Is Healthcare access affected by Extreme Weather Events in Miami, Florida?
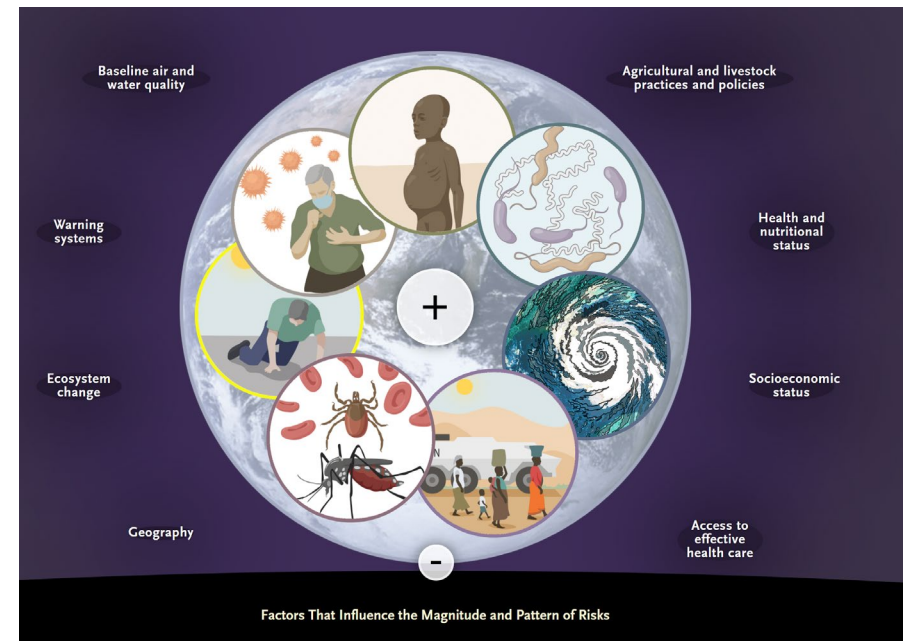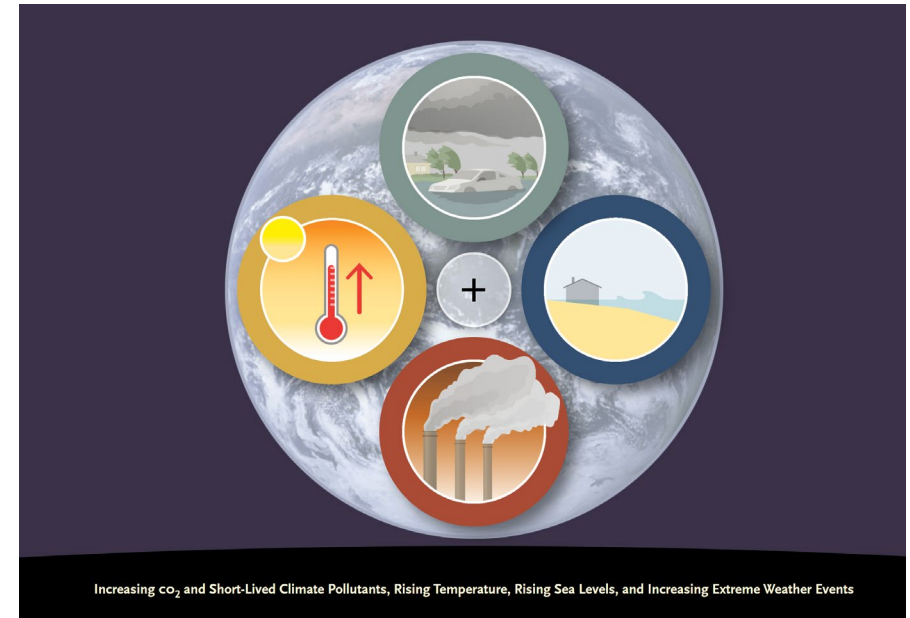# An exploratory study of outpatient HIV clinics.

Climate & Health Symposium
May 6th, 2022

University of Miami
Department of Public Health Sciences
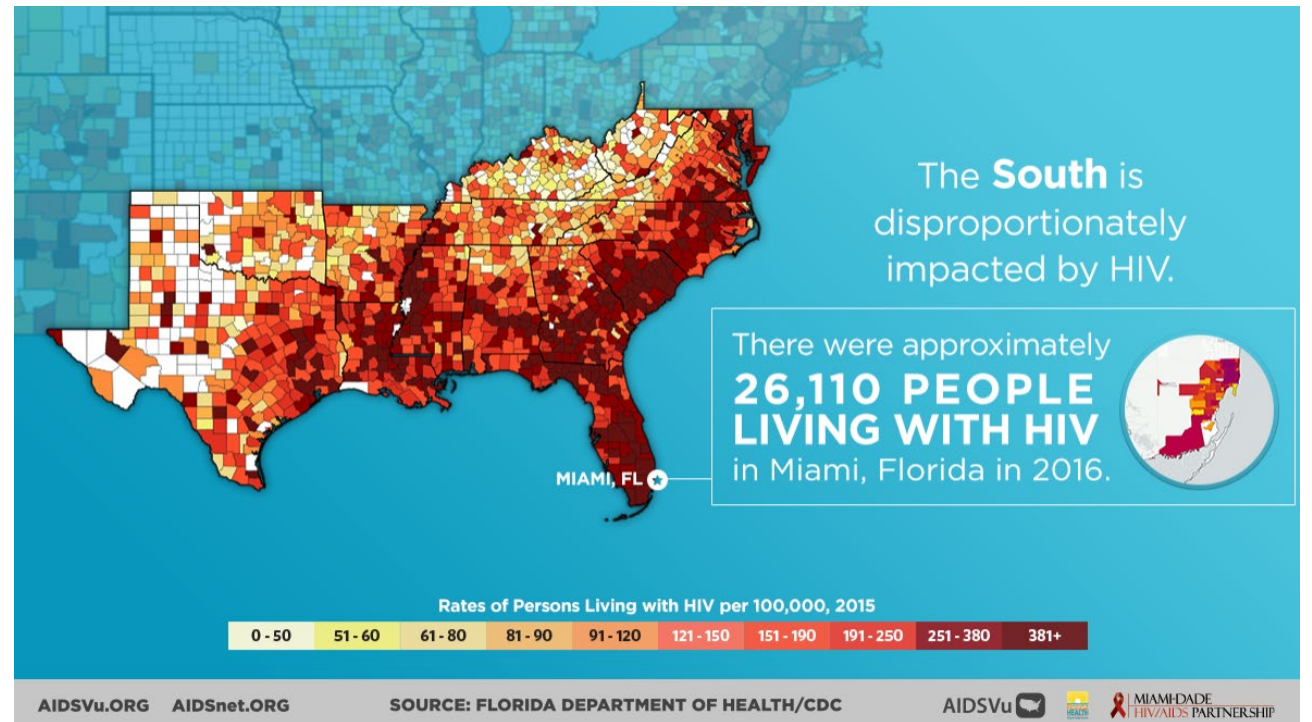**Department of Neurological Surgery**
Department of ObGyn

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Background

- The adverse **health effects** of climate change are a **growing public health problem**

- Urgency to address the directly and indirectly associated **consequences of   Extreme Weather Events (EWE)**

