Review Article

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Climate Change and Multisystem Disruption of Diabetes Care: A Climate–Health System

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Abstract:

Climate change increases the need for health systems to prepare for extreme weather events that threaten continuity of chronic disease care. This narrative review examines the clinical and health system implications of flooding for diabetes care in Southeast Asia, using the November 2025 Hat Yai floods in southern Thailand as a case study. We synthesized evidence from disaster medicine literature, regional epidemiological studies, and current diabetes guidance. Floods interrupt safe water, food, electricity, transport, and health services, while dehydration, infection, and preexisting cardiovascular and kidney disease increase susceptibility to acute multisystem decompensation. Modern cardiometabolic therapies add context-dependent hazards, including euglycemic diabetic ketoacidosis with sodium–glucose cotransporter-2 inhibitors and metformin-associated lactic acidosis during acute kidney injury, and loss of insulin refrigeration and medicine supplies threatens glycemic stability. We propose a climate–health system framework that links these hazards, with practical sick-day rules, insulin-storage measures, and roles for patients, health-care teams, and health systems across the disaster cycle. Integrating these measures into routine diabetes care and national health adaptation strategies may reduce preventable complications, although flood-specific intervention evidence remains limited.

Keywords: climate change, diabetes mellitus, disaster preparedness, floods, health systems, sick-day rules

This paper is part of the “Hat Yai Flooding 2025” collection
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Introduction

Climate change threatens health through environmental hazards and disruption of water security, food systems, shelter, and healthcare delivery[1-3]. Flooding illustrates these interconnected risks[4], and a satellite-based analysis estimated that the proportion of the global population exposed to flooding increased by 20-24% between 2000 and 2015[5]. With additional warming, the consequences for flooding will also depend on factors such as drainage, land use, settlement patterns, and preparedness[5]. These risks make continuity of chronic disease care an essential component of climate adaptation.

Diabetes management depends on uninterrupted access to medicines, protected insulin storage, glucose monitoring, predictable food and safe water, and timely clinical assessment during intercurrent illness[6]. Flooding can compromise these essential requirements simultaneously. Patients who depend on insulin are particularly vulnerable to treatment interruption, which can rapidly precipitate diabetic ketoacidosis (DKA). Metformin, sodium-glucose cotransporter-2 (SGLT2) inhibitors, renin-angiotensin system (RAS) blockers, and diuretics, the therapies that underpin modern cardiometabolic-renal protection, are intended for use in a physiological steady state. However, several can become hazardous during dehydration, fasting, and acute kidney injury (AKI) unless temporarily adjusted[7]. Diabetes vulnerability during flooding therefore reflects the interaction between physiological susceptibility and the capacity of health systems to sustain treatment[8,9].

These challenges are relevant to Southeast Asia (SEA), where flood exposure coexists with a substantial diabetes burden[10,11]. In 2024, the International Diabetes Federation (IDF) estimated that 106.9 million adults aged 20 to 79 years were living with diabetes in the IDF South-East Asia Region (mainly South Asia) and 215.4 million in the IDF Western Pacific Region, which includes Thailand and most ASEAN countries[11]. In Thailand, the National Health Examination Survey reported an age-adjusted diabetes prevalence of 9.9% among adults aged 20 years or older in 2014[12]. The need to maintain treatment across large populations makes continuity of diabetes services an important consideration in disaster preparedness.

Floods affect diabetes through multiple pathways. In a time-series study of 300 million hospitalizations across 747 communities in eight countries and territories, including Thailand, flood exposure was associated with increased more hospitalizations for up to 210 days. Diabetes had the highest cause-specific relative risk (1.61; 95% confidence interval [CI] 1.39-1.86)[13]. Disasters can interrupt medication supplies, transport, power, and health services[14-16], increase emergency visits by people with diabetes[17], and worsen glycemic control in insulin-treated patients[18]. However, much of this evidence comes from high-income countries and from hurricanes and earthquakes[16,19,20]. Evidence from urban floods in middle-income SEA countries such as Thailand remains limited.

In late November 2025, floods in Hat Yai, a major urban center in Southern Thailand, disrupted essential healthcare services, including the suspension of services at 11 of the 20 dialysis centers in Songkhla Province[22]. A separate case series from Songklanagarind Hospital described 12 patients with severe metformin-associated lactic acidosis (MALA) during the floods, all requiring renal replacement therapy[21].

A rapid attribution study of the Malacca Strait region identified increasing intensity of extreme rainfall in observational records, but limitations and inconsistencies in climate model results prevented quantification of the contribution of human-induced climate change[23]. This review synthesizes evidence on the Hat Yai floods and international disaster studies to examine acute metabolic complications, medication and technology safety, and continuity of diabetes care. It distinguishes published observations from proposed adaptations and presents a framework linking clinical risks to intervention points (Figure 1), multidisciplinary responsibilities, and patient education. Its

