

HEAT-RELATED EMERGENCY DEPARTMENT VISITS IN LOUISIANA:

Review of Syndromic Surveillance
Data for April through October 2023

MARCH 2024

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EXECUTIVE SUMMARY

This report summarizes Emergency Department (ED) visit data for heat-related illness (HRI) in Louisiana from April 1 to October 31, 2023. ED visits were selected if the medical record contained text or a diagnostic code associated with heat exhaustion, heat or sun exposure, heat cramps, heat stroke, or hyperthermia.

Over these seven months, there were 6,142 ED visits for HRI. Louisiana residents accounted for 95% (5,840) and non-residents for the remaining 5% of visits (302). The majority (93%) of visits were single occurrences, while 7% involved repeat visits for the same patient.

The daily number of ED visits generally followed fluctuations in temperature. The summer months (June through August) accounted for 84% of all HRI visits, with August having the highest number (34%). The summer of 2023 was the hottest summer on record for Louisiana. The statewide maximum temperature was above 95°F for 56 days. August had the most days over 95°F: 27 days. In comparison, between 1991 and 2020, the average number of days the statewide maximum temperature exceeded 95°F was 15 days.

Among Louisiana residents, males comprised 76% of HRI ED visits; for ages 20 to 59, eight out of 10 visits were by male patients. Children under the age of 10 had the fewest number of ED visits. Among non-residents, 77% of ED visits were males. Black Louisianans had a higher overall rate of HRI ED visits than White Louisianans, with the highest rates in the 30 to 44 age group for both races. Hispanics, accounting for 4% of patients, had 88% male representation.

Work emerged as a significant circumstance of exposure, contributing to 23% of all visits. Eighty-six percent of work-related visits were by males, primarily aged 20 to 49, and 40% of Hispanic visits were work-related. Outdoor occupations, predominantly male-dominated, influenced the higher rate among males.

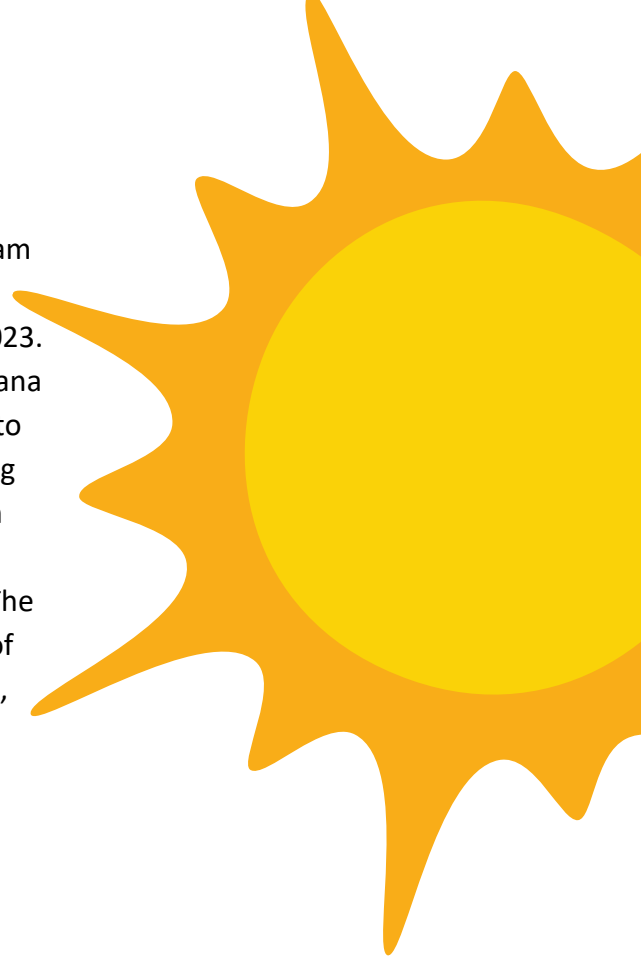
HRI ED visits varied by day, with Wednesday and Thursday having the highest overall visits and Wednesday being the peak day for workers. Age-specific patterns showed Saturday as the most common day for patients aged 0 to 19 and 50 to 79, Thursday for 20 to 49-year-olds, and Friday for those 80 and older.

