# Guidance for Health Care Providers on Understanding and Managing Typhoon and Flood Impacts on Health

Typhoons and floods are major hazards in the Philippines. These events can damage health care facilities and can lead to injuries, drownings, infectious disease outbreaks, and interruptions in medical care. Impacts can be severe and long-lasting, as seen in the aftermath of Typhoons Yolanda/Haiyan, Ondoy, and Sendong; even regional flooding can have devastating local impacts.

It is essential for health care providers to prioritize their own safety and their families during flooding and typhoons. Ensuring personal and family preparedness allows them to remain focused and effectively deliver critical services to their communities. If their families are at risk or unprotected, health care providers may face significant challenges, which could hinder their ability to care for others. By taking necessary precautions, such as having an emergency plan, securing their homes, and preparing emergency kits or Go Bags, health care providers can safeguard their well-being and be better equipped to serve those in need during emergencies.

Discussing emotional well-being and coping strategies with patients can help them manage stress and anxiety before, during, and after a typhoon or flood. Encourage simple steps such as staying connected with loved ones, identifying sources of support, and using relaxation techniques like deep breathing to reduce distress.

## Prevention of Typhoon and Flood Related Health Harms

**(See page 9)**

- Consider counseling patients on steps they can take to prevent health harms related to typhoons and flooding; provide anticipatory guidance on potential health problems they may experience and steps they should take to address them.
- Some populations are at particularly high risk of typhoon and flood-related health harms, including children, pregnant women, older persons, people living with chronic diseases or disabilities, and people in low-income or marginalized communities.
- Counseling topics include awareness of when and where dangerous flooding or high winds may occur, preparations for evacuation such as making a Go Bag and knowing where to go and how to get there, and considerations for patients with chronic medical conditions.
- Creating a typhoon and flood action plan can help patients know what to do before, during, and after a typhoon or flood.
- Creating an emergency Go Bag can help patients ensure they have essential items including medicines and documents.
- Utilizing materials provided in the patient and community section of the toolkit can support patients in preparing for typhoons and floods.

## Diagnostic and Treatment Considerations for Flood-related Health Conditions

**(See page 5)**

- Health impacts in the immediate aftermath of typhoons and floods include drownings, electrocutions, lacerations, falls, blunt trauma including motor vehicle accidents, and acute stress reactions. Clinical diagnosis with imaging and laboratory adjuncts and treatment in accordance with typical practice guidelines is appropriate.
- In the first 1 to 2 weeks after a typhoon or flood, infectious diseases including pneumonia, viral respiratory infections, cellulitis, and acute gastroenteritis are a substantial concern. Clinical diagnosis may be sufficient in many cases; X-ray imaging and laboratory testing in accordance with local guidelines can facilitate the diagnosis of some conditions. Treatment with antimicrobials should be based on local guidelines and antibiotic resistance data.
- Longer-term impacts include vector-borne diseases, skin infections from atypical organisms such as mycobacteria, molds, and fungi, respiratory irritation due to mold infestation of previously flooded structures, Hepatitis A and E outbreaks, and long-term mental health impacts including anxiety, depression, and PTSD. Consider testing for malaria, dengue, hepatitis, and other infectious diseases when appropriate; consider screening for mental health impacts in affected populations. Infectious disease treatment should be based on local guidelines and antibiotic resistance data. Mental health treatment options include office-based care, engagement with post-disaster psychosocial support services, and/or referral for specialized psychiatric care. Principles of trauma-informed care can facilitate clinical care and therapeutic relationships with impacted people.
- Chronic disease exacerbations and interruptions in chronic disease care are also a concern. Maintaining continuity of care, providing medication refills, and recognizing and treating chronic disease exacerbations are important activities after typhoons and floods.

## Typhoons and Flooding are Getting More Dangerous in the Philippines

**(See page 3)**

- Climate change, also known as global warming, is leading to heavier rainfall, higher risks of inland flooding, and more powerful typhoons. It is also leading to sea level rise, increasing the risk of coastal storm surge flooding.
- Studies conducted in the Philippines and elsewhere show that typhoons and flooding are associated with injuries, drownings, infectious disease outbreaks, mental health problems, disruptions in medical care, and other problems.
- To better prepare for these growing dangers, you and your patients can access information on predicted typhoon and tropical cyclone impacts, rainfall, and flood risk from PAGASA.
- There is also a need for proactive measures, such as climate change adaptation and building community resilience, to mitigate these disasters. Key actions include disaster preparedness through hazard mapping and resilient infrastructure, as well as integrated health care approaches that emphasize mental health readiness and public health awareness initiatives.
- As typhoons and flooding intensify due to climate change, prioritizing these measures is essential to safeguard public health and well-being.
- Increasing the likelihood of concurrent or cascading hazards such as heat waves following typhoons can result in increased morbidity and mortality due to critical infrastructure damage, such as electricity, transportation, and health care access.

## Objective

**This document is intended to provide health professionals with an overview of the relationship between typhoons, flooding, and health in the Philippines, and to provide a set of practical actions and information that can support good clinical practice and preventive medicine in the context of increasing hazard exposure resulting from global climate change.**

## Contents

This document is divided into sections on the following topics:



This document covers both typhoons and floods, as flooding is a major source of health problems during and after typhoons, and typhoons are a major source of flooding risk. Typhoons are also known as tropical cyclones; the word “typhoon” is used in this document. Tropical storms and depressions and related low-pressure areas (LPAs) have less powerful winds than typhoons, but can still lead to extremely high rainfall and flash flooding. Tropical depressions and tropical storms, which are less powerful cyclonic storms that can intensify into typhoons, are also referred to as “typhoons” in this document for simplicity. Throughout the document, symbols are used to indicate sections that apply to flooding and/or typhoons:

**PAGASA FLOOD AND TYPHOON ICONS**

Flood

Tropical Cyclone

# Health Harms Related to Typhoons, Floods, and Extreme Rainfall in the Philippines

## For Providers

**Typhoons, tropical storms and depressions, and floods can lead to a wide range of adverse health outcomes related to drowning, injury, infectious disease outbreaks, mold infestations in buildings, mobilization of toxic substances, social disruption, population displacement, food and water contamination, physical and emotional trauma, and interruptions in access to medical care (Dresser et al, 2022).**

Drowning due to flooding is a significant source of mortality in the Philippines (Martinez et al, 2016), and most direct flood-related mortality is from drowning, accounting for up to 75% of immediate mortality (Cao et al, 2023). Injuries also make up a substantial proportion of the immediate care needs of impacted populations, particularly following typhoons (Read et al, 2016; Salazar et al, 2017; van Berlaer et al, 2019; Shilkofski et al, 2017; Kim et al, 2016; Chang et al, 2016). Even after the floodwaters are gone, people can experience injuries during cleanup and reconstruction (Lowe et al, 2013).