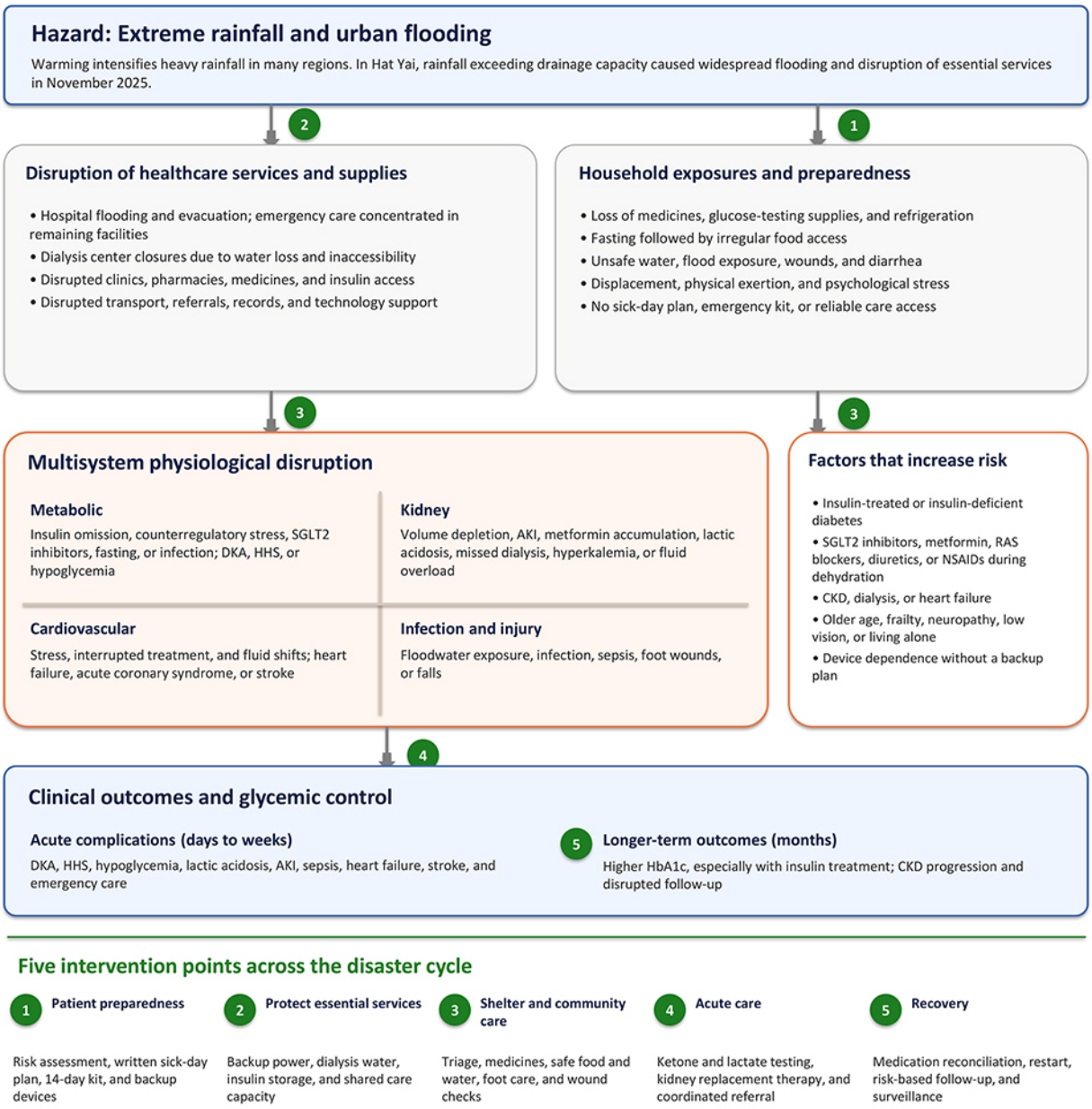


Figure 1 Climate–health–system framework for the multisystem disruption of diabetes care during floods, with intervention points. A hazard acts through the disruption of medical services and supply and through household exposures modified by patient readiness, on a physiology already altered by diabetes and its treatment, producing acute complications within days to weeks and a deterioration of glycemic control over months. Green numbers indicate the locations of the five intervention points, as shown in Tables 3 and 5 and Panels 2 and 3. Rainfall values are from the Thai Meteorological Department; pathways are synthesized from the evidence reviewed[22,25–28].

focus is the organization of diabetes care under extreme-weather conditions, without attributing the individual flood to anthropogenic climate change.

Review approach and literature search

This narrative review informed by the Scale for the Assessment of Narrative Review Articles (SANRA)[24]. PubMed and selected institutional websites were searched for publications available through October 13, 2026. Search terms addressed flooding and other natural disasters, diabetes-related complications, medication safety, healthcare disruption, disaster preparedness, and recovery. Additional sources included publications and reports from the World Health Organization, the IDF, the Thai Meteorological Department, World Weather Attribution, and other relevant public health organizations.

We prioritized population-based studies, systematic reviews, clinical guidelines, and reports directly relevant to the November 2025 Hat Yai floods. Evidence from other natural disasters was included when it addressed comparable disruptions to diabetes care. Because this was a narrative review, no formal risk-of-bias assessment or meta-analysis was undertaken.

Evidence classification

We distinguished three evidence types: published observations, established clinical guidance and proposed adaptations for flood-prone settings. Published reports of the Hat Yai floods were used to describe documented healthcare disruption and clinical consequences. International studies provided comparative evidence, but their effect estimates were not assumed to apply directly to Hat Yai. The lessons presented in Panel 1 reflect system-level observations and practical considerations rather than findings from a formal empirical study.

Ethics

There was no need for ethics approval. This review combines publicly accessible reports and peer-reviewed papers. No medical records or personal patient information were reported, and no individuals were contacted.

Evidence synthesis and clinical implications

The November 2025 Hat Yai floods: documented hazard, disruption, and severity

Hazard. The Thai Meteorological Department recorded 370.2 mm of rain in one day at its Hat Yai station on November 21, 2025, a record for a station with data since 1973 (the previous maximum was 219.4 mm, in 2010). Preliminary data showed more than 1,000 mm over November 21–25 and a November total of 1,328.8 mm, exceeding the previous November record of 926.9 mm set in 2000[29].

Population and services. Across 12 southern provinces, nearly 3 million people and more than 1.15 million households were affected[30]; at least 162 deaths had been reported within days of onset. Hat Yai Hospital, the regional public hospital, was inundated, and critically ill patients were initially evacuated by air. Reports also described delayed evacuation orders linked to failures of municipal communication. Songklanagarind Hospital remained the principal functioning major hospital in the city, and a university campus became an unplanned shelter that grew from about 2,000 to about 7,000 occupants and provided triage, medication continuity, referral, and chronic-disease care. A province-wide survey found that 11 of 20 dialysis centers in Songkhla ceased operating during the peak flood period because of municipal water loss, physical inaccessibility, and associated failures[22]. Pharmaceutical demand occurred in two phases: acute-care items in the first 10 days, then continuity of treatment for noncommunicable diseases, mental health, and prolonged anti-infective therapy.

Clinical severity. A case series from Hat Yai described 12 patients with severe MALA presenting during the floods. Healthcare disruption was accompanied by

Panel 1 Lessons from the 2025 Hat Yai floods: priorities for diabetes care in flood-prone cities

System-level lessons informed by published reports and the authors' experience during the flood response. Proposed actions are based on existing clinical guidance and require local adaptation.

1. Maintain essential diabetes and emergency services. Hospital closures concentrated acute care at the remaining facilities. Disaster plans should ensure continuity of emergency diabetes care, medication supplies, referrals, and dialysis services, with capacity for diabetic ketoacidosis (DKA), hyperosmolar hyperglycemic state (HHS), acute kidney injury (AKI), and other medical emergencies.
2. Identify and prioritize high-risk patients. Patients requiring insulin, dialysis, or caregiver assistance, and those with recurrent severe hypoglycemia, DKA, advanced kidney disease, or heart failure, may need additional support. Individualized plans should address medication access, glucose monitoring, backup insulin delivery, and early clinical assessment.
3. Prevent medication-related complications during acute illness. Dehydration, reduced oral intake, and AKI may require temporary withholding of metformin and sodium-glucose cotransporter-2 (SGLT2) inhibitors. Renin-angiotensin system blockers, diuretics, and other cardiometabolic treatments require individualized assessment. Basal insulin must be continued in insulin-deficient diabetes, with dose adjustment as clinically indicated. Every medication hold should include a restart plan.
4. Provide diabetes care in evacuation shelters. Shelters should have access to insulin and other essential medicines, glucose monitoring, hypoglycemia treatment, safe drinking water, and appropriate food. Staff should identify patients requiring ketone testing, urgent medical assessment, or dialysis and coordinate timely referrals.
5. Prevent infection and recognize acute complications. Floodwater exposure, delayed wound care, and limited access to safe water increase infection risks. Patients should receive guidance on foot protection, wound care, and warning signs of infection. Emergency pathways should also address severe metabolic complications, acute coronary syndromes, stroke, and acute limb ischemia.
6. Strengthen patient preparedness and communication. Before flood season, patients should receive a written sick-day and medication restart plan, an emergency supply checklist, and instructions for insulin storage and replacement. Backup communication channels should connect patients, shelters, pharmacies, and healthcare teams when routine services are disrupted.
7. Ensure continuity of care during recovery. Follow-up should address glycemic control, kidney function, medication reconciliation and reinitiation, replacement of lost supplies, and psychological distress. Patients with recent acute complications or interrupted essential treatment should be prioritized for reassessment.

poor oral intake, dehydration, and delayed presentation, and many patients had continued metformin despite acute illness. Blood pH ranged from 6.78 to 7.31, and peak lactate reached 24 mmol/L; all patients had advanced AKI and required emergency renal replacement therapy, and all survived to discharge[21]. WHO surveillance recorded 341 leptospirosis cases in Songkhla in epidemiological weeks 48–50 of 2025, the highest provincial count, and 324 cases nationally in week 49 alone, compared with 129 in the same week of 2024[30]. Prolonged involuntary fasting followed by abrupt refeeding with carbohydrate-dominant relief food was reported across the affected population.