The most common comorbidities were substance use, hypertensive disease, other cardiovascular disease, mental and behavioral disorders, diabetes, and respiratory conditions. The most commonly reported heat-related health effects include dehydration, syncope/collapse, acute renal failure, malaise/fatigue, nausea and vomiting, and chest pain.

Geographically, parishes with the highest counts generally included the urban centers: Caddo/Bossier, Rapides, Calcasieu, St. Landry/Lafayette, East Baton Rouge, Orleans/Jefferson, and St. Tammany/Tangipahoa. Parishes with the highest rates were generally rural parishes: Webster, Red River, Sabine, West Feliciana, Acadia, St. Martin, Iberville, St. John, St. Helena, and Washington. About 46% of all out-of-state visitors were treated in Caddo, Orleans, Jefferson, or St. Tammany Parish.

OVERVIEW

The Louisiana Occupational Heat-Related Illness Prevention Program (HRI Program) conducted syndromic surveillance of emergency department (ED) visits for HRI from April 1 through October 31, 2023. The summer of 2023 was the hottest summer on record for Louisiana and the Earth. The heat index in Louisiana reached as high as 115 to 120°F. Syndromic surveillance data for HRI were critical for tracking the impact of heat on Louisianans and communicating heat-health impacts to the Louisiana Department of Health (LDH), emergency response, local and state government, and healthcare providers. The HRI Program produced weekly reports that included daily counts of HRI ED visits and cumulative counts by age, race and ethnicity, sex, time of day, day of the week, and LDH region. The weekly reports were posted on the HRI Program's website and emailed to stakeholders. In August, the HRI Program collaborated with LDH's Bureau of Health Informatics to create a public-facing Tableau dashboard to visualize the data.



HEAT-RELATED ILLNESS

Heat-related illness (HRI or hyperthermia) is a broad term for conditions directly related to an increase in body temperature. When it is hot and humid outside, the body gets rid of excess heat by sweating and increasing blood flow to the skin. Humidity makes it harder for the body to cool itself. HRI happens when the body is unable to maintain a normal body temperature. HRI occurs along a continuum of severity ranging from mild cramps, swelling, and rashes to heat exhaustion and life-threatening heat stroke. Heat also has indirect health impacts: it can exacerbate chronic conditions such as cardiovascular, kidney, and respiratory disease, increase injuries and accidents, and strain mental health.

RISK FACTORS FOR HEAT-RELATED ILLNESS

Anyone can develop HRI, but people who are at greatest risk of HRI have one or more of the following factors:

- Chronic health conditions (e.g., cardiovascular, renal, or respiratory conditions, diabetes, obesity)
- Mental health conditions
- Dementia, cognitive difficulty, difficulty with self-care, or difficulty thermoregulating.
- Use of diuretics, anticholinergics, psychotropics, or medications affecting thermoregulation
- Substance use disorder or excessive alcohol consumption
- Social isolation or limited mobility
- Outdoor workers (e.g., construction, landscaping, transportation) and indoor workers who work in a hot, unairconditioned environment (e.g., warehouses, factories).
- Older adults (65+). As people age, their sweat-cooling mechanism becomes less efficient, and they are more likely to have chronic health conditions.
- Unhoused individuals and people living in buildings with no or limited air conditioning

METHODS

DATA SOURCES:

Syndromic surveillance data were collected near real-time from approximately 90% of EDs in Louisiana. Per Louisiana law, all conditions seen at EDs of acute care hospitals shall be reported utilizing automated, electronic reporting within one business day of the visit [Sanitary Code of the State of Louisiana (LAC 51 109)]. Emergency department data were transmitted and processed via the CDC's National Syndromic Surveillance Program's Electronic Surveillance System for the Early Notification of Community-based Epidemics, or ESSENCE, a web-based syndromic surveillance analysis system.