However, the overall medical illness burden may be much greater than the injury burden (Cuesta et al, 2020). Infectious diseases such as leptospirosis (Easton, 1999; Matsushita et al, 2018, Nazir et al, 2024), chikungunya (Cueva et al, 2018), and schistosomiasis (Guo et al, 2021) are a major concern after floods and typhoons, as are diarrheal diseases (Chua & Salazar, 2021). If people live in buildings that were recently flooded, they may also be exposed to mold, which can cause breathing problems and allergies. Toxic exposures are also a concern; there is some evidence that lead contamination of floodwaters in parts of the Philippines may pose a health hazard (Ostrea et al, 2015). Interruption in access to medical care, ranging from TB control programs to obstetrical care to management of chronic diseases is a substantial problem (van Loenhout et al, 2018; Martinez et al, 2015; Lew et al, 2015). Mental health impacts are substantial in both impacted populations and responders (Chan et al, 2016; Labarda et al, 2020).

**Table 1:** Empirically observed health impacts of typhoons and floods in the Philippines.

| HAZARD | HEALTH IMPACT | REFERENCES |
|---|---|---|
| | Increased mortality | Hu et al, 2018; Huang et al, 2024 |
| | Wounds and other trauma | Read et al, 2016; Salazar et al, 2017; van Berlaer et al, 2019; Shilkofski et al, 2017; Kim et al, 2016; Chang et al, 2016 |
| | Ocular injuries | Osaadon et al, 2018 |
| | Drowning | Martinez et al, 2016; Ching et al, 2015 |
| | Toxic exposures | Ostrea et al, 2015 |
| | Leptospirosis | Sumalapao et al, 2019; Mendoza et al, 2013; McCurry, 2009 |
| | Schistosomiasis | Belizario et al, 2021 |
| | Helminth infections | Belizario et al, 2021 |
| | Diarrhea and gastroenteritis | Salazar et al, 2017; Chang et al, 2016; Ventura et al, 2015 |
| | Respiratory tract infections | Salazar et al, 2017; van Berlaer et al, 2019; Shilkofski et al, 2017; Chang et al, 2016; Cuesta et al, 2020 |
| | Skin infections | Salazar et al, 2017; van Berlaer et al, 2019; Chang et al, 2016 |

| HAZARD | HEALTH IMPACT | REFERENCES |
|---|---|---|
| | Fever | Salazar et al, 2017; Shilkofski et al, 2017 |
| | Disruption of WASH programs, access, and infrastructure | Belizario et al, 2021; Magtibay et al, 2015; Ramos et al, 2015 |
| | Potential for disruption of infectious disease control programs | Lew et al, 2015; Chernoff et al, 2021 |
| | Acute stress disorders and psychological distress | Lavenda et al, 2017; Chan et al, 2016; Labarda et al, 2020; Weintraub et al, 2016 |
| | PTSD, Anxiety, and Depression | Labarda et al, 2020; Chan et al, 2016; Sylwanowicz et al, 2018 |
| | Need for management of chronic conditions, e.g. hypertension, asthma, diabetes | Mobula et al, 2016; Salazar et al, 2017; Martinez et al, 2015; Savage et al, 2015 |
| | Lack of access to obstetrical care | van Loenhout et al, 2018; Sato et al, 2016 |
| | Increased out-of-pocket costs for health care | Espallardo et al, 2015 |
| | Increased demand for rehabilitation services | Benigno et al, 2015 |
| | Food insecurity and malnutrition | Clark, 2012; Belizario et al, 2021 |

# Factors Affecting Flood Risk in the Philippines
## For Providers

**Floods can also cause long-term harm through impacts on livelihoods, crop production, food security, access to medical care, and mental health (Clark 2012).**

Flooding can result from prolonged or intense rainfall, local topography, failures of infrastructure such as dams, and the design of the built environment, particularly in cities where paved surfaces may increase flood risk.

The Philippines is among the most flood-affected countries on the planet (Hu et al, 2018), and is expected to experience worsening risks from flooding as a result of climate change (Cruz et al, 2017). Climate change is leading to warmer temperatures in the atmosphere, which allows the atmosphere to hold more moisture which can then fall as rain. Warmer temperatures can also increase evaporation from the ocean. These factors can combine to produce extremely powerful rainfall and resulting freshwater flooding (US EPA, 2024).

In a 2015 report, the WHO and UNFCCC modeled flood risk as one of the key health hazards that is expected to worsen as a result of climate change. Under a high emissions future scenario, the Philippines could see an additional nine (9) or more days of heavy rainfall and potential flooding every year (WHO, 2015).

Increasing urbanization means that larger numbers of people are now living in areas where paved surfaces and concrete dominate the landscape. These “impermeable surfaces” do not absorb water when it falls as rain, and instead lead to immediate runoff. This can lead to flash flooding in urban areas.

Settlement of low-lying areas, including the floodplains of rivers, puts large numbers of people and their homes and possessions at risk from flooding. As the population in low-lying areas increases, more and more people are expected to be exposed to flooding risks.

# Factors Affecting Typhoon Risk in the Philippines
## For Providers

**The Philippines is one of the countries most frequently impacted by typhoons, particularly in the northern and eastern regions (Holden & Marshal, 2018). Its geographical location, combined with an increasing population in coastal and flood-prone areas, heightens vulnerability to these events. Climate change has further exacerbated these risks by influencing typhoon behavior and intensifying storm impacts, including higher wind speeds, heavier rainfall, and more frequent storm surges.**

Typhoons, also known as tropical cyclones in scientific literature, have threatened the Philippines since record-keeping began. Disaster preparedness efforts in the country have reduced mortality rates during typhoons, showing the Philippines' extensive experience in managing these hazards (Huang et al, 2024). However, several features of typhoons, such as their intensity, track, rainfall, and intensification rate, appear to be connected to climate change and may contribute to increased risk.

Global analyses of tropical cyclones in recent decades suggest these storms are increasingly moving poleward, becoming more powerful, undergoing rapid intensification (gaining size and strength quickly), slowing in movement (resulting in prolonged impacts), and producing heavier rainfall (IPCC AR6, 2021). In the Northern Western Pacific, storm tracks are migrating poleward, which may explain the lack of a clear trend toward increasing storm intensity in this region compared to other ocean basins (Kossin et al., 2019). While evidence does not currently indicate a change in the total number of cyclones, the Philippines is expected to face increasingly hazardous typhoons characterized by heavy rain, high winds, storm surges, rapid intensification, and slower movement in the future (Holden & Marshal, 2018; IPCC AR6 2021).