Table 1 summarizes these documented impacts and their clinical implications. These reports illustrate the severity and concurrent metabolic, kidney, infectious, and service-related consequences. Panel 1 summarizes clinical and health system priorities informed by published reports and the experience from Hat Yai flooding.

Evidence from floods and other disasters

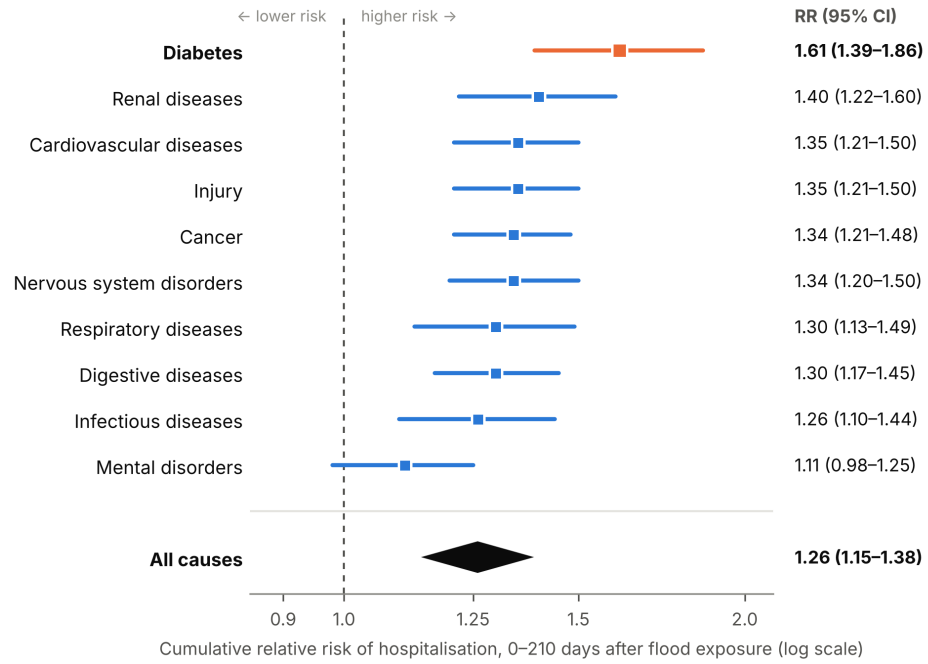
Population-level risk. The strongest evidence comes from multicountry time-series studies. In 747 communities in Australia, Brazil, Canada, Chile, New Zealand, Taiwan, Thailand, and Vietnam from 2000–2019, hospitalization risk increased after flood exposure and persisted for up to 210 days; of the ten cause-specific outcomes, diabetes had the largest cumulative relative risk (1.61; 95% CI 1.39–1.86), followed by renal disease (1.40; 95% CI 1.22–1.60), cardiovascular disease and injury (each 1.35; 95% CI 1.21–1.50), and infectious disease (1.26; 95% CI 1.10–1.44) (Figure 2)[13]. The Thailand-specific estimates were not statistically significant for these outcomes, so the pooled results support concern about prolonged morbidity but should not be applied as local effect sizes. In 761 communities in 35 countries or territories, flood exposure raised all-cause, cardiovascular, and respiratory mortality for up to 60 days (50 days for cardiovascular mortality), with stronger associations in low-income settings and in populations with more older people[31]. Among 11.8 million U.S. Medicare beneficiaries, flood exposure was associated with increases of 4.8% in emergency department visits and 7.4% in unplanned hospitalizations[32]. In a six-country study that included Thailand, infectious disease hospitalizations remained elevated for up to 26 weeks after floods[33].

Mortality. After Hurricanes Katrina and Rita, older people with diabetes in heavily affected counties had nearly 40% higher all-cause mortality in the first month than matched controls, with the largest early excess from heart disease and nephritis and a higher risk among those who relocated[34]. Among people receiving maintenance dialysis

Table 1 Documented impacts of the November 2025 Hat Yai floods and implications for diabetes care

Domain	Documented observation	Implications for diabetes care
Extreme rainfall[29]	Hat Yai recorded 370.2 mm of rainfall on November 21, 2025, and 1,328.8 mm during November, exceeding previous station records.	Rapid flooding may limit evacuation and access to essential medicines.
Population affected[30]	Nearly 3 million people and more than 1.15 million households or homes were reported affected across 12 southern provinces.	Large-scale displacement increases demand for healthcare and medication continuity.
Healthcare disruption[21-22]	Flooding disrupted hospital services, transportation, utilities, and access to medical care.	Remaining facilities require coordinated emergency care, referrals, and medication supplies.
Dialysis interruption[22]	Eleven of 20 dialysis centers (55%) in Songkhla Province suspended operations during the peak flooding.	Increased risk of missed dialysis, fluid overload, and hyperkalemia.
Metformin-associated lactic acidosis[21]	Twelve patients presented with severe MALA and AKI; all required emergency renal replacement therapy and survived to discharge.	Supports sick-day education, early recognition, and access to emergency kidney care.
Leptospirosis[30]	Songkhla reported 341 cases during epidemiological weeks 48–50 of 2025.	Supports infection surveillance and assessment of floodwater exposure in febrile patients.

Documented observations are drawn from published studies and official reports, the clinical implications are interpretations based on established medical knowledge and disaster-care principles. These observations do not establish flood-attributable incidence or risk.
AKI=acute kidney injury, MALA=metformin-associated lactic acidosis



CI=confidence interval, RR=relative risk

Figure 2 Cumulative relative risk of hospitalization within 210 days of flood exposure, by cause, in 747 communities in eight countries and territories, 2000–2019. Values are those reported by Yang et al.[13] and were redrawn. Squares show point estimates and horizontal lines with 95% confidence intervals; the diamond shows all causes. The pooled estimates should not be read as local effect sizes

in the United States, hurricane exposure was associated with higher mortality in the following 30 days (hazard ratio 1.13; 95% CI 1.05–1.22)[35]. After Hurricane Maria, diabetes accounted for 195 of an estimated 1,205 excess deaths in Puerto Rico, behind only heart disease and unspecified other causes[36]. Non-communicable diseases accounted for at least 30% of deaths after two Caribbean hurricanes[37].

