

Historical Healthcare Burdens Associated with Extreme Weather Events at the Belau National Hospital in the Republic of Palau, 2011-2021



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Introduction

Climate change is associated with increased frequency of extreme weather events (EWE), resulting in higher demands on health systems. **EWE increase health care utilization rates** with varying degrees of lagged health impacts depending on the type of event and time to presentation.

The Republic of Palau is a small island state in the Western Pacific that is particularly vulnerable to the health system impacts of EWE, including **typhoons, extreme heat, and prolonged rainfall**.

Materials and Methods

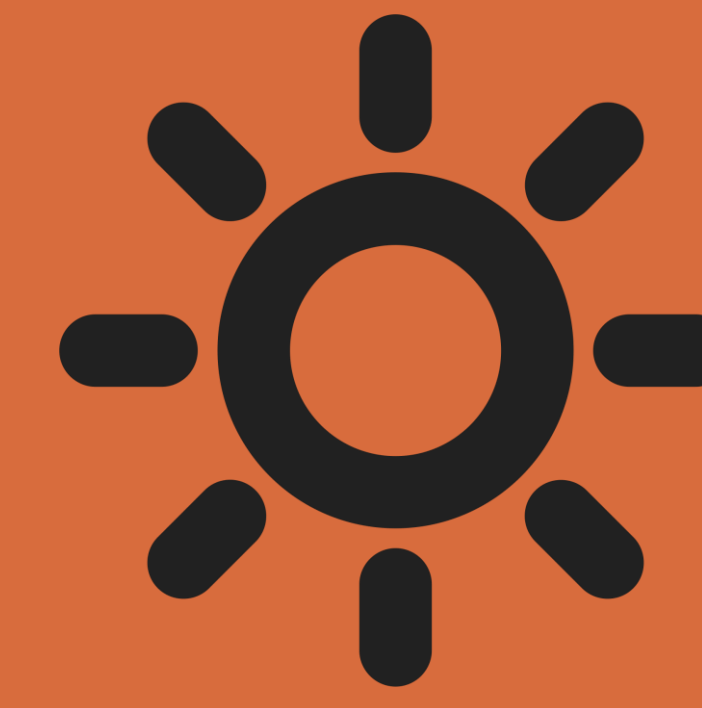
- **Retrospective study** between 2011-2021 at Belau National Hospital, a regional tertiary care hospital
- $n = 22,967$ hospital encounters
- Analyzed deidentified outcome data: **ED visits, ICU admissions, mortality count, and length of stay**
- Average rainfall, ambient temperature, and typhoon event data were extracted from historical climate databases
- Compared **EWE type and cumulative outcome counts at 30-days post-event** using descriptive statistics

Results



Typhoons (storm wind speed ≥ 64 kts)

- Bopha: Nov. 25-Dec. 9, 2012
- Haiyan: Nov. 3-11, 2013
- Surigae: Apr. 16, 2021



Extreme heat (≥ 3 days with daily temperature above 95th percentile)

- September 2011
- May 2015
- March 2016



Prolonged rainfall (≥ 20 inches of precipitation in a month)

- July 2011
- July 2014
- July 2017
- May 2020
- Aug. 2020
- Oct. 2020
- Apr. 2021
- May 2021
- Oct. 2021

Table 1. Comparison of healthcare utilization metrics by extreme weather event type within 30 days following event Day 0

	Typhoons (n=3)	Heat events (n=3)	Rainfall events (n=9)
Median ED visits (IQR)	853 (846-873)	928 (782-990.5)	741 (710-806)
Median ICU admissions (IQR)	157 (133.5-157)	169 (159.5-169.5)	197 (107-145)
Median mortality (IQR)	16 (12.5-19.5)	14 (12.5-15)	11 (9.5-11.5)
Median LOS	4	4	4

Primary Outcomes

- Highest median ED visitation during extreme heat events
- Highest median ICU admissions during prolonged rainfall periods

Secondary Outcomes

- Highest median mortality during typhoon events
- No difference in median length of stay between EWE type

Conclusions

- **Higher rates of acute care service utilization**—e.g. ED visits—following **heat events**, consistent with acute exacerbations of existing pathology secondary to heat stress
- **Higher rates of critical care service utilization**—e.g. ICU admission—following **prolonged rainfall**, consistent with delayed pathology associated with rainfall like vector-borne diseases
- **Higher mortality rates** following **typhoons**, consistent with immediate post-event traumatic causes of mortality
- Further study into **LOS causes**

As the first study of its kind in Palau, these results provide a description of the post-EWE healthcare resource utilization patterns in Palau.

Future Directions

- 1 Evaluate **inferential associations** between EWE type, outcomes using a **lagged distribution Poisson model**
- 2 **Match counts** for post-event periods—e.g. day 0, day 4, day 30—to analyze **temporal associations with healthcare demands**
- 3 Include **additional regional hospitals** as well as **receiving facilities** to analyze off-island **medical transport utilization rates**.

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Further Information

Please email the primary point of contact for this study, alessandra.santiago@cuanschutz.edu, with any questions or comments. Additional references available upon request.

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