Sea level rise driven by climate change increases the risk of coastal flooding, particularly during typhoons (IPCC AR6, 2021). This is particularly dangerous during typhoons, when powerful winds can lead to storm surges, causing major destruction in coastal areas. As sea levels continue to rise and typhoons grow stronger, storm surges may threaten new locations and populations previously unexposed to such hazards.

The settlement of coastal areas increases the number of people exposed to hazards such as storm surge flooding and high winds. The Philippines ranks among the top ten countries globally in terms of the number of people living in low-elevation zones by the mid-21st century (Neumann et al., 2015). This trend indicates that the country will likely continue to have large populations residing in high-risk areas for the foreseeable future.

# Recognition and Management of Typhoon and Flood Related Health Conditions
## For Providers

Typhoons and flooding are associated with a wide range of acute and subacute illnesses and injuries. The following section provides an overview of anticipated clinical presentations during the immediate, early, and late stages of a typhoon and/or flooding disaster and general information about diagnostic and management considerations. **This resource is not intended to replace the good clinical judgment of health professionals nor is it intended to supersede policies or treatment guidelines** related to specific diseases or conditions. Further reading including clinical practice guidelines and other reference materials related to specific conditions mentioned in this section are provided in the Appendix.

## Immediate Health Impacts

The immediate health impacts of typhoons and flooding are related to the direct effects of floodwaters, high winds, and related traumatic injuries. Cases may include drownings, near drownings, blunt trauma from the effects of floodwaters, collapsed buildings, blown debris, motor vehicle accidents, falls, lacerations and puncture wounds, electrocutions related to damaged infrastructure, and acute stress reactions. Recognition and diagnosis of these conditions are typically based on history and clinical examination, with adjunct testing including chest X-rays for drowning/near drowning cases and standard diagnostics for traumatic injuries in accordance with current trauma guidelines. While most management decisions can be taken following standard guidelines for these conditions, special clinical considerations in the setting of typhoons and flooding include the following:

- Consider antibiotic prophylaxis for wounds or lacerations that come into contact with floodwater, which is often contaminated with a wide variety of infectious agents. Injuries that come into contact with floodwater carry a high risk of subsequent wound infection.
- While overall evidence for antibiotic prophylaxis in drowning or near drowning events involving respiratory aspiration of water is mixed, consider antibiotic prophylaxis for near drownings in the context of flooding, given the high rates of microbial contamination in floodwaters.
- Consider Tetanus immunization for individuals with wounds and lacerations when appropriate.
- Consider referrals to post-disaster mental health resources and counseling services for patients experiencing acute stress reactions or other mental health impacts when appropriate.

## Immediate Health Effects (1 to 2 Weeks After Typhoon or Flood)

In the first 1 to 2 weeks after a typhoon or flood, infectious diseases including pneumonia, viral respiratory infections, cellulitis, and gastroenteritis are a substantial concern. Clinical diagnosis may be sufficient in many cases; X-ray imaging and laboratory testing in accordance with local guidelines can facilitate the diagnosis of some conditions. Treatment with antimicrobials should be based on local guidelines and antibiotic resistance data. While most management decisions can be taken in accordance with standard guidelines for these conditions, special clinical considerations in the setting of flooding include the following:

- Infectious etiologies of pneumonia in the post-flood setting include fungal pneumonia, aspiration pneumonia, atypical pneumonia, and polymicrobial infections. Consider expanded antibiotic coverage and in some cases initiation of antifungal therapy and/or referral to higher levels of care for severe cases.
- Many patients will experience viral respiratory infections such as COVID-19 and influenza in the post-flood setting, particularly in the context of evacuations, mass care, and congregate sheltering. Consider mask use, hand hygiene, and other steps to prevent further transmission of viral infections. Testing people for infection may help identify cases and help people and emergency teams take steps to prevent further transmission of these infections.
- Gastroenteritis is a substantial concern in populations affected by extreme rainfall and/or flooding. A wide variety of infectious agents have been documented; see table. Consider early antimicrobial therapy in accordance with local guidelines for the suspected infectious agent, and encourage WASH activities to prevent onward transmission. Ensure adequate hydration, including access to and use of Oral Rehydration Solution. Assess patients for clinically significant dehydration. Patients who are unable to drink oral fluids may require intravenous fluid administration and/or hospitalization.
- Many patients will experience skin and soft tissue infections, including cellulitis. Risk is high in patients who had direct contact with floodwaters. Consider early initiation of antibiotics in accordance with local guidelines for the treatment of cellulitis. Maintain a high index of suspicion for necrotizing skin and soft tissue infections, which require early initiation of broad-spectrum antibiotics and emergent surgical debridement.
- Leptospirosis infections are a common problem after flooding events and typhoons in the Philippines. Research in the Philippines has shown that leptospirosis can survive in salty or brackish conditions, so clinicians should maintain an index of suspicion for leptospirosis in settings affected by coastal flooding in addition to settings affected

by river flooding. In rural areas where screening and diagnostic services may be limited, clinicians must be able to recognize clinical manifestations and identify patients requiring hospital admission for timely referral to facilities with the necessary services. It is essential to screen for and treat leptospirosis following established guidelines (see Appendix) and ensure the availability of post-exposure prophylaxis. Additionally, a proper referral system should be in place to manage cases efficiently and prevent complications.

**Table 2:** Pathogens associated with waterborne infections during and after floods.

| PATHOGEN(S) | IMPACT OF FLOODING | EXPOSURE MECHANISM |
|---|---|---|
| Cryptosporidium, G. lamblia | Increased discharge from water treatment plants, industry, and animal-feeding operations due to flooding and infrastructure damage | Increased because of higher pathogen burden in water sources |
| V. cholerae, hepatitis A virus, and other fecal pathogens | Compromised WASH infrastructure (e.g., wells and potable water sources) due to damage from flooding and extreme events | Increased because of higher pathogen burden in water sources |
| Leptospira, staphylococcus, hepatitis A virus, rotavirus | Increased pathogen mobilization and transport due to stormwater runoff and sewage overflow | Increased because of more frequent exposure to contaminated surface water (e.g., floodwater) and soil (e.g., mud) |
| Escherichia coli O157:H7 and other fecal pathogens from animal and human sources | Increased runoff from nonpoint sources (e.g., livestock manure, wildlife, or septic system); groundwater contamination with fecal pathogens during heavy precipitation in regions with insufficient water treatment; overwhelmed water treatment, resulting in contamination of water sources and river and lake sediments | Increased because of higher pathogen concentrations in surface water |

## Delayed and Long-term Health Impacts

The health impacts of flooding and typhoons can extend for months or years following a disaster. Impacts may result from altered infectious disease dynamics and exposures, toxic exposures, mental health impacts, disruptions in access to health care, and disruptions in livelihoods, housing, and other social determinants of health.