Glycemic control, care use, and recovery. After Katrina, mean glycated hemoglobin (HbA1c) in a state safety-net system rose from 7.7% to 8.3%, with no significant rise in Veterans Affairs or private systems, whereas systolic blood pressure increased in all three[19]. Different parameters recovered at different rates[38], and diabetes screening among older survivors remained lower for years39. After extensive flooding in Hull, United Kingdom, insulin-treated patients experienced the most significant deterioration in glycemic control, peaking 6–9 months later[18]. After the 2023 earthquakes in Türkiye, HbA1c and fasting glucose rose in adults with type 2 diabetes[40], whereas glycemic control improved in children with type 1 diabetes who used continuous glucose monitoring and deteriorated in those who did not[41]. In Fukushima, psychological distress was independently associated with HbA1c of 7% or higher[42].

Acute demand. In the week after Hurricane Sandy[17], adults with diabetes living in the highest-risk evacuation zone made more emergency department visits, with excess visits for myocardial infarction, prescription refills, and dialysis. After Hurricane Matthew, the proportion of hospital

visits involving DKA rose from 1.0% to 2.3%[43]. Flooding after Hurricane Harvey was associated with increased emergency visits for dehydration and intestinal infection[44].

Continuity and lived experience. After a flash flood in Japan, 23% of evacuated outpatients interrupted their medicines, compared with 9% overall; older age was associated with greater interruption risk, and preparation to leave with medicines with lower risk (odds ratio 0.2; 95% CI 0.03–0.8). Medication interruption was associated with deteriorating health[14]. During the 2011 floods in central Thailand, only 3% of patients whose HIV clinic had closed experienced interrupted access to antiretroviral therapy. Advance medication supplies and dispensing at flood-free facilities supported treatment continuity, providing a Thai precedent for maintaining essential chronic disease care during disasters[45]. Older people with type 2 diabetes interviewed after the 2024 floods in southern Brazil described losing insulin, syringes, and test strips together with their belongings and reported disrupted diets and physical activity and poorer mental health[46]. After the 2018 Kerala floods, a state non-communicable disease coordination unit integrated treatment and referral protocols into the disaster response[47]. A systematic review of evacuation shelters after earthquakes in Japan identified nutritionally unbalanced food provision, concerns about medication shortages, and worsening diabetes and hypertension control[48]. A separate study of evacuees after a volcanic eruption in Japan associated high-sodium shelter diets with increased blood pressure[49].

Two overlapping patterns emerge from the evidence (Table 2). The early aftermath is characterized by increased emergency care use for metabolic, kidney, infectious, and cardiovascular conditions, alongside urgent needs for medication replacement and dialysis. Several cohorts also identify an early increase in mortality. During recovery, impaired glycemic control and disrupted self-management can persist for months, particularly among insulin-treated patients, older adults, displaced people, and underserved populations. Much of this evidence derives from observational studies in high-income settings, often using administrative records. These findings support sustained diabetes care beyond the immediate response but do not establish the magnitude or duration of risk in Hat Yai. The published local MALA series illustrates the potential severity of metabolic complications and their demands on emergency kidney care.

A climate–health system framework for multisystem disruption

Figure 1 integrates these observations into a proposed framework linking flood exposure to two parallel pathways: disruption of health services and medical supplies, and household exposures modified by patient preparedness. These pathways interact with physiological vulnerabilities associated with diabetes and its treatment, potentially precipitating acute multisystem decompensation within days to weeks and deterioration in glycemic control over subsequent months. Five intervention points identify opportunities to prevent complications and preserve continuity of care along these pathways.

Treatment continuity. Flooding can disrupt access to medicines, testing supplies, and refrigeration when clinics, pharmacies, and transport services are also disrupted[6,14,46]. Missed appointments do not necessarily indicate missed doses, but evacuation, older age, and dependence on care increase the risk of interruption, and preparation to evacuate with medicines is associated with lower risk14. Insulin-treated people are especially vulnerable because insulin omission can precipitate ketoacidosis within hours[25,50].

Metabolic decompensation. Infection, inadequate insulin, and acute illness are the principal precipitants of DKA and hyperosmolar hyperglycemic state (HHS)[25]. In people taking SGLT2 inhibitors, fasting, dehydration, and intercurrent illness can precipitate ketoacidosis with only modest hyperglycemia[25,51]; a near-normal glucose level therefore does not exclude DKA. Nutritional disruption may

Table 2 Selected studies of floods and other disasters: findings relevant to diabetes care

Study (event, setting)	Design and population	Main findings
Hospital use and mortality		
Yang et al., 2025[13] (floods, 2000–2019; 8 countries and territories, including Thailand)	Time-series study; daily hospitalizations in 747 communities	Increased hospitalization risk for up to 210 days; diabetes had the highest cause-specific cumulative RR: 1.61 (95% CI 1.39–1.86).
Yang et al., 2023[31] (floods; 35 countries and territories)	Time-series study; daily mortality in 761 communities	Increased mortality risk for up to 60 days (all-cause and respiratory) and 50 days (cardiovascular); stronger associations in lower-income settings and communities with more older adults.
Wettstein et al., 2025[32] (U.S. floods, 2008–2017)	Cohort; 11.8 million Medicare beneficiaries aged ≥65 years	ED visit and hospitalization rates increased by 4.8% and 7.4%, respectively, after flood exposure; largest increases at age ≥85 years.
Quast et al., 2019[34] (Hurricanes Katrina and Rita, United States)	Propensity-matched cohort; 170,328 affected older adults with diabetes and matched controls	All-cause mortality nearly 40% higher in the first month, with a smaller difference thereafter; higher mortality among those who relocated.
Blum et al., 2022[35] (27 U.S. hurricanes)	Cohort; 187,388 people receiving maintenance dialysis	30-day mortality: adjusted HR 1.13 (95% CI 1.05–1.22).
Lee et al., 2016[17] (Hurricane Sandy, New York City)	ED claims; adults with diabetes	Increased first-week ED visits in the highest-risk evacuation zone, including visits for myocardial infarction, prescription refills, and dialysis.
Medication access and acute complications		
Tomio et al., 2010[14] (2006 flash flood, Japan)	Cross-sectional survey; 309 outpatients receiving chronic medication	Medication interruption in 9% overall and 23% of evacuees. Preparation to leave with medication was associated with less interruption (OR 0.2; 95% CI 0.03–0.8); interruption was associated with poorer health at 1 month.
Travia et al., 2021[43] (Hurricane Matthew, United States)	Mixed methods; hospital records for the 6 months before versus after the hurricane (different patients)	DKA accounted for 1.0% of visits before and 2.3% after the hurricane; no significant change in mean HbA1c.
Corrêa et al., 2025[46] (2024 floods, southern Brazil)	Qualitative study; 50 older adults with type 2 diabetes	Participants reported lost insulin and monitoring supplies, disrupted medication access, dietary changes, reduced activity, and distress.
Glycemic control during recovery		
Fonseca et al., 2009[19] (Hurricane Katrina, United States)	Observational study; 1,795 adults with diabetes in 3 health systems; before versus 6–16 months after the hurricane	HbA1c rose from 7.7% to 8.3% in the safety-net system, with no significant rise in the others; systolic blood pressure rose in all three.
Ng et al., 2011[18] (floods, Hull, United Kingdom)	Longitudinal study; flood-affected versus unaffected patients	Deterioration in glycemic control mainly in insulin-treated patients, greatest 6–9 months after flooding.
Özdemir and Ozturk, 2025[40] (2023 earthquakes, Türkiye)	Retrospective before–after cohort; 550 adults with type 2 diabetes	HbA1c and fasting glucose increased.
Tarçın et al., 2023[41] (2023 earthquakes, Türkiye)	Retrospective observational study; 134 children with type 1 diabetes: 58 with CGM assistance and 76 without CGM	HbA1c improved in the CGM group and worsened in the non-CGM group.