To create a daily temperature time series for Louisiana, nClimGrid-Daily was used. nClimGrid-Daily is a gridded (0.0417° or 5-km) dataset developed by the National Centers for Environmental Information (NCEI) offering daily minimum, maximum, and average temperature (and precipitation) from 1951 to near present. It is suitable for weather/climate monitoring and undergoes strict quality control ([Durre, et al, 2022](#)).

DEFINITION OF HEAT-RELATED ILLNESS:

Each record represents an ED visit for HRI. Records were selected if the Chief Complaint (i.e., patient's stated reason for visit), Admit Reason (i.e., provider's noted reason for admission), Clinical Impression, Triage notes, or Discharge Diagnosis contained text or diagnostic codes associated with heat exhaustion, heat exposure, heat cramps, heat stroke or hyperthermia.

DATA ELEMENTS:

Key data elements include demographics (age, race, sex, and ethnicity), location (parish/county and zip code) of hospital and residence, date and time of visit, and fields related to the reason for visit, treatment, and diagnosis (chief complaint, admit reason, clinical impression, triage notes, and discharge diagnosis).

RATE CALCULATIONS:

Non-Louisiana residents were included in all HRI visit counts but were excluded from rate calculations because the denominators for rate calculations were Louisiana residents. Denominator data for rate calculations were obtained from the American Community Survey (ACS) one-year estimates for 2022 and census parish-level data for 2022.

LIMITATIONS:

While syndromic surveillance is a valuable near real-time data source for assessing the impacts of HRI in Louisiana, it is accompanied by some limitations that should be considered when interpreting the data.

Not all ED visits in the state are included in the data analyzed (approximately 90% of EDs report data). Also, the amount of ED data received by ESSENCE may change over time due to the onboarding and off-boarding of facilities, changes in electronic health reporting systems, and data outages for various reasons. Patients seen outside of EDs, such as at urgent care centers or by emergency medical services without transport to a hospital, are not captured.

Syndromic surveillance records are not verified using clinical standards so they do not represent clinically confirmed diagnoses. Some records are identified from pre-visit information. This information may be inaccurately or incompletely reported which could result in misclassification of HRI ED visits. An example of this issue is the Chief Complaint category, which relies on self-reporting and may provide ambiguous information.



RESULTS

There were 6,142 ED visits for HRI from April 1 to October 31, 2023.

Louisiana residents accounted for 5,840 ED visits (95%). There were 302 ED visits for non-Louisiana residents.