***Infections:*** During the weeks and months following a flood or typhoon, debris can provide a breeding ground for mosquitoes and other disease vectors and a suitable habitat for mold and fungi, while WASH infrastructure may be insufficient, and many individuals will reside in congregate living situations, either temporarily or permanently.

- Maintain a high index of suspicion for vector-borne illnesses such as malaria and dengue, and proceed with diagnostics and treatment in accordance with guidelines from public health authorities and relevant medical bodies.
- Consider atypical organisms such as mycobacteria, mold, and fungi when evaluating patients with skin infections.
- Consider Hepatitis A and Hepatitis E in patients with relevant symptoms who have potential exposures related to impaired WASH facilities and/or contaminated water.
- Consider tuberculosis in patients with relevant symptoms who have had to reside in congregate living situations following a flood or typhoon.
- Consider schistosomiasis in patients with exposure to potentially contaminated water.
- Consider respiratory irritation or allergies due to mold growing in recently flooded structures in patients presenting with new respiratory or allergic symptoms.

***Toxic Exposures:*** Toxic exposures may occur during and after floods. People who run generators indoors can die from carbon monoxide poisoning. In addition, floodwaters can mobilize heavy metals and/or toxic chemicals into the drinking water supply, flooded agricultural land, or other locations. Health risks depend on which toxins are released and the extent of exposure to them. After flooding, monitoring may be done to assess air and water quality but is not always adequate to address all relevant hazardous exposures.

- Counsel patients not to run generators or poorly ventilated cooking stoves indoors, as this can lead to carbon monoxide poisoning.

- Counsel patients to discard food that has come into contact with flood waters.
- Counsel patients to drink water from safe sources that are unlikely to be contaminated by chemicals or heavy metals.

See Table 3 for a description of potential toxic exposure pathways and risks.

***Mental Health:*** Floods and typhoons are associated with substantial mental health impacts. Studies in the Philippines have reported anxiety, depression, and PTSD following major storms; these results are similar to findings from research in other settings around the world.

- Consider screening impacted individuals for disaster-related mental health conditions through clinical interviews and/or validated screening tools (see Appendix). Additionally, expand screening efforts to include adjustment difficulties, substance use behaviors, and stress responses.
- Consider culturally responsive interventions within the community (i.e. faith-based support, community health circles, traditional healing methods, etc.) which may place crucial in recovery.
- When feasible, consider providing connections to psychosocial support for at-risk individuals (people with chronic diseases, older persons, people with disability, low-income and marginalized communities, etc.).
- Consider recognizing the impact on children and adolescents, who may exhibit regressive behaviors, difficulty sleeping, etc. and provide structured routines, emotional validation, and safe spaces for expression can help support their well-being during and after disasters.
- Interpersonal violence and intimate partner violence have been identified as post-disaster risks in the Philippines, particularly for women. Consider screening and referral as appropriate. In addition, consider promoting protective community mechanisms such as safe shelters, peer networks, and emergency response protocols to reduce risk.
- Refer to your established referral pathway to local mental health services and community-based networks to ensure that patients receive appropriate specialized or non-specialized psychiatric care.

***Access to Health Care:*** Disruptions of access to health care are frequent following floods and typhoons. Displacement of populations, destruction of medical facilities, interruption of medical supply chains, impacts on health care workers, and financial constraints can all contribute to reduced access to health care. Loss of access to care can contribute to adverse health outcomes for patients with pre-existing medical conditions or chronic health needs and can result in underdiagnosis and undertreatment of disaster-related health.

- Consider the need for continuity of access to chronic medications when caring for displaced persons, and consider temporary substitutions if supply chains are disrupted.
- Encourage patients to keep a written list of their medications in case they need to access care in a new setting.
- Coordinate with the Provincial Health Office, Provincial Department of Health Office, or the Department of Health Regional Office to pre-stock essential medicines and supplies to prevent shortages during emergencies.
- Assess health care infrastructure in low-resource settings to identify gaps in care delivery and establish care navigation and coordination during disasters.
- Build linkages with nearby provinces or regions to ensure timely support and resource-sharing when local capacities are overwhelmed.

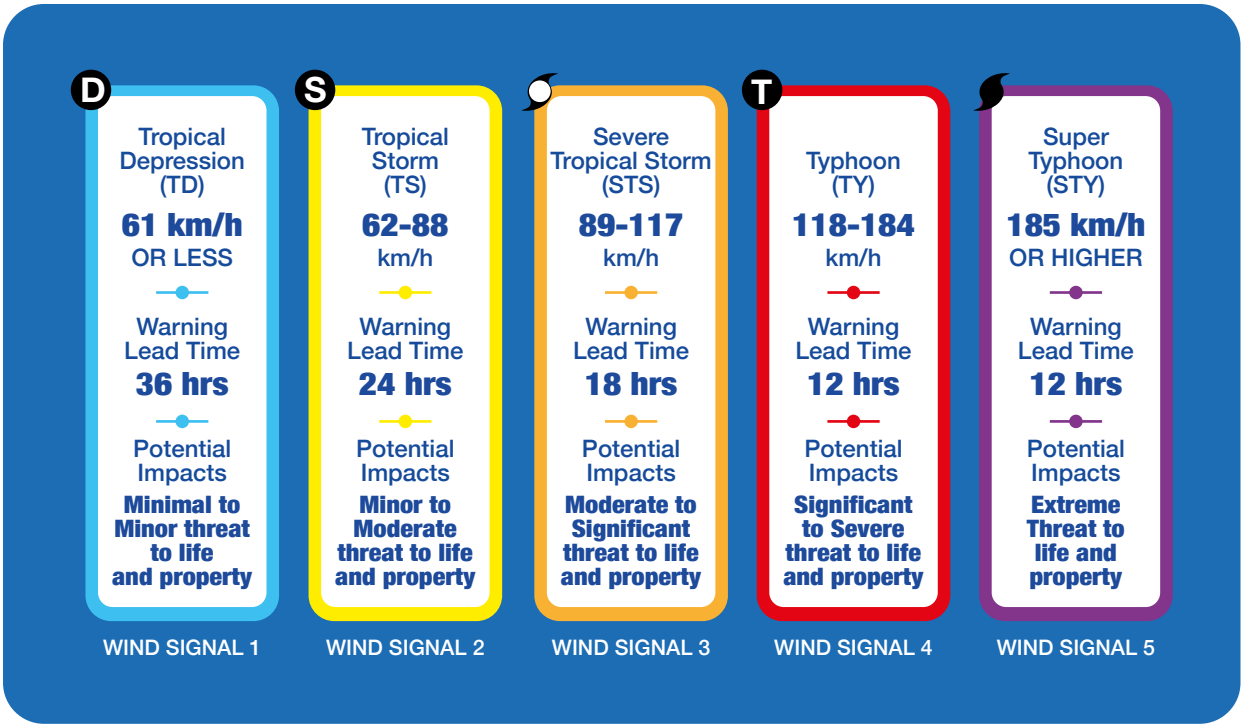
**Table 3:** Toxic exposure pathways and risks following typhoons and flooding.