These observational studies include general-population, diabetes, and dialysis cohorts; findings are not uniformly diabetes-specific. Differences in populations and disasters limit direct comparison, and estimates do not quantify risk in Hat Yai. The Hat Yai MALA case series[21] is summarized in Table 1.
CGM=continuous glucose monitoring, CI=confidence interval, DKA=diabetic ketoacidosis, ED=emergency department, HbA1c=glycated hemoglobin, HR=hazard ratio, MALA=metformin-associated lactic acidosis, OR=odds ratio, RR=relative risk

involve involuntary fasting, with a risk of hypoglycemia in people taking insulin or sulfonylureas, followed by carbohydrate-dominant relief food that may worsen hyperglycemia and, after prolonged starvation, increase the risk of refeeding syndrome.

Renal decompensation. Reduced intake, diarrhea, vomiting, and sepsis can cause volume depletion and AKI. Metformin, which is cleared by the kidney, can then accumulate, and lactic acidosis may develop when AKI coincides with hypoperfusion or sepsis[26]. For people already receiving dialysis, closure of centers can interrupt scheduled treatment, increase the risk of hyperkalemia and fluid overload, and increase demand at functioning units[22]. Hurricane exposure has also been associated with increased mortality among patients receiving dialysis[35].

Cardiovascular decompensation. Psychological stress, physical exertion during evacuation, interrupted antihypertensive and heart-failure treatment, high-sodium relief food, and fluid shifts can precipitate myocardial infarction and heart failure. Population data show increased hospitalization and mortality from cardiovascular disease after floods[13,31].

Infection and injury. Contact with floodwater roughly doubled the odds of leptospirosis in a meta-analysis of observational studies (pooled odds ratio 2.19; 95% CI 1.48–3.24)[27], and leptospirosis can present with AKI and multiorgan failure. Melioidosis, caused by the soil- and waterborne bacterium *Burkholderia pseudomallei*, is endemic in SEA; an estimated 165,000 cases and 89,000 deaths occur worldwide each year[52]. Diabetes is a major risk factor, and mortality can exceed 40% in some regions[28]. Minor wounds, delayed wound care, and wading through floodwater on neuropathic feet expose people with diabetes to soft-tissue and foot infection, while poor visibility, unstable ground, neuropathy, low vision, and frailty increase the risk of falls during evacuation.

Treatment-related vulnerabilities during floods

The advances that have transformed diabetes outcomes in stable conditions also create new dependencies. Tables 3 and 4 summarize the main hazards and mitigation measures; four deserve emphasis.

Medication safety during acute illness. Therapies chosen for long-term organ protection may require adjustment during acute dehydration: metformin through accumulation, SGLT2 inhibitors through ketoacidosis risk and volume loss, RAS blockers and diuretics because of their effects on blood pressure, volume status, and kidney function, and non-steroidal anti-inflammatory drugs (NSAIDs) through reduced renal perfusion[53,54]. An international Delphi panel agreed that RAS blockers, diuretics, NSAIDs, SGLT2 inhibitors, and metformin should be temporarily stopped during volume-depleting illness, and that certain signs should prompt urgent contact with a clinician, including reduced consciousness, severe vomiting, low blood pressure, elevated ketones, tachycardia, and fever[55]. Potential harms also include blanket withdrawal of all medicines, failure to restart them, or failure to adjust sulfonylureas and mealtime insulin when meals are missed.

Device and digital dependence. Continuous glucose monitors, insulin pumps, and automated insulin delivery depend on power, compatible devices, sensors, and consumables. When available, they may support glycemic control after a disaster[41], but when power, networks, or supplies fail, users may lack the skills or equipment for injection-based therapy unless a written backup plan exists. Electronic prescribing and health records may also become inaccessible during network outages; a patient-held medication list provides a backup. Automated dispensing systems also failed after the 2024 Noto Peninsula earthquake, shifting work to pharmacists[61].

Insulin storage and product switching. Fear that heat-exposed insulin is ineffective can lead to disposal of usable supplies, whereas genuinely damaged insulin

Table 3 Maintaining diabetes care during floods: system vulnerabilities and mitigation

Component	Vulnerability	Mitigation	Evidence basis
Insulin storage	Power loss, heat, freezing, or floodwater; unnecessary disposal when storage history is uncertain	Teach product-specific temperature and time limits; protect from heat, freezing, and floodwater; assess storage history, not appearance alone; never use frozen insulin.	Stability studies and guidance[56–60].
Insulin substitution and donated medicines	Changes in formulation, concentration, device, or timing can cause dosing errors; donations may not match regimens	Clinician or pharmacist review of substitutions; written dosing instructions and additional glucose checks; verify donated products before dispensing.	Guidance and service reports; proposed pharmacy procedures[60,61].
Glucose sensors, pumps, and automated insulin delivery	Loss of power, devices, or consumables; pump failure can rapidly cause insulin deficiency	Backup glucose meter, ketone-testing supplies, and power source; written injection regimen with doses and switch timing; rehearse injections before flood season.	Observational evidence and guidance; proposed backup procedures[41,53,62].
Electronic records and prescribing	Power or network failure limits access to medication histories, prescriptions, doses, and pump settings	Portable medication list and insulin regimen, including pump settings; paper prescribing and dispensing procedures; local reserve supplies.	Service reports and guidance; proposed adaptations[61,62].
Dialysis and emergency kidney care	Water, power, and transport failures interrupt dialysis and limit treatment of AKI or severe MALA	Protect utilities; identify alternative sites; coordinate referrals, transport, and capacity sharing between facilities.	Clinical and service observations; proposed adaptations[21,22,63].
Food relief and shelters	Irregular meals and variable carbohydrate intake increase glucose variability; high-sodium food may worsen hypertension or fluid retention	Coordinate meals, glucose checks, and medication doses; adapt advice to available food; individualize sodium advice; stock hypoglycemia treatment and diabetes supplies.	Observational evidence and guidance; proposed shelter procedures[48,49,64,65].