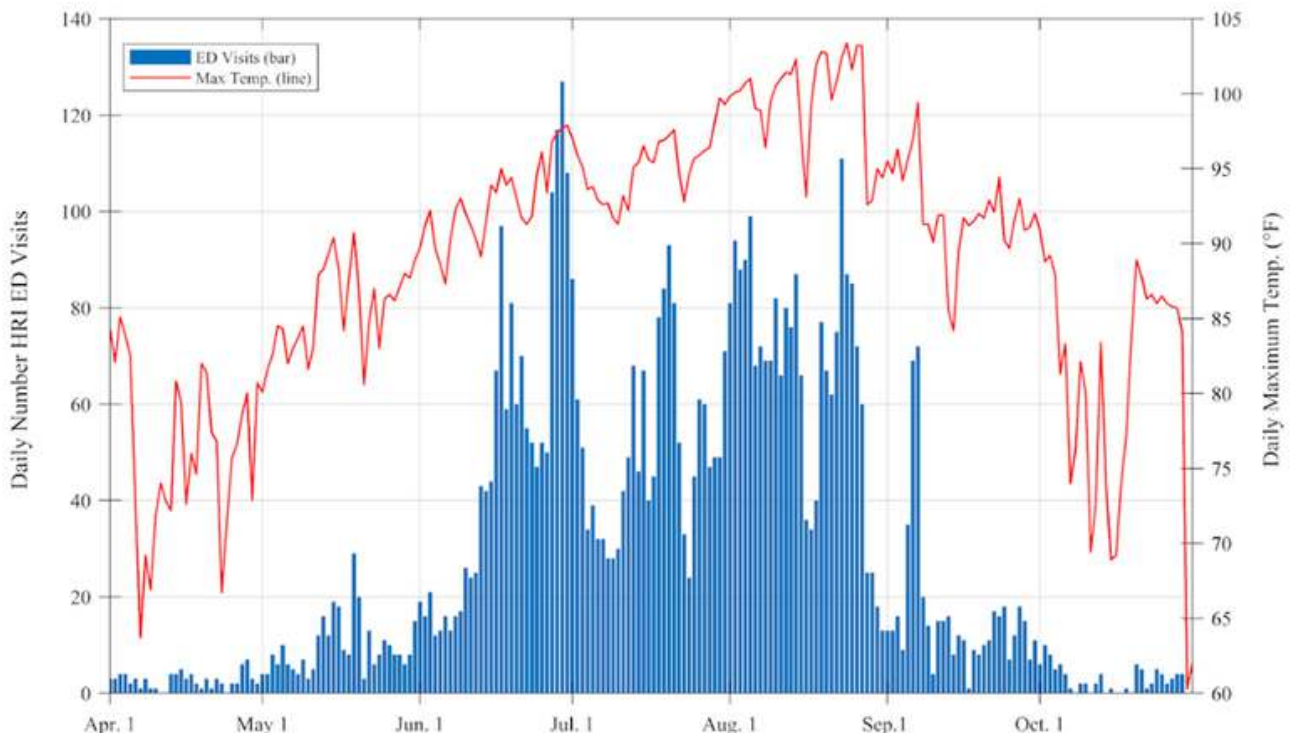
Most visits (93% of all visits) represent a single ED visit for HRI during the seven-month reporting period.

Number of ED Visits per Patient	Number of Visits
1 visit	5,709 (93%)
2 visits	356 (6%)
3 or more visits	77 (1%)
Total number of visits	6,142

HRI ED VISITS BY DAY & TEMPERATURE

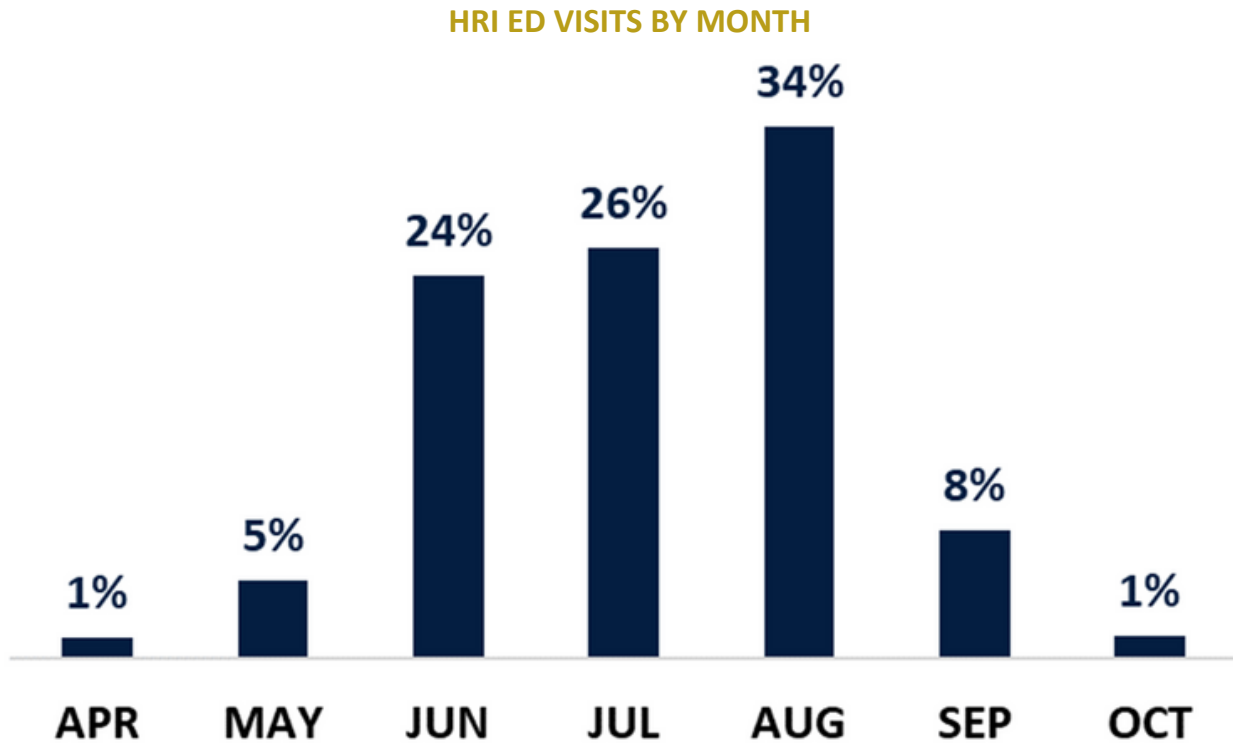
Statewide daily maximum temperatures are plotted against daily HRI ED visits. The daily number of ED visits generally followed fluctuations in temperature. The days with the highest number of visits were earlier in the season (late June) despite higher temperatures later in the season (August). This may reflect changes in behavior, such as limiting outdoor activities during the hottest part of the day.