| TOXIC EXPOSURE | EXPOSURE PATHWAY | ADVICE FOR PATIENTS |
|---|---|---|
| Carbon Monoxide | Running generators indoors | Don't use generators indoors |
| Lead and other heavy metals | Mobilization into floodwaters | Drink and bathe in water from uncontaminated sources |
| Industrial chemicals | Mobilization into floodwaters | Avoid contact with floodwaters |
| Gasoline ingestion or fumes | Siphoning gasoline or storing gasoline indoors | Do not siphon gasoline; do not store fuel indoors |

# Prevention of Health Harms from Floods and Typhoons
## For Providers

Anticipatory guidance (guidance given in advance of a forecasted event), and other actions not only reduces health impacts but also helps patients feel more in control, lowering anxiety and distress by providing clear steps to follow before, during, and after an emergency. An **anticipatory guidance script is provided in the Appendix,** which includes questions to ask your patients related to the following key topics. **Information, Education, and Communication (IEC) materials for patients** on preventing health harms from flooding and typhoons are available as part of this toolkit. These can be used to help your patients/clients make typhoon and flood action plans, so that they know what to do before, during, and after these events.

**Figure 1:** Tropical Cyclone Wind Signal from PAGASA.




Make sure patients know where to get information about typhoon and flood warnings and forecasts for heavy rainfall. PAGASA, local media, and local authorities are useful sources of information about imminent typhoons and flood risk. PAGASA provides tropical cyclone advisories, bulletins, and alerts, along with a Basin Hydrological Forecast that includes details on Flood Watches and Flood Advisories. These updates can be accessed through this link https://www.pagasa.dost.gov.ph/flood#flood-information

**Figure 2:** Flood Warning Icons from PAGASA.

| ICON | DESCRIPTION | FORECAST | ACTION / RESPONSE |
|---|---|---|---|
|  | **Flood Monitoring**<br>*Telemetered:* Slow rise in water level but still below alarm level<br>*Non-Telemetered:* Monitor for possible flooding area | *Telemetered:* Flood is possible<br>*Non-Telemetered:* Light to Moderate Rainfall | *Telemetered:* Flood is possible<br>*Non-Telemetered:* Light to Moderate Rainfall |
|  | **Flood Alert**<br>*Telemetered:* Water level is continuously rising but still below critical level<br>*Non-Telemetered:* Alert for possible flash floods and landslides | *Telemetered:* Flood is threatening<br>*Non-Telemetered:* Moderate to Heavy Rainfall | *Telemetered:*<br>*Non-Telemetered:* Advised to be alert for possible flood, flash flood and landslides |
|  | **Flood Warning**<br>*Telemetered:* Water level is above critical level<br>*Non-Telemetered:* Flood is occuring immediate action is recommended | *Telemetered:* Flood is occuring<br>*Non-Telemetered:* Heavy to Intense Rainfall | *Telemetered:*<br>*Non-Telemetered:* Advised to take appropriate action |
|  | **Severe Flood Warning**<br>*Telemetered:* Water level is continuously rising above critical level<br>*Non-Telemetered:* Flood is persisting force evacuation is recommended | *Telemetered:* Flood is persisting<br>*Non-Telemetered:* Intense to Torrential Rainfall | *Telemetered:*<br>*Non-Telemetered:* Advised to force evacuation |
|  | **Final**<br>*Telemetered:* Slow recession of water level<br>*Non-Telemetered:* Light rains | Flood is no longer possible | |

Make sure people understand the risks where they live and work. It is important to understand that flooding risks are typically present during typhoons, and that in addition, typhoons bring additional risks related to high winds, coastal storm surges, flash floods, and landslides, especially for those living in river valleys, on hillsides, or the mountains.

Flood risk depends on many factors including rainfall, geography, volume of recent rainfall, the built environment, and proximity to rivers (and their levels). If available, maps of flood risk can help patients and their caregivers assess whether they live in a location at risk from flooding. Individuals can check the flood risk for their home's location on this website at https://noah.up.edu.ph/know-your-hazards/flood. This site will give people the likelihood that flooding will occur at their address. Historical experience may underestimate the risk of the increasingly powerful rainstorms that are now occurring as a result of climate change.

Typhoons cause flooding and also bring risks related to high winds and coastal storm surges. It is important for people living in coastal areas to understand the risks related to storm surge, which is one of the most deadly hazards associated with these storms. The risks from storm surges and the exposure to storm surges are increasing as a result of both sea level rise and trends toward more powerful typhoons, meaning that people who were previously safe may now be at risk. High winds during typhoons can pose a severe hazard as well, particularly to people living in informal or poorly constructed housing; it is important for people to know where to go to take shelter from high winds and blown debris before a typhoon arrives.

Make sure patients understand how typhoons and flooding can affect their health. Health risks from flooding include immediate risks such as drowning and injuries, as well as post-event risks including soft tissue infections, respiratory infections, disruptions in medical care, and mental health impacts. See the following section "Recognition and Management of Typhoon and Flood Related Health Conditions" for additional information on the specific health impacts of typhoons and flooding. IEC materials are available to help educate patients on these health risks.

Advise patients against walking, swimming, or driving through flood waters. Driving or walking through floodwater has been shown to contribute to a large proportion of flood-related drownings and infections.

Make sure patients understand the importance of obeying directions from local authorities if instructed to evacuate. Evacuation may be the best choice when flooding is expected near a patient's home. Patients can be encouraged to pay attention to local authorities and media outlets for evacuation orders (i.e., through newscasts, reputable social media accounts, or automated alerts on a smartphone).

Make sure patients have a plan for when, how, and where to evacuate. In many cases, local authorities will provide information on available evacuation areas. Older persons, people with disabilities, and other people who may have difficulty with transportation should take extra care to make plans in advance for how they will get to safety.