- **Transdisciplinary approaches are needed** to address climate change, from agriculture to healthcare
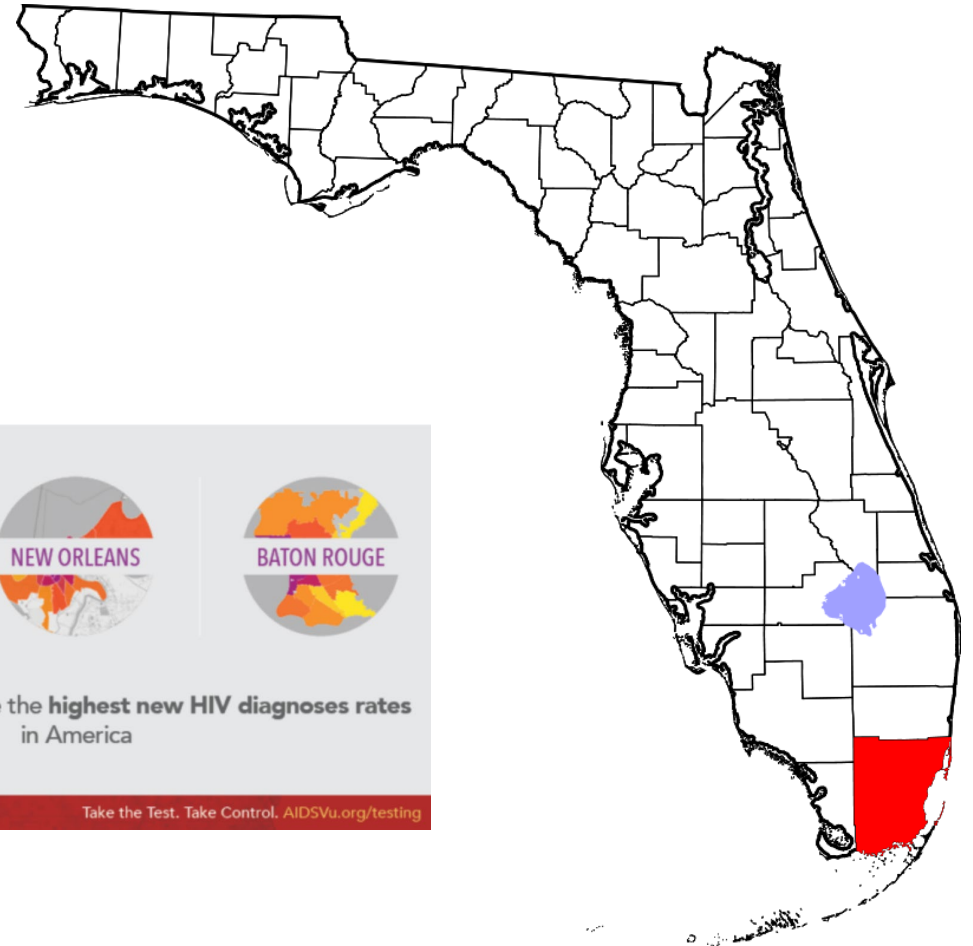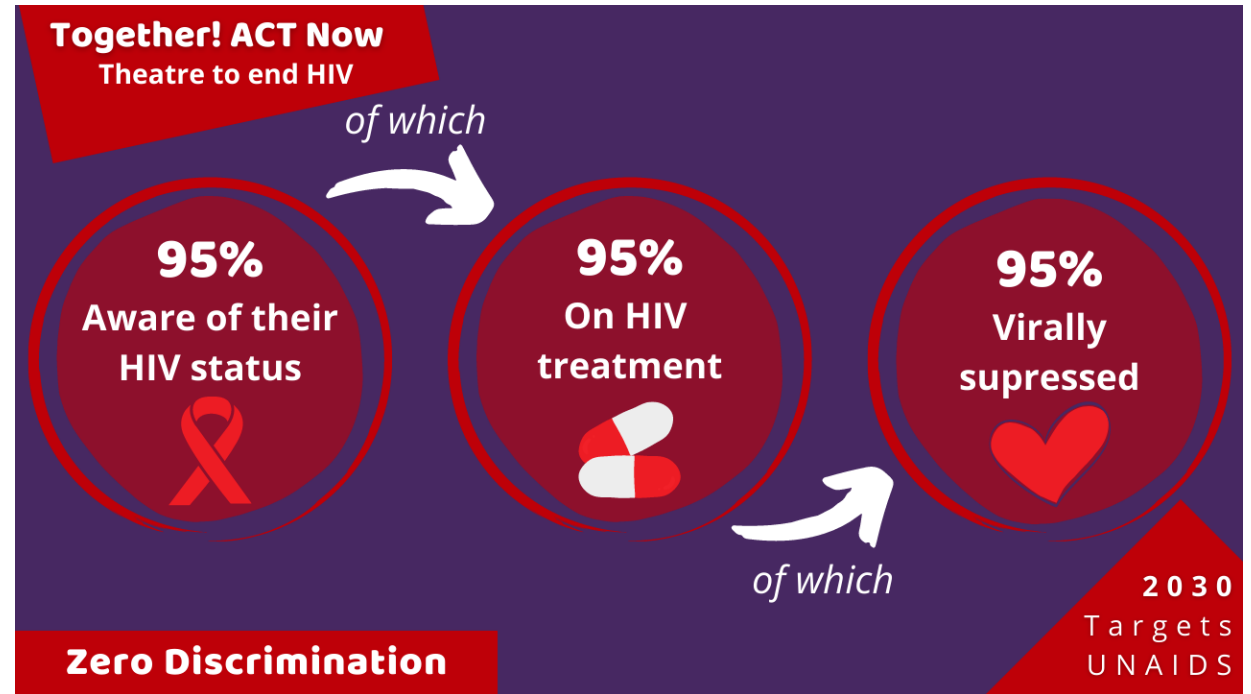

(Haines and Ebi NEJM 2019)

HIV

The **South** is disproportionately impacted by HIV.

There were approximately **26,110 PEOPLE LIVING WITH HIV** in Miami, Florida in 2016.

MIAMI, FL

Rates of Persons Living with HIV per 100,000, 2015

| 0 - 50 | 51 - 60 | 61 - 80 | 81 - 90 | 91 - 120 | 121 - 150 | 151 - 190 | 191 - 250 | 251 - 380 | 381+ |

AIDSVu.ORG   AIDSnet.ORG   SOURCE: FLORIDA DEPARTMENT OF HEALTH/CDC   AIDSVu   MIAMI-DADE HIV/AIDS PARTNERSHIP

Southern U.S. houses:
nearly **40% of all population**
approximately **45% of all PLWH**
- Almost **50% of all new HIV diagnoses** in 2019

HIV

Miami, Florida, has the highest HIV infection rate in the United States.

MIAMI   NEW ORLEANS   BATON ROUGE

…these three cities have the **highest new HIV diagnoses rates** in America

AIDSVu   Take the Test. Take Control. AIDSVu.org/testing

HIV

Together! ACT Now
Theatre to end HIV

of which

95%
Aware of their HIV status

95%
On HIV treatment

95%
Virally supressed

of which

**Zero Discrimination**

2030
Targets
UNAIDS

In MDC, the HIV/AIDS treatment cascade is as follows:
- **64%** of diagnosed PLWH are in regular care
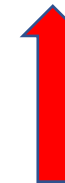- **60%** of those in care were virologically suppressed—preventing transmission in the community

Understanding the influence of EWE on the healthcare for PLWH may increasingly become an important factor towards better control of the HIV epidemic.