LOUISIANA DAILY MAXIMUM TEMPERATURE AND HRI ED VISITS 2023



HRI ED VISITS BY MONTH

The summer months (June through August) accounted for 84% of all HRI visits. August had more visits than any other month.

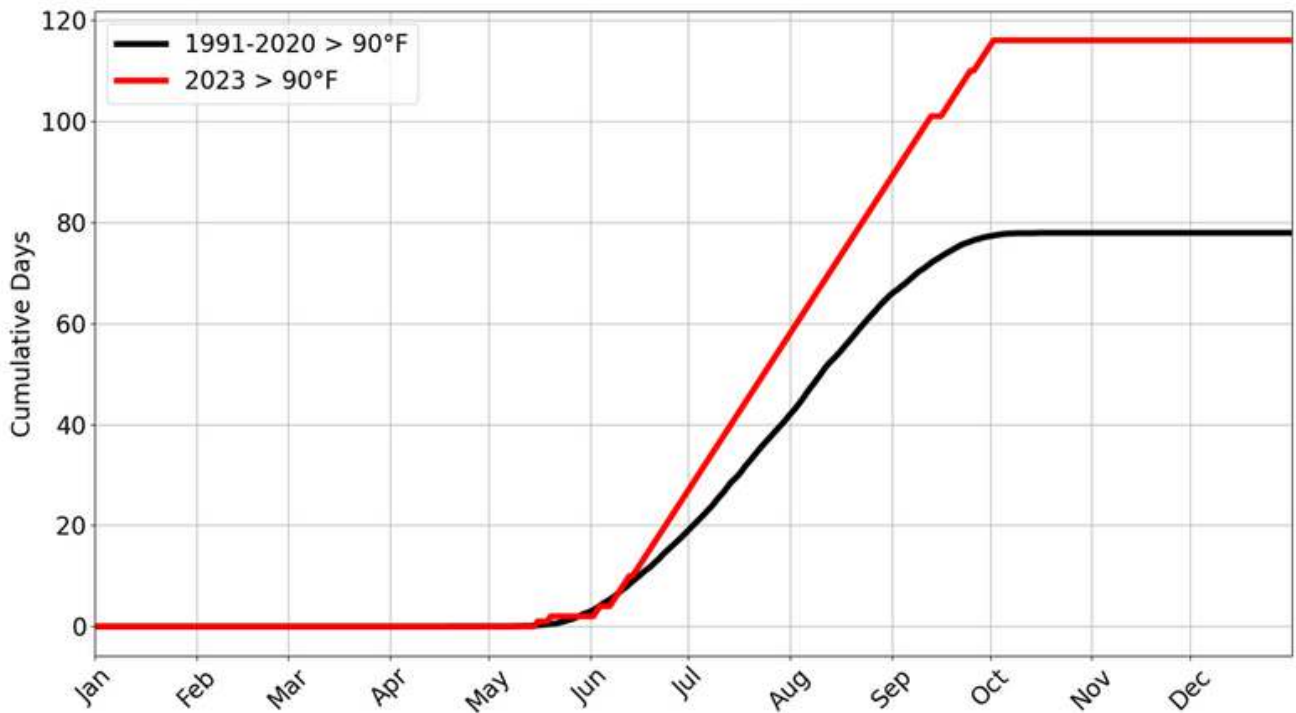


DAYS WITH TEMPERATURES ABOVE 90°F & 95°F

The figures below depict the cumulative number of days that the statewide daily maximum temperature was above 90°F or 95°F. In each figure, the month is on the horizontal-axis, and the vertical-axis is the cumulative number of days above the specified temperature