The measures combine published evidence, clinical guidance, and proposed operational adaptations; they have not been evaluated together as an integrated flood-response program. Medication adjustments during acute illness are summarized in Table 4. AKI=acute kidney injury, MALA=metformin-associated lactic acidosis

may be used unknowingly. Unopened insulin should be refrigerated at 2–8 °C, but most products may be used at room temperature for a defined period, often about 4 weeks; limits are product-specific, and labeling is inconsistent[56,60]. Several formulations stored for 4 weeks at temperatures oscillating between 25 °C and 37 °C retained pharmacopeial potency and receptor bioactivity[57]. In a Thai randomized crossover trial, insulin glargine pens kept at 37 °C for 21 days produced a similar mean glucose on continuous monitoring to refrigerated pens (158.7 vs 157.0 mg/dL)[58]. Continuous storage at 32 °C and 37 °C for 28 days, by contrast, reduced insulin content by 14% and 18% in an earlier study summarized by Kaufmann and colleagues[57]. Under hot, humid conditions in Thailand, clay-pot devices filled with wet sand or soil lowered storage temperature by about 2 °C, at least as well as a commercial cooling wallet[59]. Substituting one insulin product for another in an emergency requires dose advice and additional monitoring[60].

Centralized specialist services. Concentrating dialysis and other specialist services in a few facilities creates vulnerabilities when floods disrupt access or operations, particularly for people with diabetes and advanced kidney disease. After Hurricane Harvey, 21% of hemodialysis clinics in Harris County flooded; official flood maps had not identified 42% of affected clinics as being at risk[63]. During the Hat Yai floods, more than half of Songkhla dialysis centers suspended services[22]. Hospitals in central Thailand surveyed after earlier floods also fell short of flood-preparedness standards for surge capacity, service management, and support systems[66].

Clinical management during flood-related acute illness

Flood exposure alone does not justify discontinuing diabetes treatment. Acute illness, reduced oral intake, or dehydration should prompt reassessment and medication-specific adjustments according to clinical status. Table 4 summarizes these decisions, and Panel 2 translates them into practical guidance for patients, shelter staff, and community health workers.

Basal insulin must not be stopped in type 1 diabetes or other insulin-deficient states; doses are adjusted according to glucose and, when available, ketone monitoring, while prandial insulin and sulfonylureas are reduced or omitted according to the individual plan when meals are missed[53]. Metformin should be withheld during significant dehydration, persistent vomiting or diarrhea, inability to maintain intake, or suspected AKI, and SGLT2 inhibitors during any acute illness with reduced intake or hydration[25,53,55]. Decisions about RAS blockers, angiotensin receptor–neprilysin inhibitors, and diuretics should be individualized to blood pressure, volume status, and kidney function: temporary withholding may prevent AKI in a dehydrated patient, but blanket withdrawal can precipitate congestion in heart failure[54]. Each hold should be paired with a restart instruction and a designated contact for clinical advice, because errors in restarting medicines are a recognized harm of sick-day rules.

The evidence base for sick-day medication guidance remains largely consensus-based[55,67], and a randomized trial in people with chronic kidney disease found no improvement in kidney outcomes with a self-managed sick-day protocol over 6 months[68]. These findings support linking written plans to accessible clinical advice and evaluating their implementation, rather than abandoning guidance.

Hypoglycemia deserves equal prominence. For a conscious adult who can swallow safely, glucose below 70 mg/dL (3.9 mmol/L) should be treated with 15–20 g of fast-acting carbohydrate and rechecked after 15 minutes; inability to swallow, unconsciousness, or seizure requires glucagon if available and emergency assistance, with nothing given by mouth[7]. Shelters should stock measured portions of sugar for treating hypoglycemia and glucose meters with adequate test strips and lancets.

Emergency assessment should include glucose, ketones, electrolytes, creatinine, and acid-base status, together with a search for the precipitating illness. Lactate should be measured in acidotic patients taking metformin, and facilities receiving such patients need a pathway to renal replacement therapy. A history of floodwater or soil exposure should prompt consideration of leptospirosis and melioidosis in compatible illness, following local diagnostic and treatment guidance.

Roles of the health system and the healthcare team

Effective diabetes care during disasters depends on coordinated health system preparedness. Reviews identify gaps across six WHO building blocks: governance, financing, workforce, medical products, information, and service delivery. Only a few models of care have been evaluated[69]. Priorities include adaptation planning, reliable electricity and water, vulnerability assessment, and disease surveillance[69], guided by the WHO Health Emergency and Disaster Risk Management framework.

Governance and essential supplies. Disaster plans should integrate diabetes and other noncommunicable diseases, drawing on the 2018 Kerala response and dedicated emergency medicine kits[47,64,65.] We propose that disaster declarations enable access to prescribed medicines across facilities, regardless of district or insurance registration. Continuity plans should protect utilities for dialysis and insulin storage. We also propose medicine reserves sufficient for at least seven days, adjusted to local demand and resupply constraints.

The care team. Defined responsibilities support coordinated diabetes care (Table 5). Physicians lead risk

Table 4 Medication decisions during flood-related acute illness in adults with diabetes

Medication	Main hazard	During illness	Continuation, restart, and review
Basal insulin[7,25,53]	Omission: DKA, especially in insulin-deficient diabetes. Excess dosing: hypoglycemia.	Never stop in type 1 or other insulin-deficient diabetes; adjust the dose according to the individual plan with glucose and ketone checks.	Continue throughout illness; reassess the dose as intake and clinical status recover. Seek urgent advice if insulin is unavailable.
Mealtime insulin[7,25,53]	Hypoglycemia when meals are missed; hyperglycemia if needed correction doses are omitted.	Reduce or omit the meal-related dose when meals are missed; use correction insulin according to the individual plan. Check glucose more often.	Resume meal-related doses with food; adjust to glucose levels and kidney function.
Sulfonylureas[7,53]	Hypoglycemia with poor intake; risk increases with impaired kidney function.	Reduce or withhold with poor intake, hypoglycemia, or AKI; monitor glucose.	Restart when intake is reliable and hypoglycemia risk has resolved; review the agent and dose against kidney function.
Metformin[21,53]	Accumulation during AKI may contribute to lactic acidosis.	Withhold with significant dehydration, persistent vomiting or diarrhea, inability to maintain intake, or suspected AKI.	Restart when intake and hydration recover and, if AKI was suspected, after confirming adequate kidney function.
SGLT2 inhibitors[25,51,53,54]	Volume depletion; ketoacidosis without marked hyperglycemia.	Withhold during significant acute illness, prolonged fasting, dehydration, or suspected AKI; test ketones if unwell, even when glucose is near normal.	Consider restart after recovery of intake and hydration and resolution of ketosis. Do not restart routinely after DKA; obtain specialist review.
GLP-1 receptor agonists[53]	Persistent gastrointestinal symptoms may worsen dehydration.	Consider withholding with persistent vomiting or inability to maintain hydration.	Restart when intake is tolerated; follow product-specific missed-dose and retitration instructions.
DPP-4 inhibitors[53,54]	Low intrinsic hypoglycemia risk.	Usually continue if clinically appropriate.	Review kidney function; adjust the dose when required for the specific agent.
ACE inhibitors, ARBs, ARNIs, diuretics, and MRAs[54,55]	Hypotension and AKI during volume depletion; hyperkalemia with RAS blockers/MRAs. Withdrawal may worsen heart failure.	Individualize according to blood pressure, volume status, potassium, and kidney function. Consider temporary withholding with hypotension, dehydration, or AKI; avoid blanket withdrawal in heart failure or dialysis.	Clinician-directed restart; reassess volume status, potassium, and creatinine.
NSAIDs[54]	AKI with dehydration, especially with RAS blockers and diuretics.	Avoid during dehydration or AKI, including over-the-counter use; consider acetaminophen when appropriate.	Do not restart automatically; review the indication and kidney function.