Previous study
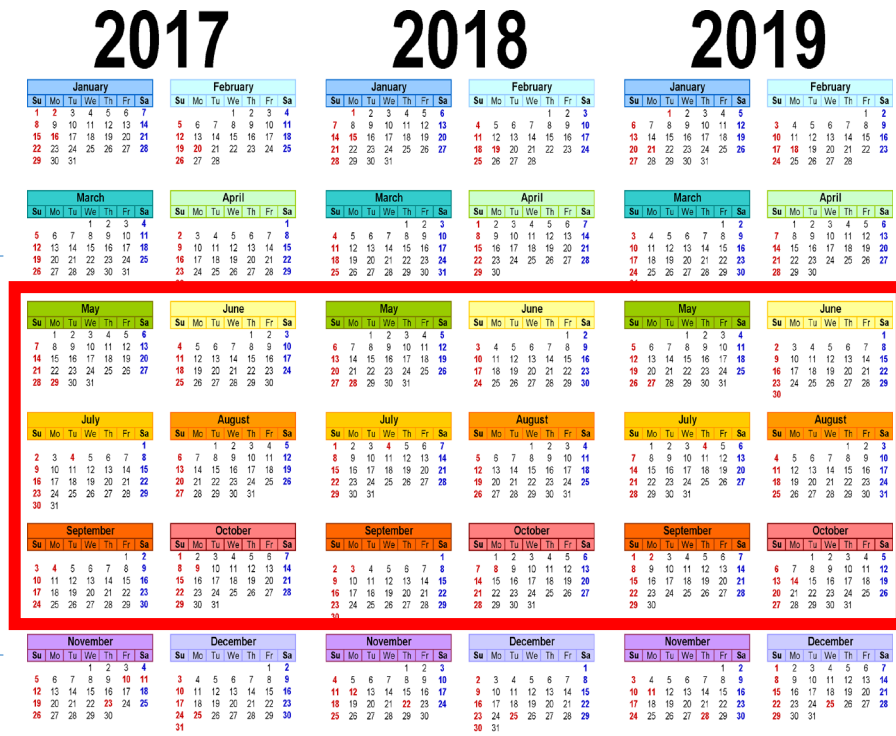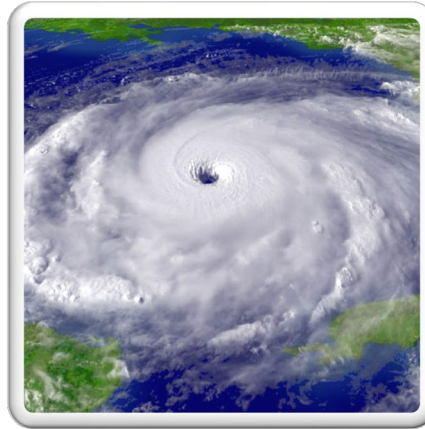
2017   2018   2019

Heat Index >100°F   **14%** Clinic **'No-show' (RR)**
Precipitation 1-2 in   **16%** Clinic **'No-show' (RR)**
Precipitation >2 in   **13%** Clinic **'No-show' (RR)**

Samano, D., Saha, S., Kot, T. C., Potter, J. E., & Duthely, L. M. (2021). Impact of Extreme Weather on Healthcare Utilization by People with HIV in Metropolitan Miami. *International journal of environmental research and public health*, *18*(5), 2442. https://doi.org/10.3390/ijerph18052442

Aims

Observational, descriptive, ecological study

1) To examine the relationship between EWE and PLWH accessing outpatient HIV clinics by race and ethnicity in Miami, Florida from 2015-2019

2) Document the study's methodology for reproducibility in different climatological regions, other out-patient settings, in the US or internationally

3) Present results to stakeholders to improve health outcomes for PLWH and to inform future health policy
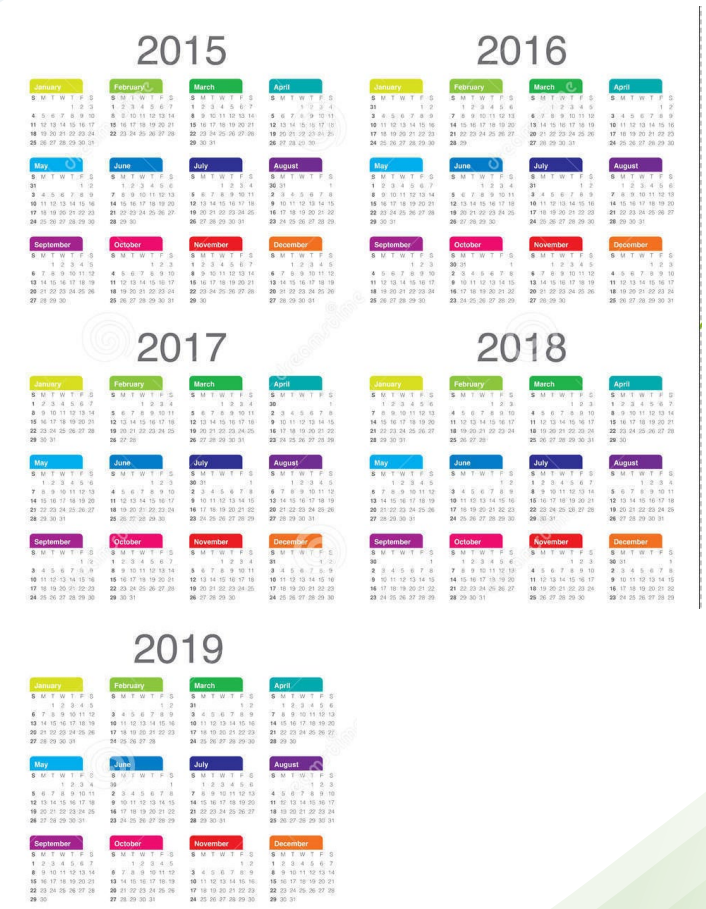
Methods & Results

