and pre-exercised patient transfer protocols. Equally important is awareness of diseases already active at the time of flooding. In 2025, influenza was already circulating before the flood occurred; clinicians evaluating febrile patients in the post-flood period must therefore maintain an expanded differential that includes pre-existing community pathogens alongside diseases potentially amplified by flooding.

During and after flooding, disease risks may evolve over time. In the 2025 Hat Yai flood, reported diarrheal illness increased within days, while leptospirosis cases peaked one to two weeks after flooding, with house-cleaning representing a potential additional exposure window. For individuals in whom doxycycline chemoprophylaxis is indicated, its duration should account for ongoing exposure during cleanup. We suggest continuing enhanced leptospirosis surveillance for at least one month after the last potential exposure, based on the reported maximum incubation period of 30 days. Mosquito-borne disease surveillance and targeted larval control should be guided by local conditions and vector control progress, with continued monitoring over the following months where risks persist. Wound infection surveillance should be activated from the first day of flooding and maintained through the period of active debris cleanup.

An important preparedness gap is surveillance system fragility. The automated MDRO surveillance system at Songklanagarind Hospital illustrates the potential value of direct laboratory linkage in supporting reporting during healthcare disruption; similar approaches could be adapted for community disease surveillance before the next flood. At hospitals receiving increased patient volumes, pre-positioned infection control supplies, risk-based MDRO screening of transferred patients with cohort isolation capacity[40], and nursing surge plans with dedicated infection control responsibilities should be included in preparedness planning.

Limitations

1. As this narrative review used surveillance data for descriptive illustration, no inferential statistical analyses were performed. Causal effects of flooding could not be established, and seasonality and other potential confounders were not assessed.

2. Disrupted community surveillance and diagnostic misclassification may have resulted in both under- and over-reporting.

3. Hospital surveillance may have been affected by changes in patient populations, diagnostic testing, documentation, and staff availability.

4. Laboratory-based MDRO surveillance did not distinguish infection from colonization or capture untested cases; onset timing did not establish where acquisition occurred.

5. Selected diseases and single-hospital data may not reflect the full flood-related infectious disease burden or be generalizable to other settings.

Conclusion

The 2025 Hat Yai flood highlighted risks from diseases already present in the region, including leptospirosis, melioidosis, dengue, and healthcare-associated infections. Knowledge of the local endemic disease profile provides a basis for preparation.

Reliable surveillance is a prerequisite for an effective response. Without accurate, timely data, the scale and composition of an outbreak are difficult to assess, responses are harder to calibrate, and post-event analysis to improve future preparedness is limited. The 2025 experience highlighted the vulnerability of manual surveillance systems under crisis conditions, precisely when their output was most needed. Strengthening surveillance through automation should therefore be a preparedness priority.

The flood also highlighted the need for functional protocols for major healthcare disruption. When five of six hospitals became inoperable simultaneously, critical decisions about patient transfer, oxygen supply, surge capacity, and infection control had to be made under crisis conditions. A region that concentrates its hospital infrastructure within a flood-prone basin requires pre-established protocols for this scenario, rather than relying solely on responses developed in real time.

Hat Yai will flood again. Many of the diseases, diagnostic challenges, and institutional pressures that may follow can be anticipated. The question is whether the health system will meet the next event with the surveillance infrastructure, clinical preparedness, and institutional protocols needed to respond effectively.

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Conflict of interest

There are no potential conflicts of interest to declare.

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