Responsiveness to evacuation alerts has been found to vary by age, gender, and other factors. Studies in other parts of the world have shown that men and full-time residents may be more likely to want to stay and protect their property, whereas children, older persons, pregnant women, individuals with health concerns, or part-time residents are more likely to evacuate early.

Make sure patients know what to bring when they evacuate. Making a Go Bag is a helpful way to ensure that nothing important gets forgotten and that patients can leave quickly. In addition to the standard items in an evacuation kit, patients should be encouraged to bring a list of their medications, a supply of their medications, and if possible, any essential medical devices they need to maintain their health. **Handouts and checklists on what to pack in a Go Bag are available.** You can provide prescriptions for additional refills of medications so that patients have some to store in their Go Bag.

**Figure 3:** Go Bag

**FOOD AND MEDICINES**

- Drinking water and food that does not spoil easily
- First aid kit and medicines: Alcohol, band-aids, antiseptics, bandage, tweezer, and the list of medicines taken every day with dosage

**IMPORTANT DOCUMENTS**

- Passports, birth and marriage certificates, property and insurance documents, medical records, family photo, etc.
- Government-issued IDs or IDs with blood type and emergency contact details
- Enough money for basic needs, ATM card, or Passbook


**TOILETRIES**

- Clothes, antibacterial soap, toothbrush and toothpaste
- COVID-19 safety kit (face masks, alcohol or hand sanitizer)
- Mosquito repellant, Menstrual pads, diapers, wet wipes

**EMERGENCY TOOLS**

- Blanket, raincoat, paracord
- Radio, flashlight (solar or battery operated) with back-up batteries, fully-charged power bank, whistle
- Pen and notebook, list of emergency contact numbers including barangay and LGU

After a typhoon or flood, if patients have evacuated, they should only return home when authorities say it is safe. There can be substantial dangers associated with return.

- Tell patients to avoid exposure to floodwaters, which can lead to drownings, injury, and infectious diseases.
- Tell patients to boil water or otherwise secure safe drinking water, and to follow standard WASH guidelines. Boiling water will kill bacteria that could lead to infectious diseases.
- There can be toxic exposures when cleaning up after a flood or typhoon disaster, including heavy metals, industrial chemicals, and mold. Alternative sources of safe drinking water will be needed in case of chemical contamination. Boiling water will not be sufficient.
- Patients with respiratory conditions like asthma or other immunosuppressive conditions should be particularly careful with toxins, mold, and infectious exposures during cleanup.
- Debris can be dangerous and lead to traumatic injuries including cuts and punctures, which can lead to tetanus. Tell patients to avoid entering unstable or damaged buildings. Provide tetanus immunizations if patients are not up to date.
- Counsel patients on not using electrical equipment in water as it could lead to electrocution.

It is essential to have an available and accessible list of hotline numbers of the local government units, appropriate agencies, and referral hospitals or institutions offering specialized care to ensure timely coordination during evacuation efforts. These numbers enable health care providers to collaborate effectively with authorities in assisting individuals and communities at risk of flooding and typhoons. Having direct access to these contacts helps streamline emergency responses, prioritize the safety of vulnerable populations, and address urgent medical needs during disasters.

**IEC materials for patients** summarizing these recommendations are available as part of this toolkit.

Advise patients and caregivers that mental health impacts are common following disasters such as typhoons and floods. Encourage them to seek professional attention if they develop symptoms of anxiety, depression, post-traumatic stress, substance use, or other mental health concerns. To support this, capacity building for health care workers is essential, including training in disaster risk communication and mental health and psychosocial support. Regular disaster preparedness training should also be introduced, emphasizing collective and individual counseling through community-based sessions.

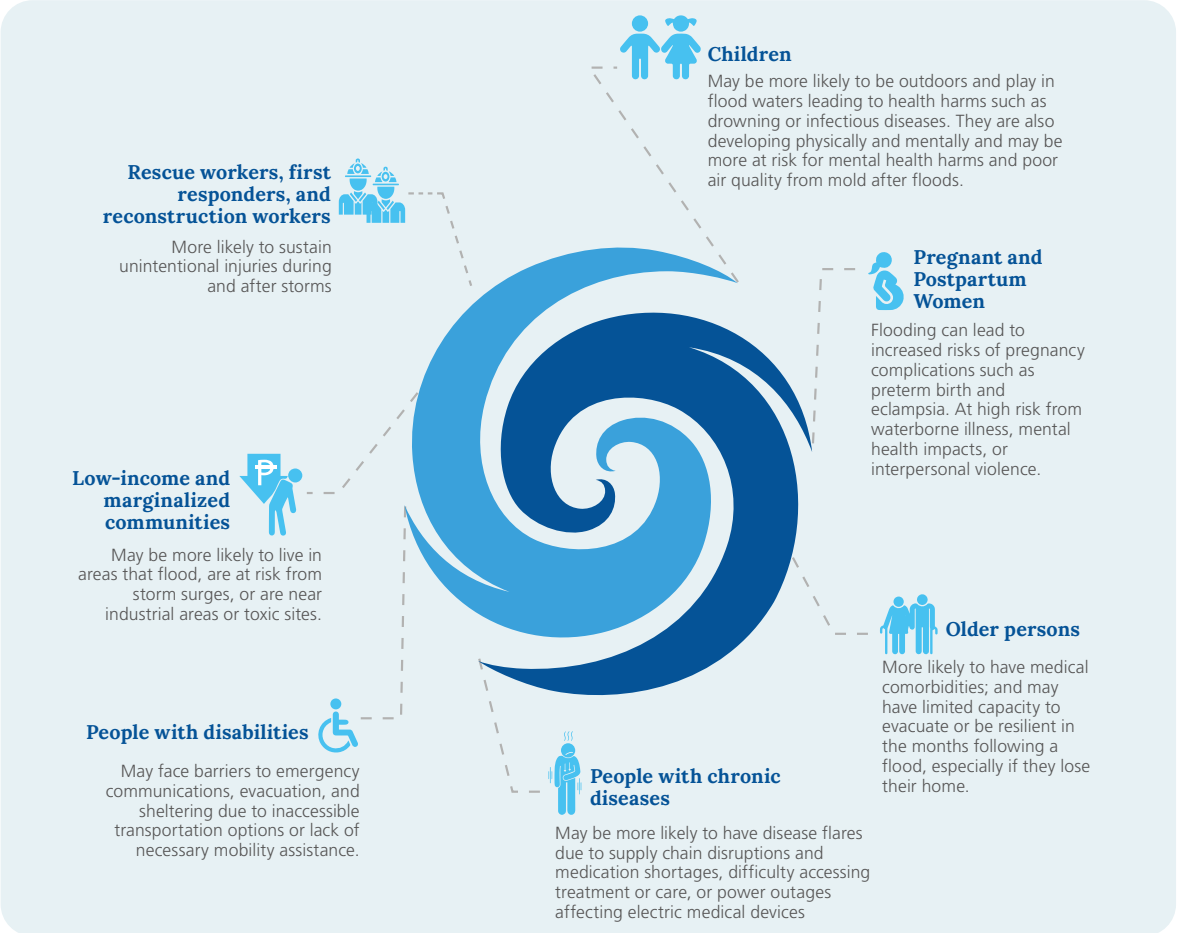
Advise patients with chronic diseases to make sure they bring their medications with them if they have to evacuate, and consider providing them with information (if available) on a backup location in which they can obtain appropriate treatment or medication refills if their usual Health Center, clinic, hospital, or pharmacy is damaged by a typhoon or flood. Interruptions in access to medical care and treatments are a substantial cause of health harms in the aftermath of disasters such as floods; it is important for patients to reestablish care as soon as possible following such events.