1. Weather Data (1990-2019)

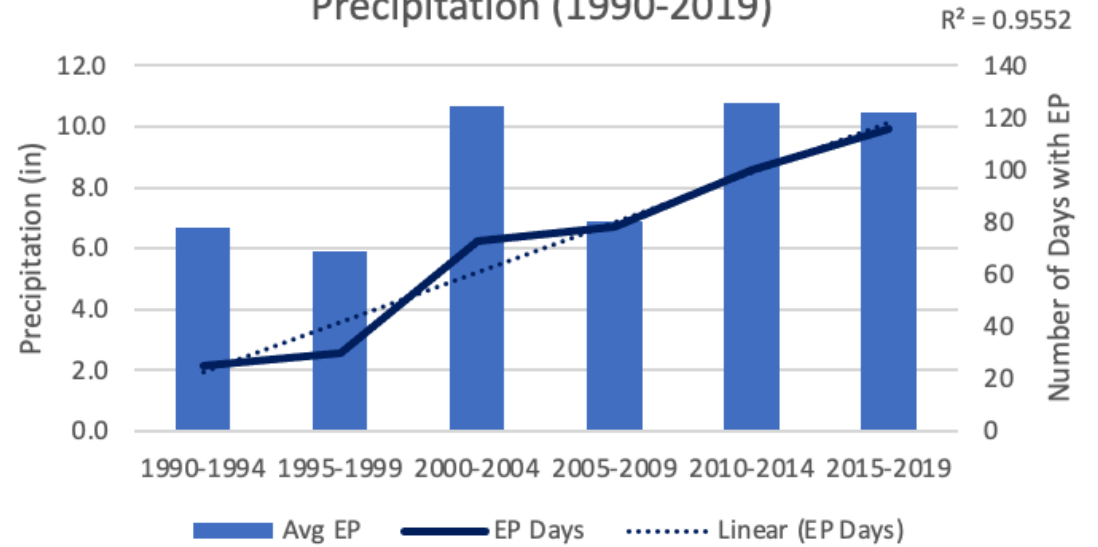2. Outpatient HIV Clinics registry

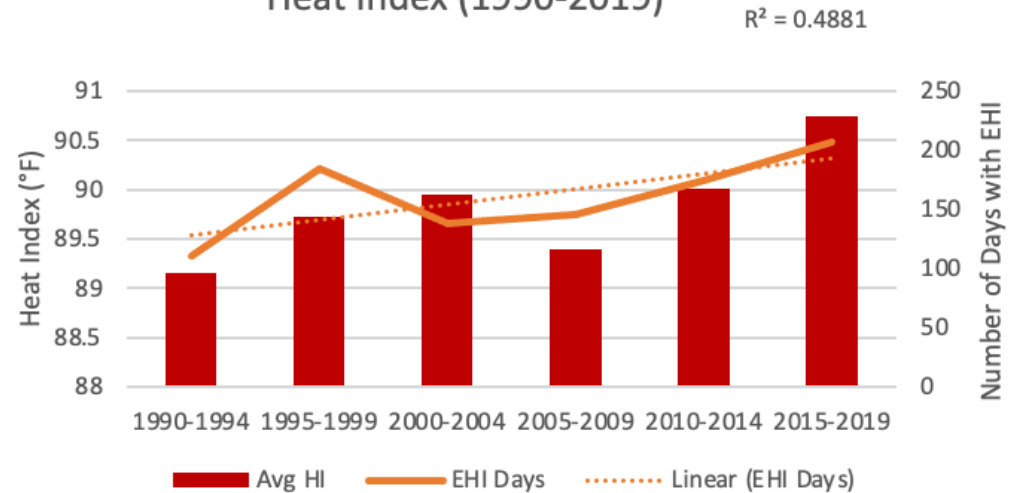3. Association between EWE and Clinics (Poisson Regression)

1. Weather Data (1990-2019)

Average Precipitation vs # of Days with Extreme Precipitation (1990-2019)

R² = 0.9552

Legend: Avg EP — EP Days ······· Linear (EP Days)

Average Heat Index vs # of Days with Extreme Heat Index (1990-2019)

R² = 0.4881

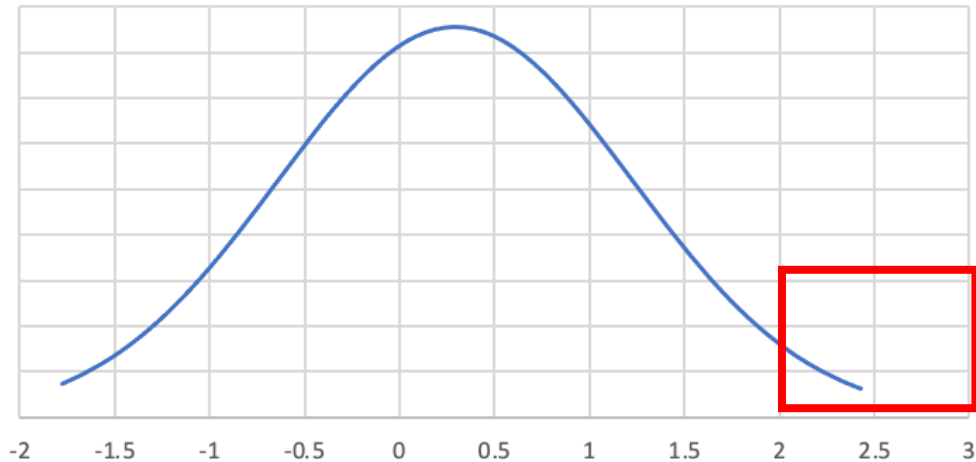Legend: Avg HI — EHI Days ······· Linear (EHI Days)

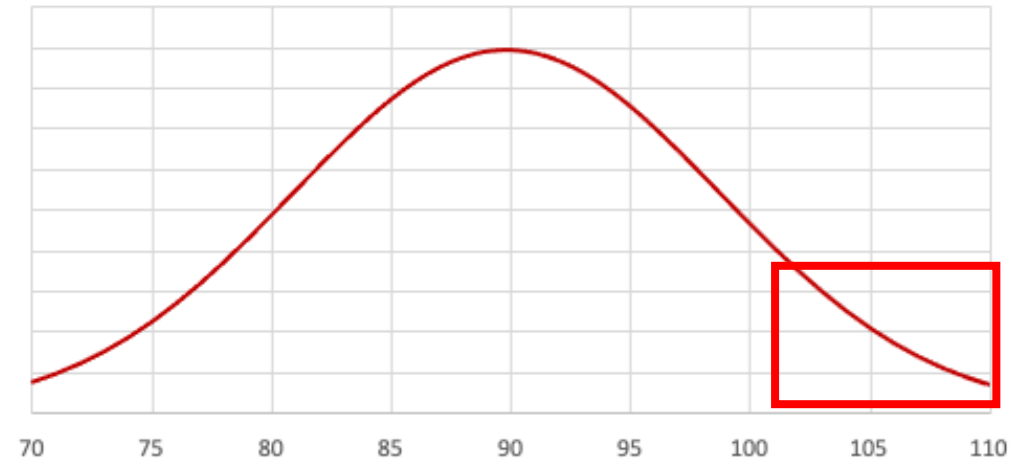Local Definition of Extreme Weather Events (EWE).