threshold. The red line represents the number of days above threshold for 2023, and the black line represents the average number of days above threshold for 1991-2020.

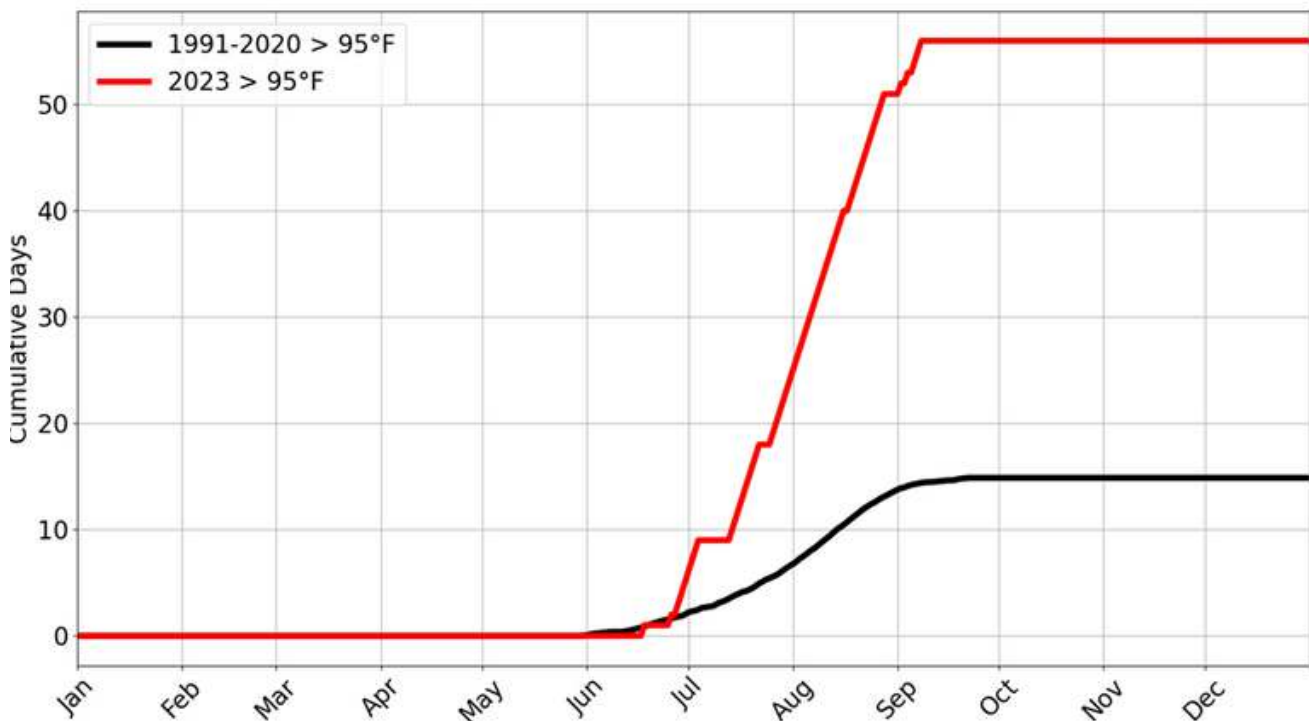
In 2023, the statewide maximum temperature was above 90°F for 116 days. On average, the state experiences 78 days with daily maximum temperatures above 90°F. The number of consecutive days over 90°F was 91 days from June 14 to September 12: every day in July and August was over 90°F. The mean number of consecutive days over 90°F from 1991 to 2020 was 25 days.