General principles for adults, not fixed prescribing instructions. Flood exposure alone does not justify stopping treatment. Record each temporary hold, restart plan, and route to clinical advice. Evidence that self-managed medication holds improve outcomes is limited[55,67,68]. Insulin adjustments require an individualized plan; meal-related and correction doses are not interchangeable.
ACE=angiotensin-converting enzyme, AKI=acute kidney injury, ARB=angiotensin receptor blocker, ARNI=angiotensin receptor–neprilysin inhibitor, DKA=diabetic ketoacidosis, DPP-4=dipeptidyl peptidase-4, GLP-1=glucagon-like peptide-1, MRA=mineralocorticoid receptor antagonist, NSAID=nonsteroidal anti-inflammatory drug, RAS=renin–angiotensin system, SGLT2=sodium-glucose cotransporter

stratification, medication planning, and acute management. Diabetes nurse educators provide preparedness education and remote support[70]. Pharmacists coordinate emergency supplies, safe substitution, and dispensing during system outages[61]. Dietitians align nutrition advice with available food, while nephrology teams coordinate dialysis access. Emergency teams triage metabolic complications, and mental health teams address distress affecting self-management. Community health volunteers can maintain patient registries, check emergency kits, and identify warning signs requiring referral. Established telephone and telemedicine pathways can support continuity across these roles.

Panel 2 Practical tools for people with diabetes, shelters, and community health workers

A. The flood diabetes kit (prepare before the season; supplies for at least 14 days)

- All usual medicines, insulin, and pen needles or syringes in a waterproof bag.
- Glucose meter, strips, lancets, and spare batteries; ketone-testing supplies according to the individual sick-day plan.
- Fast-acting glucose (tablets, sugar, or juice), nonperishable snacks, and glucagon if prescribed.
- A written medication list with doses, the sick-day and restart plan, and emergency contacts, including an alternative dialysis unit when applicable.
- For sensor, pump, or automated-delivery users: spare consumables, a power source, and a written injection-based backup regimen with doses and switch timing.

B. Insulin when the power fails

- Follow product-specific storage limits; protect insulin from freezing, direct sunlight, and heat, including vehicles and metal-roofed spaces.
- Evaporative cooling may lower temperature, but effectiveness varies and does not guarantee suitable storage conditions.
- For unopened insulin stored without refrigeration, follow the manufacturer's applicable temperature and time limits; record when refrigeration was lost.
- Do not use frozen insulin or insulin with clumping, discoloration, or unexpected cloudiness. Normal appearance does not confirm potency. If heat exposure is uncertain and replacement is unavailable, seek urgent advice and monitor glucose more often.
- Changing to a different insulin product requires dose advice and additional glucose checks.

C. Red flags for same-day medical assessment

- Seek immediate emergency care for chest pain, stroke symptoms, severe breathlessness, altered consciousness, or seizure.
- Suspected ketoacidosis, including rapid breathing, abdominal pain, or persistent vomiting, requires emergency assessment even when glucose is not markedly elevated, particularly during SGLT2 inhibitor treatment.
- Blood ketones ≥3.0 mmol/L or urine ketones ≥2+ require emergency assessment. Blood ketones ≥1.5 but <3.0 mmol/L warrant urgent clinical advice; symptoms or deterioration require emergency care.
- Hypoglycemia that persists despite treatment requires urgent help. Inability to swallow, loss of consciousness, or seizure requires emergency care, glucagon if available, and nothing by mouth.
- Inability to retain fluids, little or no urine, or marked dizziness requires urgent assessment; severe illness warrants emergency care.
- A missed dialysis session with breathlessness, palpitations, or marked weakness requires emergency assessment; report missed dialysis promptly even without symptoms.
- Fever after floodwater or soil exposure, or a hot, swollen, or discharging foot or wound, requires prompt assessment.

Adapted from clinical and emergency-preparedness guidance[7,25,53,56,59,60,62]. Ketone thresholds guide escalation; they do not diagnose DKA without the other diagnostic criteria. Symptoms and clinical status take precedence. Apply local emergency protocols and individualized plans

Table 5 Roles of people with diabetes, the healthcare team, and the health system before, during, and after floods

Actor	Before the season	During flooding	Recovery	Proposed indicators
People with diabetes and families	Keep a 14-day kit and written plan (Panel 2); attend a preseason session (Panel 3); identify an alternative pharmacy and dialysis unit, if applicable.	Continue basal insulin in insulin-deficient diabetes; follow individualized sick-day and fluid advice; protect feet and seek help for warning signs.	Restart medicines as advised; replace lost or compromised insulin; attend follow-up.	Priority patients with a documented plan and checked kit (%).
Community health volunteers, primary care, and shelter teams	Maintain a high-risk patient registry; check home kits; provide culturally appropriate materials in local languages; identify suitable shelters.	Identify diabetes, treatment needs, missing supplies, and warning signs at entry; arrange timely medication access and glucose testing; stock hypoglycemia treatment.	Contact patients who missed care; assess feet, wounds, and psychological distress.	Shelters with testing supplies (n); registry patients contacted within 2 weeks (%)†.
Physicians and diabetes nurse educators	Risk-stratify; provide hold-and-restart plans and preseason education with teach-back; agree on acute-care protocols and a helpline.	Provide telephone or messaging support; coordinate insulin and monitoring supplies.	Reconcile medicines; prioritize follow-up after DKA, MALA, or AKI and disrupted insulin treatment; individualize follow-up duration.	Preseason sessions delivered (n); helpline response time.
Pharmacists	Distribute medicine reserves across sites; plan a 7-day institutional reserve†; establish substitution protocols for insulin and cardiorenal medicines.	Provide emergency dispensing under applicable regulations and local protocols; maintain manual dispensing during system outages.	Reconcile substitutions and replenish supplies according to demand.	Time to medication replacement.
Dietitians and food-relief coordinators	Adapt nutrition advice to available donations; plan shelter menus with appropriate sodium limits.	Coordinate regular meals, carbohydrate portions, and hypoglycemia prevention.	Assess nutrition and screen for refeeding risk after prolonged fasting.	Shelters providing appropriate meal options for diabetes (n).
Emergency, nephrology, dialysis, and hospital teams	Test backup power and water; define evacuation triggers; provide access to ketone and lactate testing.	Manage metabolic emergencies, AKI, and sepsis; coordinate dialysis capacity across functioning units and urgent referrals.	Restore dialysis schedules; reassess kidney function after AKI.	Dialysis units with tested ≥72-hour backup (%)†; transfer delays.
Mental health and social services	Identify people living alone or with severe mental illness.	Provide psychological first aid and referral when needed.	Assess distress that may impair diabetes self-management.	People with a positive distress screen who receive follow-up (%).
Health authorities and policymakers	Include noncommunicable disease care in disaster plans; authorize cross-district medication access after disaster declaration*; include diabetes scenarios in drills.	Maintain a coordinated information channel with backup communication; organize transport to functioning facilities, including dialysis units.	Review the response; update plans before the next season; support independent evaluation.	Plan updated and tested before the season.