Retrospective analysis:

a. **30 years of *weather data*** obtained from NOAA database at HIV-Clinics Zip Code

b. Local EWE were defined as greater than or equal to **90th percentile** of daily values in 3 decades

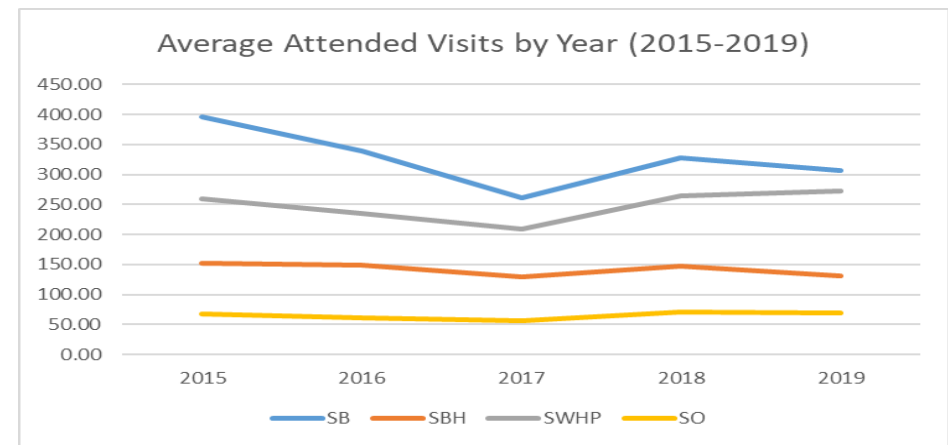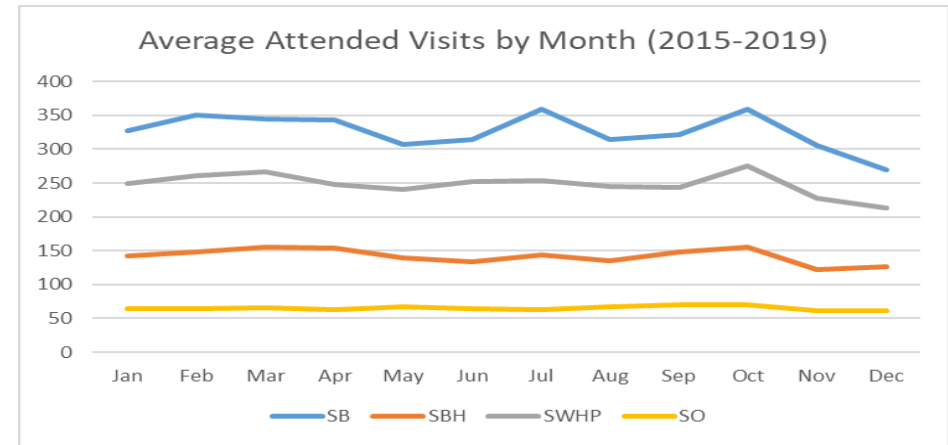Normal Distribution of Precipitation in Miami, FL (1990-2019)

90th = 2.12 in

Normal Distribution of Heat Index in Miami, FL (1990-2019)

90th = 101.5°F

Average Attended Visits by Month (2015-2019)

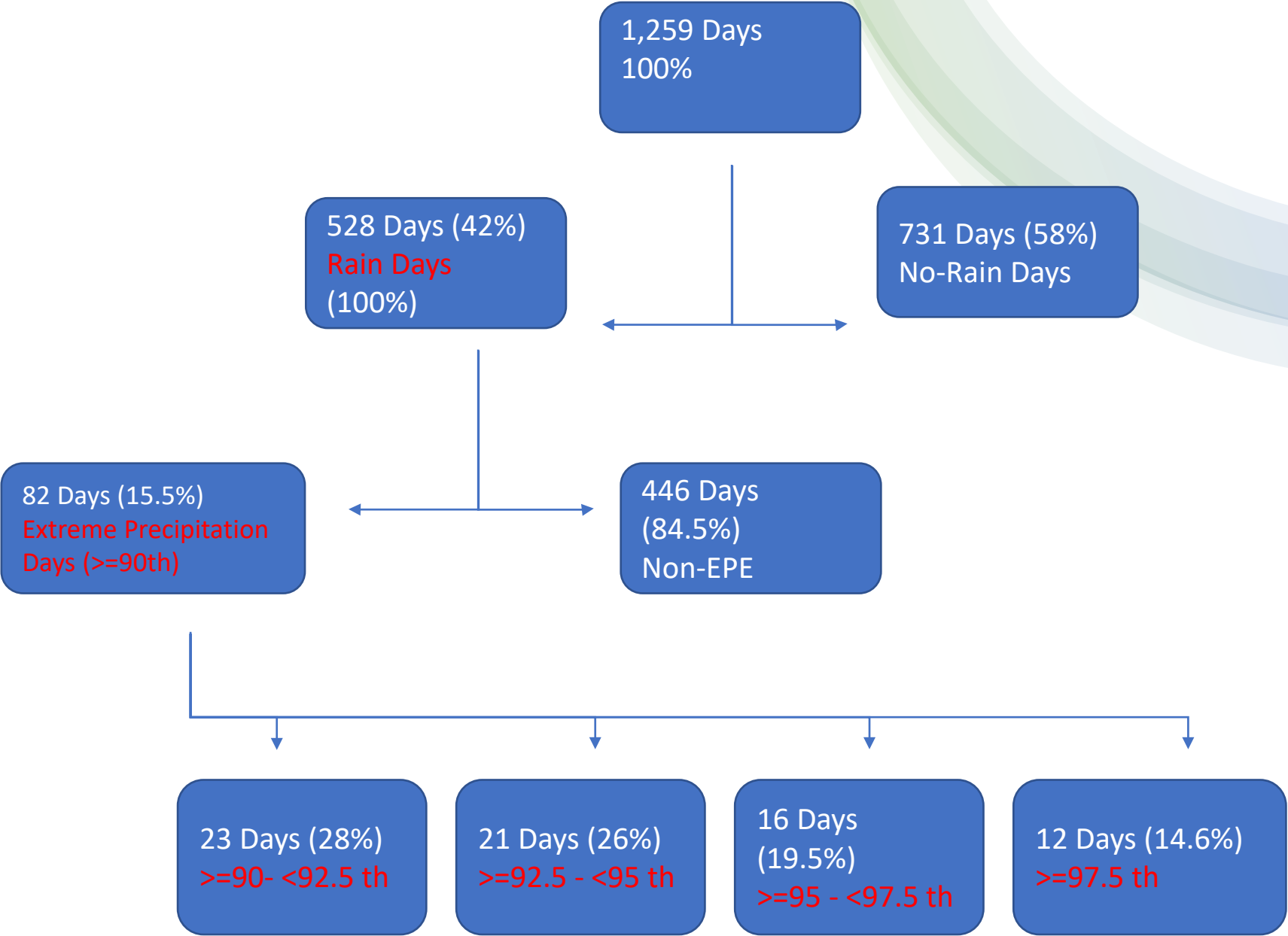Average Attended Visits by Year (2015-2019)