# Populations at Elevated Risk During Typhoons and Floods

## For Providers

Some populations are at elevated risk of health problems after floods and typhoons. Patients with pre-existing medical issues, particularly those on chronic medications or other treatments, are at risk of health impacts from interruptions in their care. Children, pregnant and postpartum women, and older persons are at higher risk of health harms due to both physiology and socially mediated risks and dependencies. Rescue workers and reconstruction workers are at risk of injuries during rescue and clean-up operations. Risks specific to each population are described in Figure 5.

**Figure 4:** Population at Elevated Risk During Floods and Typhoons



# Helping Patients Establish a Flood Action Plan

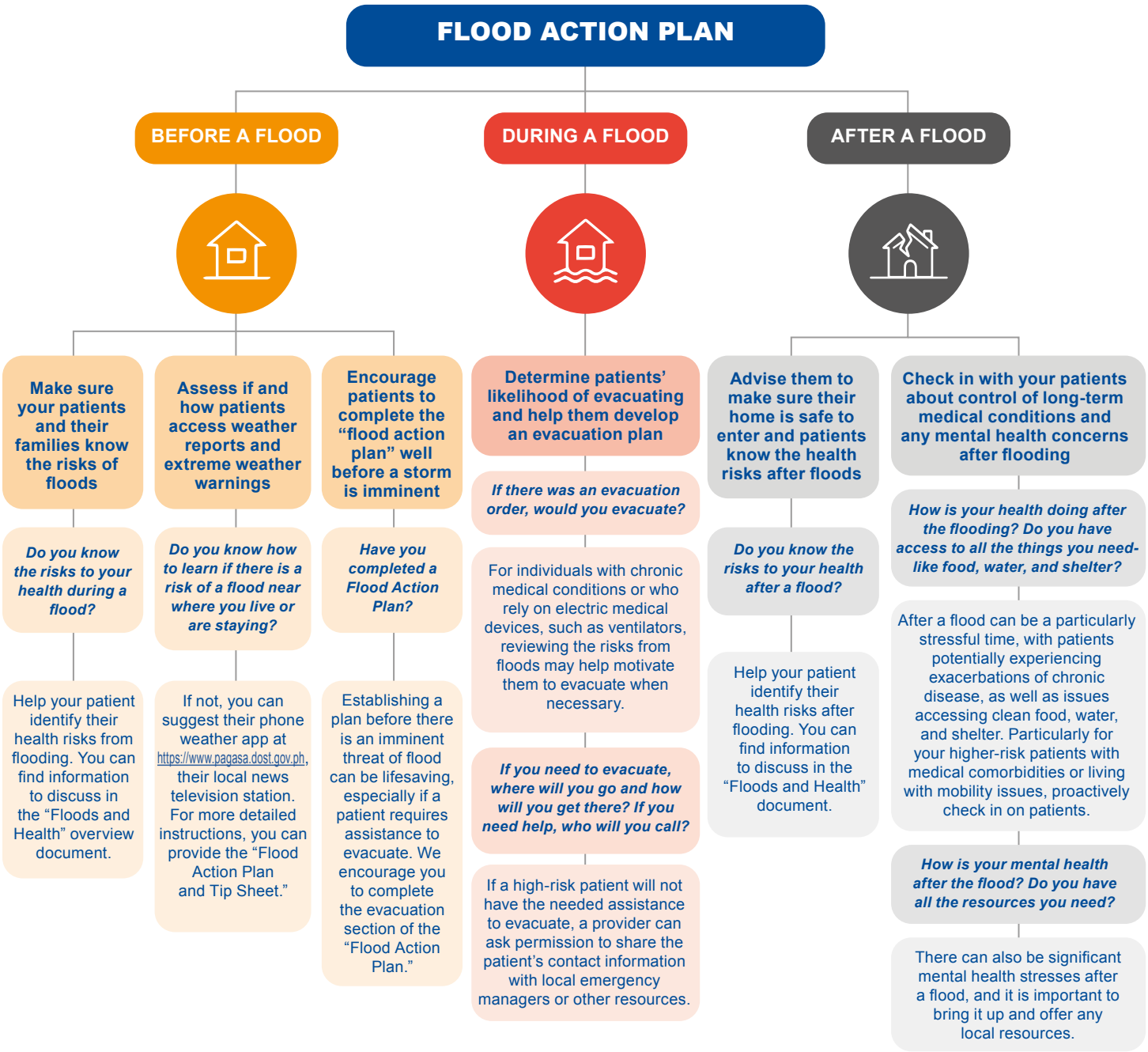
## For Providers

## Purpose

Flooding is increasing in frequency and severity with the changing climate leading to health harms including drowning, infectious disease outbreaks, mold infestations in buildings, mobilization of toxic substances, social upheaval, displacement, and physical and emotional trauma.

Below is anticipatory guidance to help you prepare for the completion of the "Flood Action Plan and Tip Sheet" included in this toolkit with your patients, guiding what to do Before, During, and After a Flood.