Clinical actions draw on the guidance discussed in the text; responsibilities and indicators are the authors' proposals and require local evaluation. *Proposed policy, not a statement of current entitlement. †The 7-day institutional reserve, 2-week outreach target, and ≥72-hour backup are proposed planning targets, not validated standards. Urgent clinical needs require earlier assessment. Define denominators and measurement periods locally. AKI=acute kidney injury, DKA=diabetic ketoacidosis, MALA=metformin-associated lactic acidosis

Patient education and preparedness

Diabetes education before each flood season should translate advice into a rehearsed personal action plan. Priorities include assembling an emergency kit, maintaining medication and contact lists, identifying evacuation routes and transport support, and confirming access to replacement medicines. Reported gaps in emergency supplies, contact knowledge, and transport emphasize the need to assess practical readiness alongside knowledge[71]. Structured education can improve preparedness[72], while planning to evacuate with medicines is associated with fewer treatment interruptions[14].

Panel 3 outlines a proposed clinic-based session covering medication adjustment and restart, insulin storage, glucose monitoring, hypoglycemia treatment using locally available sugar, and warning signs requiring urgent care. Teams should use teach-back and practical demonstrations, involve family members or caregivers, and provide pictorial and written materials in Thai and locally used languages, including Malay where appropriate. Each patient should leave with an individualized plan stored with the emergency kit. Community volunteers can support home kit checks, while shelter staff and community leaders should participate in evacuation and referral drills.

Health-system actions across the disaster cycle

Before flooding. Identify high-risk patients and confirm individualized sick-day and restart plans, portable medication lists, and 14-day supplies. Equip designated shelters with glucose and ketone testing, hypoglycemia treatment, and referral pathways. Test backup power, water, insulin storage, dialysis arrangements, evacuation triggers, and communication channels. Distribute medicine reserves across accessible sites.

During flooding. Identify people with diabetes at shelter entry, document treatment needs, and arrange timely medication replacement. Coordinate meals with

Panel 3 A proposed 15-minute flood-preparedness session for diabetes clinics

When: Every visit in the 2 months before the flood season (October to early November on the east coast of Southern Thailand) and at discharge after any acute admission.

Who: Prioritize insulin-treated patients, metformin or SGLT2 inhibitor users with kidney disease, dialysis patients, and people with heart failure, frailty, or limited support. Involve a caregiver where possible.

My plan (3 minutes): Review the written sick-day and restart plan; mark which medicines to hold and which never to stop (basal insulin) and who decides on restart.

My kit (3 minutes): Verify 14 days of medicines and supplies. Keep medication details, photographs of medicine labels, emergency contacts, and the care plan in a waterproof container.

My insulin (2 minutes): Review safe storage during power loss and how to obtain replacement supplies.

My warning signs (3 minutes): Hypoglycemia treatment; ketone and dehydration red flags; when and how to seek help, including a number that works when clinics are closed.

My feet and water (2 minutes): Avoid wading; protective footwear; daily foot checks; wound cleaning with safe water.

Teach-back (2 minutes): The patient explains the three most important actions in their own words.

Materials: a one-page pictorial plan in Thai (and Malay where needed), a wallet card with the medicine list and emergency numbers, and the kit checklist.

Evaluation: the proportion of priority patients with a documented plan and a checked kit before the season.

medication use, emphasizing regular intake, practical carbohydrate portions, and appropriate sodium restriction. Maintain capacity for metabolic, kidney, infectious, and cardiovascular emergencies, supported by diagnostic testing and coordinated referral and dialysis allocation.

During recovery. Reconcile withheld, substituted, or lost medicines; confirm appropriate restart; and replace compromised insulin and supplies. Prioritize follow-up after DKA, MALA, acute kidney injury, or missed dialysis, and for patients with unstable glycemia or disrupted insulin access. Restore preventive care and provide telephone, community, or home-based follow-up according to access.

Measure readiness. Track the proportion of high-risk patients with documented plans and adequate supplies, dialysis units with tested backup utilities, and shelters with functioning testing equipment, hypoglycemia treatment, and referral arrangements. These operational measures.

Surveillance, evaluation, and research priorities

Hospital activity reflects both clinical need and access to care. Closures, referral diversion, transport barriers, and capacity limits can alter attendance and admission counts independently of morbidity. Evaluations should therefore use clearly defined populations, consistent case definitions, suitable comparison periods, and clinical validation of coded or automated diagnoses.

Discussion

The 2025 Hat Yai floods illustrate how disruption of essential infrastructure can rapidly compromise diabetes care. Published reports describe disrupted healthcare access and dialysis services, alongside severe metabolic and kidney complications[21,22]. International studies similarly associate floods and other disasters with increased diabetes-related hospitalization, early excess mortality, and prolonged disruption of diabetes management[13,34,39]. These findings support preparedness extending beyond the immediate emergency, although pooled estimates cannot quantify local risk.

Three practical lessons emerge. First, disruption of major facilities requires citywide surge planning, coordinated referrals, and shared dialysis capacity. Second, continuity of medication access during displacement requires arrangements that operate across administrative boundaries. We propose that these arrangements be activated following a disaster declaration. Third, the benefits of contemporary diabetes therapies and technologies depend partly on reliable supplies, monitoring, and infrastructure. Preparedness should therefore integrate treatment continuity with individualized medication adjustment, backup insulin delivery, and accessible clinical records.

These priorities provide a practical framework for evaluation. Their feasibility and effectiveness in reducing flood-related diabetes complications require prospective assessment.

Strengths and limitations

This review brings together local reports from the 2025 Hat Yai floods with population-level and disaster-specific studies from other settings and distinguishes observations, guidance, and proposals. Several limitations apply. As a narrative review, this article may have omitted relevant evidence, and source selection may be biased. The Hat Yai reports describe selected patients and services and cannot establish incidence or excess risk. Some event details rely on contemporaneous reports and require confirmation against final official records. The lessons in Panel 1 reflect the perspective of one institution. Evidence from other disasters comes mainly from high-income countries and relies largely on administrative outcomes. The clinical recommendations adapt existing diabetes and kidney guidance, whereas the operational proposals have not been evaluated as an integrated program. Feasibility may vary with resources, language, health literacy, social

support, and transport. Children and pregnant women require population-specific guidance[53,73].

Conclusion

Flooding threatens diabetes care through simultaneous disruption of treatment, essential infrastructure, and healthcare services. The Hat Yai experience highlights priorities for medication and insulin continuity, individualized sick-day and restart plans, patient preparedness, coordinated emergency and dialysis care, and follow-up during recovery. These measures should inform routine diabetes care and disaster preparedness within climate adaptation planning. Prospective evaluation is needed to determine which adaptations are feasible and reduce complications.

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Conflict of interest

There are no conflicts of interest to declare.

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