1. Weather Data (1990-2019)

2. Outpatient HIV Clinics registry

Scheduled visits: **87,122**
~ **52%** Overall **attendance**
M-F operating days

SB = Black, SBH= Black Haitian, SWHP= White Hispanic, SO= Others

Precipitation

1,259 Days
100%

528 Days (42%)
Rain Days
(100%)

731 Days (58%)
No-Rain Days

82 Days (15.5%)
Extreme Precipitation
Days (>=90th)

446 Days
(84.5%)
Non-EPE

23 Days (28%)
>=90- <92.5 th

21 Days (26%)
>=92.5 - <95 th

16 Days
(19.5%)
>=95 - <97.5 th

12 Days (14.6%)
>=97.5 th

1. Weather Data (1990-2019)

2. Outpatient HIV Clinics registry

3. Association between EWE and
Clinics (Poisson Regression)

Precipitation
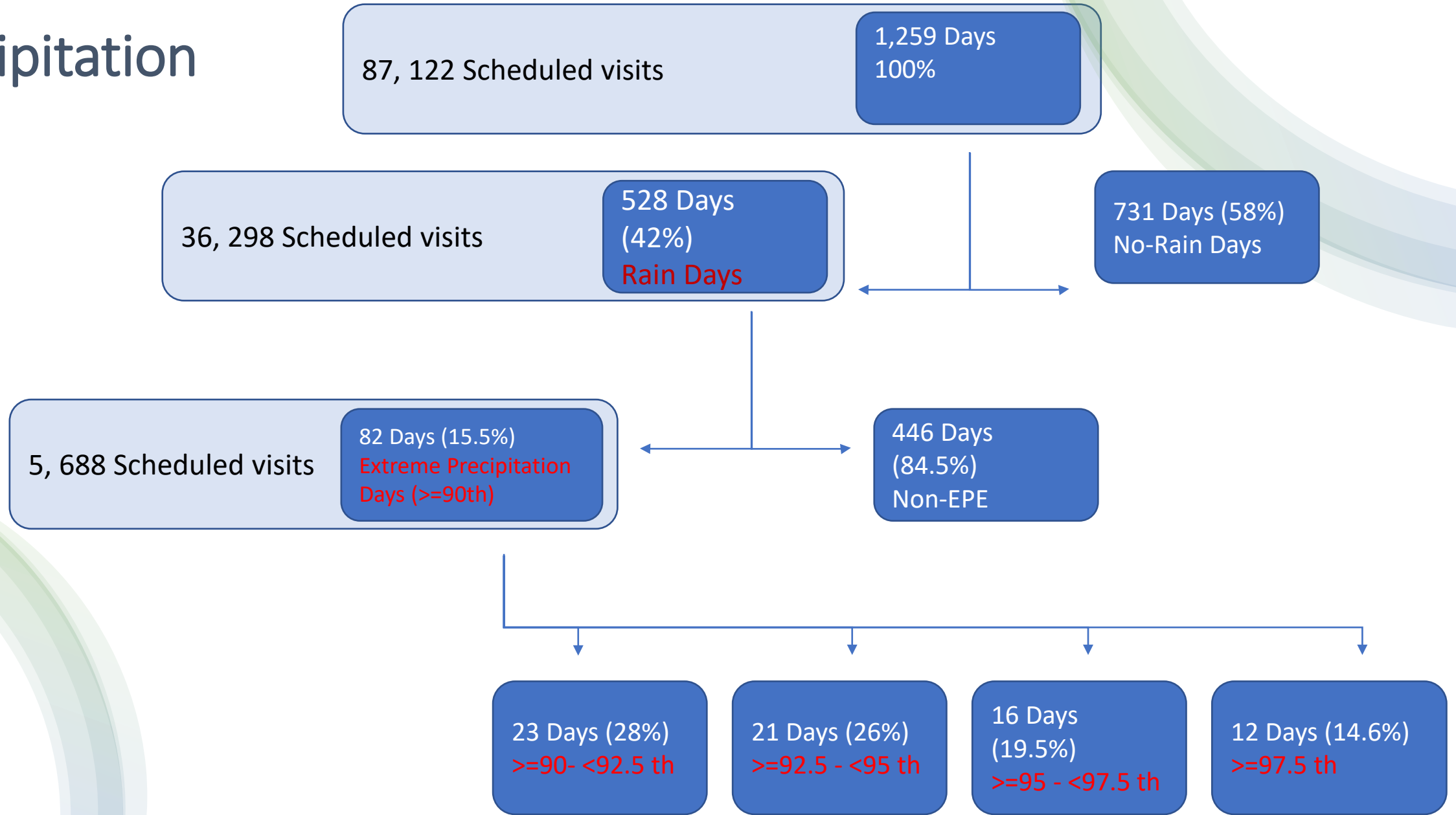
Precipitation

Among EPE subgroups, patient attendance displayed a decreasing trend as Daily precipitation increased

Relative Risk from Poisson Regression

% Decrease in Attendance during Precipitation and EP (≥ 2 Inches)
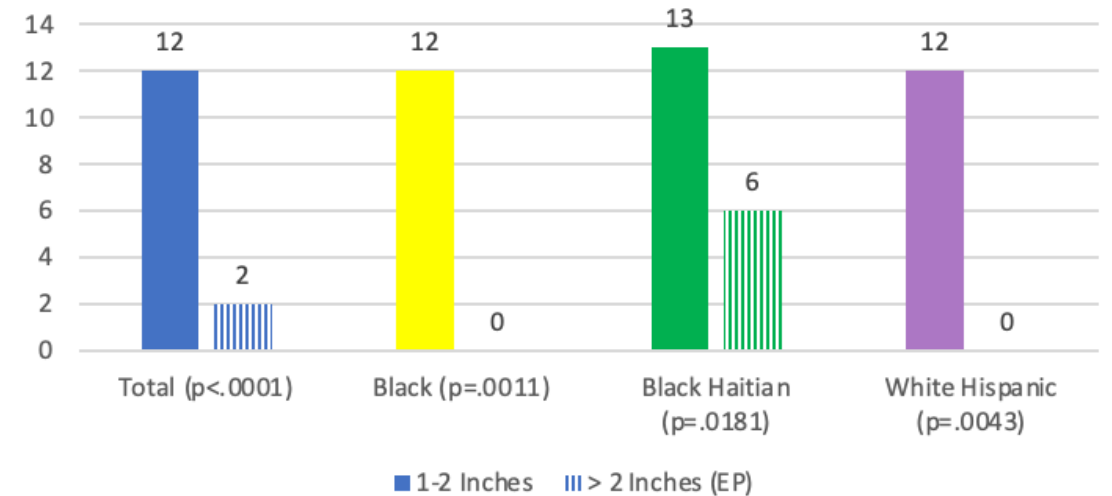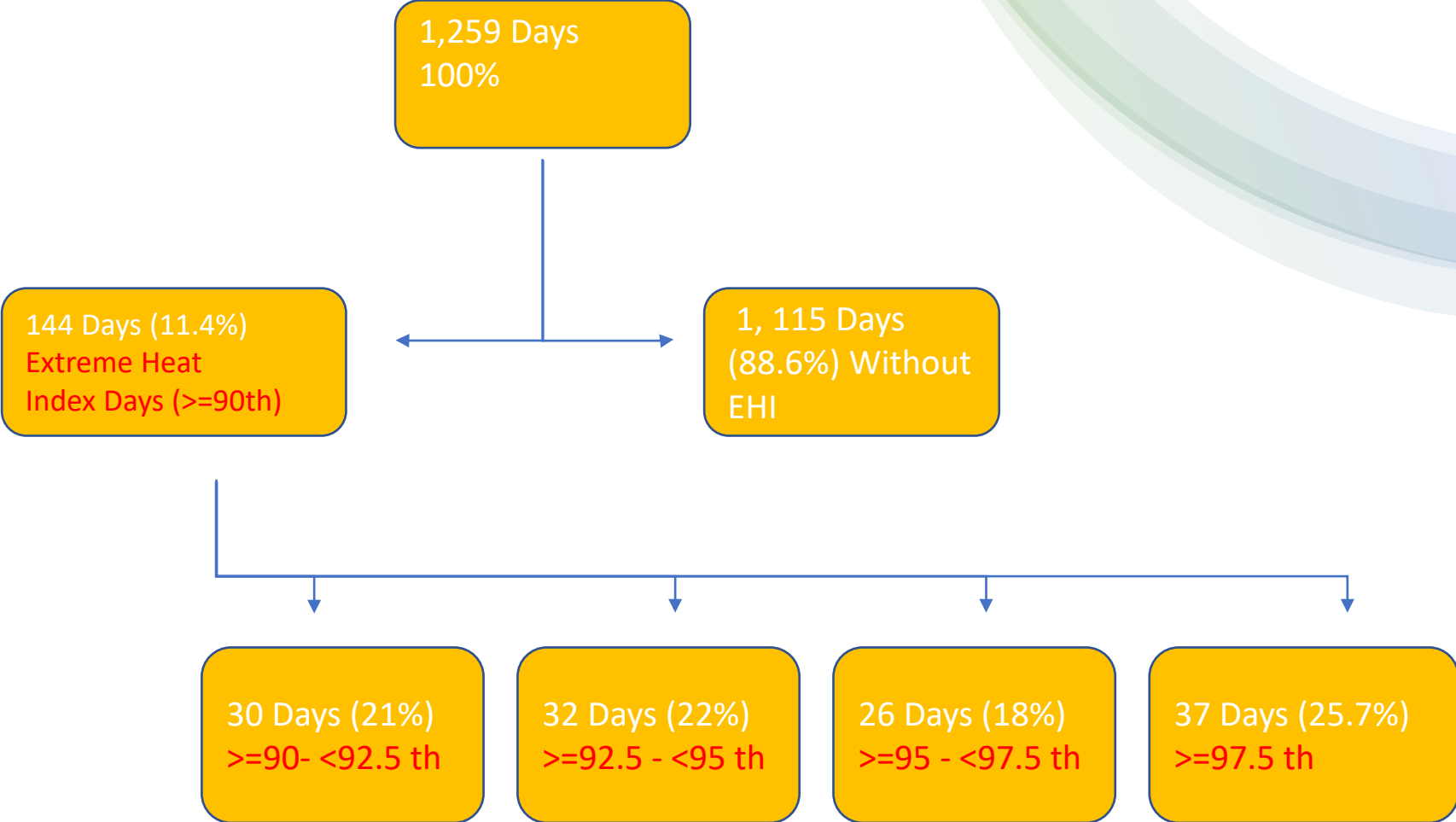
5,688 Scheduled visits