**Figure 5:** Flood Action Plan



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# Appendices for Providers

## Appendix A

### Relevant Clinical Practice Guidelines from the Department of Health of the Philippines

Clinical practice guidelines developed by the Department of Health of the Philippines and collaborating organizations are available for a variety of medical conditions or situations that may be relevant following floods and typhoons. The full list of clinical cactus guidelines is available from the Department of Health website (https://doh.gov.ph/dpcb/doh-approved-cpg/); links are provided to the most relevant content here:

CPG: Screening for Mental Health and Addiction
https://drive.google.com/file/d/1Nq-QO0UYMh0MiLWeKmO8CSdcuZyFdlbg/view

CPG: Management of Acute Infectious Diarrhea in Children and Adults
https://www.psmid.org/cpg-for-acute-infectious-diarrhea/

CPG: Diagnosis, Management, and Treatment of Typhoid Fever in Adults
https://www.psmid.org/diagnosis-treatment-and-prevention-of-typhoid-fever-in-adults-2017/

CPG: Diagnosis and Treatment of Adult Tuberculosis
https://drive.google.com/file/d/1v9lVYXYiOjOp01CKSEUkruSM7cHvSoP5/view

CPG: Diagnosis, Management and Prevention of Dengue for Adult and Pediatric Filipinos in the Primary Care Setting
https://drive.google.com/file/d/1jHeKHrAIi_ih9655DZ8K5GcHkQPDv8v9/view

CPG: Immunization for Adults
https://drive.google.com/file/d/15bZXoiltUJxGMlp5wgOMxI70tY6PTplE/view

## Appendix B

### Other Relevant Guidelines for Specific Flood-related Health Conditions

Infectious Diseases

- Yonson, R. (2018). Floods and Pestilence: Diseases in Philippine Urban Areas. Economics of Disasters and Climate Change, 2(2), 107–135. doi:10.1007/s41885-017-0021-2 10.1007/s41885-017-0021-2

Trauma

- WHO Guidelines for Essential Trauma care: https://www.who.int/publications/i/item/guidelines-for-essential-trauma-care

SSTIs

- The Philippine National Antibiotic Guidelines: https://ritm.gov.ph/national-antibiotic-guidelines-2017/

Drowning
- US Military JTS CPG for Drowning: https://jts.health.mil/assets/docs/cpgs/Drowning_Management_17_Mar_2025_ID64.pdf
- Wilderness Medical Society Practice Guidelines for Treatment and Prevention of Drowning: https://journals.sagepub.com/doi/full/10.1016/j.wem.2019.06.007

Electrocution
- Emergency Medicine Practice Guide Evidence Based Review of Electrical Injuries: https://med.fsu.edu/sites/default/files/userFiles/1118%20Electrical%20Injuries%20EMP.pdf

Pneumonia
- Philippine Society for Microbiology and Infectious Diseases CPG for Management and Prevention of Adult Community Acquired Pneumonia: https://www.psmid.org/wp-content/uploads/2021/12/2020-Community-Acquired-Pneumonia-Clinical-Practice-Guidelines.pdf

Leptospirosis
- PhilHealth Policy Statement: https://www.philhealth.gov.ph/partners/providers/pdf/Leptospirosis_Policy_Statements.pdf
- Philippine Society for Microbiology and Infectious Diseases CPG for Leptospirosis: https://www.psmid.org/wp-content/uploads/2020/03/CPG-Leptospirosis-2010.pdf

Hepatitis E
- WHO fact Sheet: https://www.who.int/news-room/fact-sheets/detail/hepatitis-e
- US CDC Guidance: https://wwwnc.cdc.gov/travel/yellowbook/2024/infections-diseases/hepatitis-e

Hepatitis A
- WHO fact sheet: https://www.who.int/news-room/fact-sheets/detail/hepatitis-a#:~:text=Treatment,liver%2C%20e.g.%20acetaminophen%2C%20paracetamol
- US CDC Clinical Care guidance: https://www.cdc.gov/hepatitis-a/hcp/clinical-care/index.html

Emergency Kit Checklist
- UNICEF go bag guidance: https://www.unicef.org/philippines/emergency-go-bag-checklist

Vaccination
- CPG for Adult Immunization: https://www.psmid.org/clinical-practice-guidelines-for-adult-immunization-2018

# Appendix C

## Anticipatory Guidance Template

The following questions are a template to help health professionals provide anticipatory guidance to help their patients prepare for typhoons and floods.

**Part 1: Help Patients Understand Their Risk**

*Ask: Do you know the risks to your health during a flood or typhoon?*
- Help your patient identify their health risks from flooding and typhoons. Examples include drowning, injury, and infections. You can find information to discuss in the list of health impacts provided earlier in this document. IEC materials are also available to help guide this conversation.

*Ask: Do you know how to check if there is a risk of flooding or typhoon impacts where you live or work?*
- If not, you can suggest PAGASA or local television or radio stations. Encourage patients to take steps to stay safe, such as evacuating from low-lying areas before a storm actually occurs, at which point it may be too late.

**Part 2: Help Patients Know What to Do During a Flood or Typhoon**

*Ask: Have you planned what you will do if there is a flood or typhoon?*
- Establishing a plan before there is an imminent threat can be lifesaving, especially if a patient requires assistance to evacuate. Help patients identify critical actions (evacuation, sheltering, etc.) ahead of time.

*Ask: If there was an evacuation order, would you evacuate?*
- For individuals with physical or medical vulnerabilities, reviewing the risks from floods and typhoons may help motivate them to evacuate when necessary.

*Ask: If you need to evacuate, where will you go, and how will you get there? If you need help, who will you call?*
- If a high-risk patient will not have the needed assistance to evacuate, a provider can ask permission to share the patient's contact information with local emergency managers or other resources.

*Ask: Have you prepared an Emergency Kit or Go Bag, including important documents, supplies, and medications?*
- If a patient has not made an emergency kit/Go Bag, you can advise them on being ready to evacuate with critical medicines, documents, and other items; consider providing materials on individual disaster preparedness actions, including emergency kit/Go Bag checklists.

**Part 3: Help Patients Know How to Stay Safe After a Flood or Typhoon**

*Ask: Do you know the risks to your health after a flood or typhoon?*
- Help your patient identify their health risks after flooding and typhoons. Advise patients that the following days and weeks can be a particularly stressful time, with patients potentially experiencing mental health impacts, exacerbations of chronic disease, and issues accessing clean food, water, and shelter. You can find additional information to discuss in the section on the health impacts of flooding earlier in this document.

*Ask: Do you know that damaged or flooded housing can be dangerous to your health?*
- Advise them to make sure their home is safe to enter after a flood or typhoon, and to have a qualified person check for structural problems and for wet areas that can lead to the growth of mold.

*Ask: Do you have a plan for how to keep treating your chronic medical conditions after a flood or typhoon?*
- Interruptions in supply chains and clinic and pharmacy closures can make it difficult for patients to get their usual treatment. Advise patients on where they might be able to go to get appropriate care or necessary medical supplies, if this information is available.