82 Days (15.5%)
Extreme Precipitation Days (>=90th)

23 Days (28%)
>=90- <92.5 th

21 Days (26%)
>=92.5 - <95 th

16 Days (19.5%)
>=95 - <97.5 th

12 Days (14.6%)
>=97.5 th

Heat Index

1,259 Days
100%

144 Days (11.4%)
Extreme Heat
Index Days (>=90th)

1, 115 Days
(88.6%) Without
EHI

30 Days (21%)
>=90- <92.5 th

32 Days (22%)
>=92.5 - <95 th

26 Days (18%)
>=95 - <97.5 th

37 Days (25.7%)
>=97.5 th

1. Weather Data (1990-2019)

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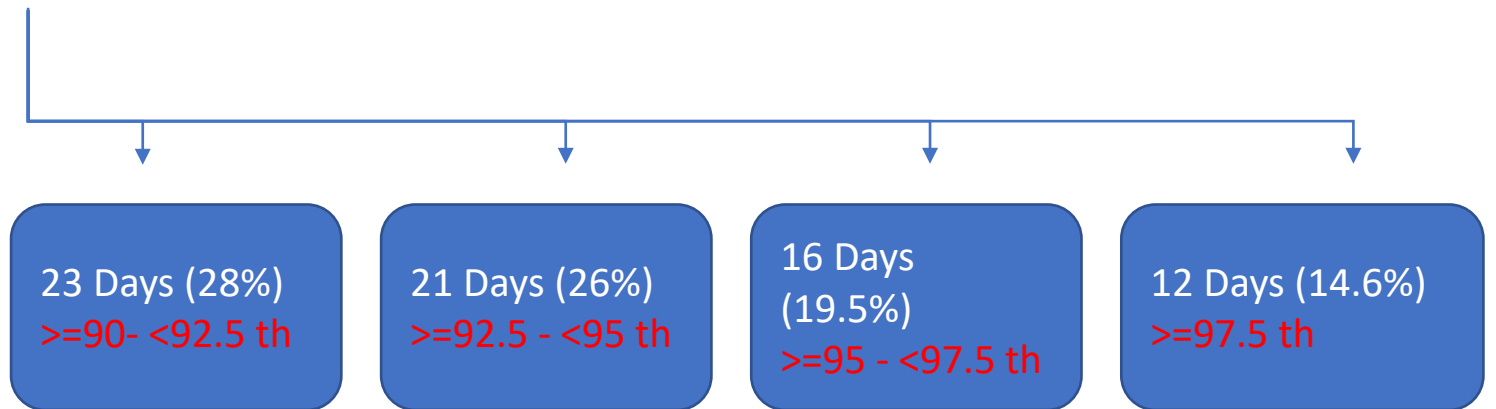3. Association between EWE and Clinics (Poisson Regression)

Heat Index

87, 122 Scheduled visits — 1,259 Days 100%

9, 736 Scheduled visits — 144 Days (11.4%) Extreme Heat Index Days (>=90th)

1, 115 Days (88.6%) Without EHI

- 30 Days (21%) >=90- <92.5 th
- 32 Days (22%) >=92.5 - <95 th
- 26 Days (18%) >=95 - <97.5 th
- 37 Days (25.7%) >=97.5 th
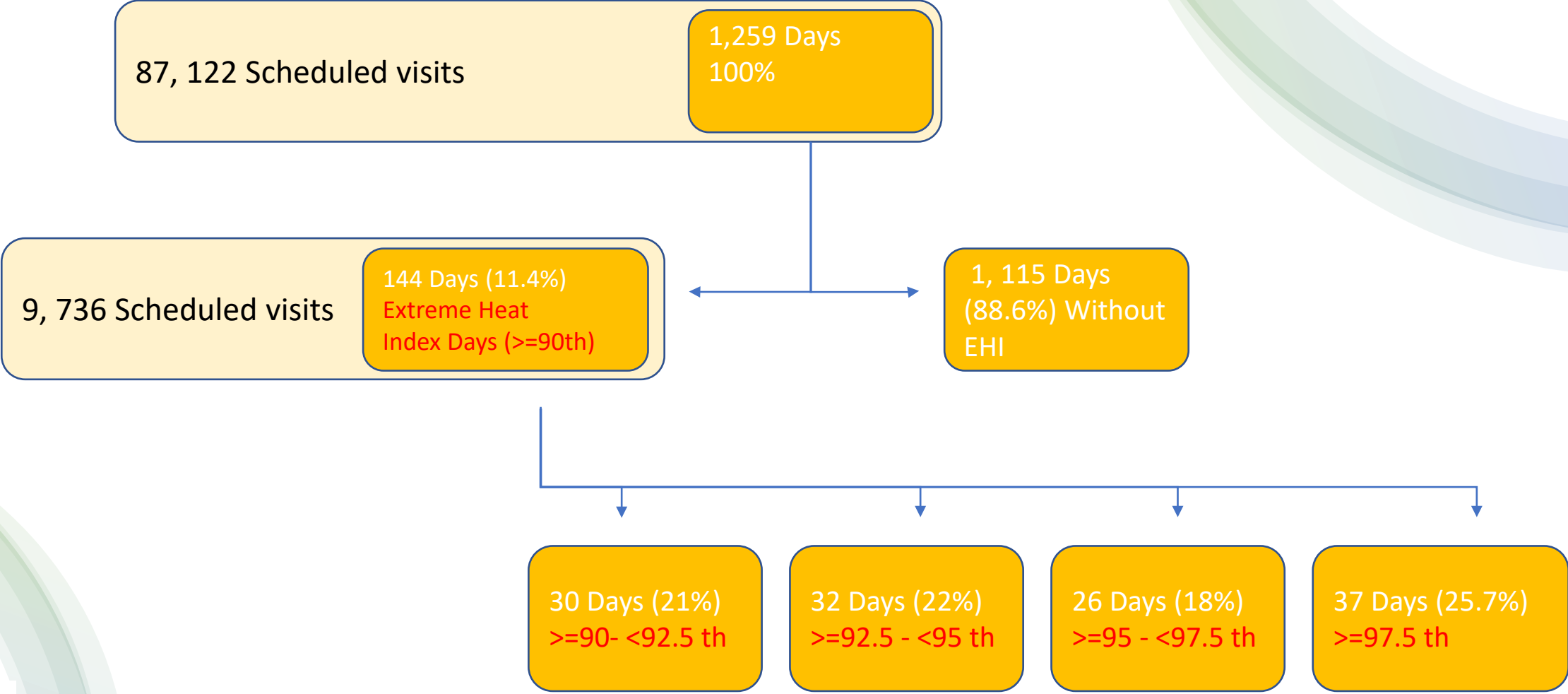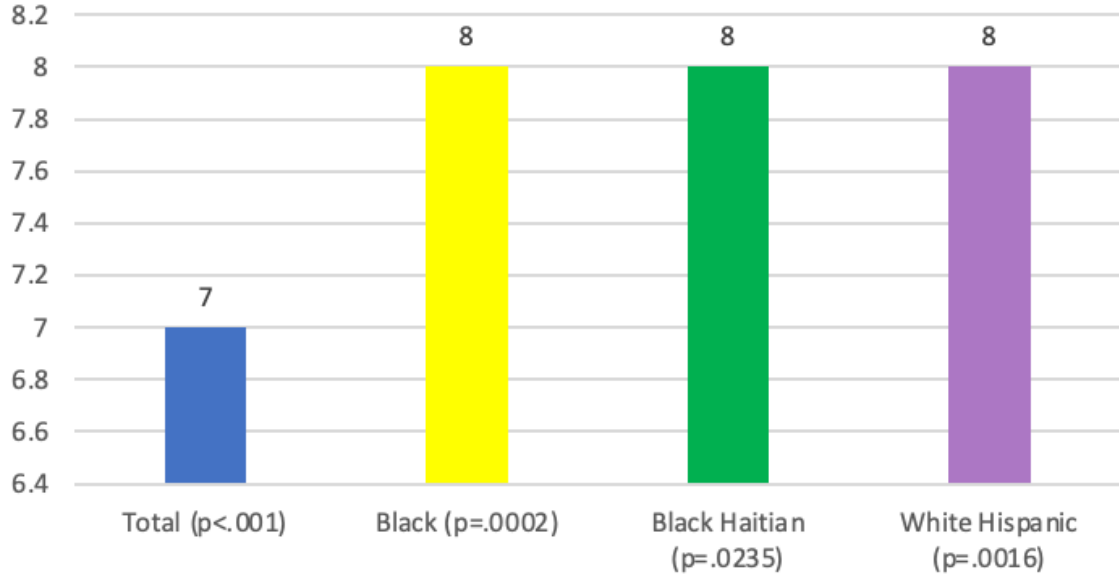
1. Weather Data (1990-2019)

2. Outpatient HIV Clinics registry

3. Association between EWE and Clinics (Poisson Regression)

Heat Index
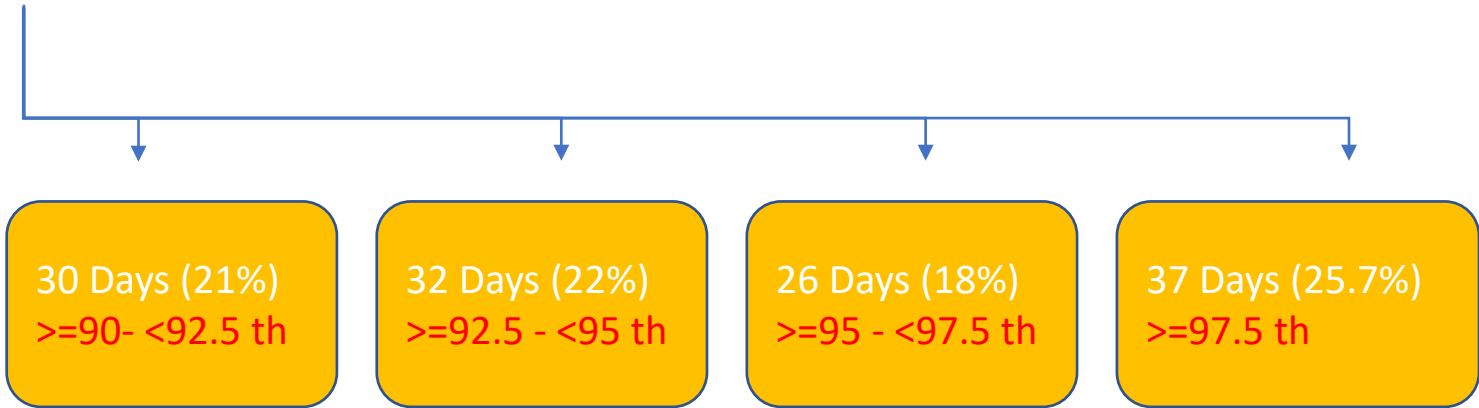
Relative Risk from Poisson Regression

% Decrease in Attendance during EHI (≥ 101.5 °F)

9, 736 Scheduled visits

144 Days (11.4%)
Extreme Heat
Index Days (>=90th)

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Methods & Results

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Discussion

There is ~8% RR of decrease in Healthcare access by EHI (>101.5°F)

There is ~12-13% RR of decrease in Healthcare access by **average precipitation (1-2 in) and EP** in Black Haitian(>2 in)

- This study represents a novel approach to understand the (in)direct effects of Extreme Precipitation on outpatient healthcare utilization, specific to HIV clinics

- As EWE become more extreme, there seems to be an association with lower HIV-clinic attendance. However, further analysis and statistical modelling is required to assess significance of findings

- This research has the potential to improve HIVp's healthcare adherence in Miami through institutional, individual and collective resilience to climate change

- This novel research approach could be replicated at any geographic location, adjusting to other Extreme Weather Events, using publicly available weather-data and healthcare registries

Take Home Messages

EWE are an additional stressor that impact healthcare access

This methodology can be reproduced in different climatological regions, other out-patient settings, in the US or internationally to improve health outcomes and inform future health policy

Exploratory research is much needed to identify equitable solutions for the challenges imposed by EWE

THANK YOU!

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dxs1059@med.miami.edu

Please feel free to contact us to learn more about out research and collaboration options