CUMULATIVE COUNT OF DAYS WITH TEMPERATURES > 90°F (LOUISIANA)



In 2023, the statewide maximum temperature was above 95°F for 56 days. August had the most days over 95°F: 27 days. Between 1991 and 2020, the average number of days the statewide maximum temperature exceeded 95°F was 15 days. The longest consecutive streak above 95°F was 22 days from July 26 to August 16, 2023. The average number of consecutive days over 95°F from 1991 to 2020 was six days.

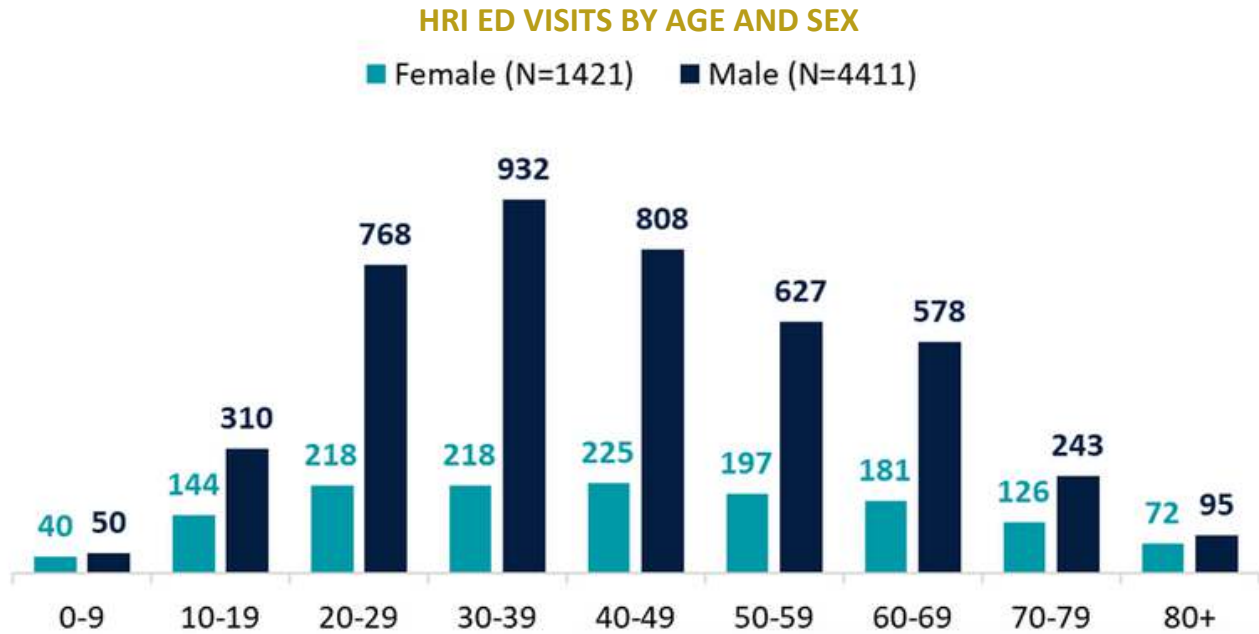
CUMULATIVE COUNT OF DAYS WITH TEMPERATURES > 95°F (LOUISIANA)



HRI ED VISITS BY AGE AND SEX

The figure below depicts age and sex data for Louisiana residents. Males accounted for 76% of all resident HRI visits and there were more males than females for every age group.

For ages 20 to 59, eight out of every 10 visits was a male patient. Children under the age of 10 had the fewest number of visits. Among non-residents, 77% of visits were from the males and males ages 20 to 29 had the greatest number of visits.

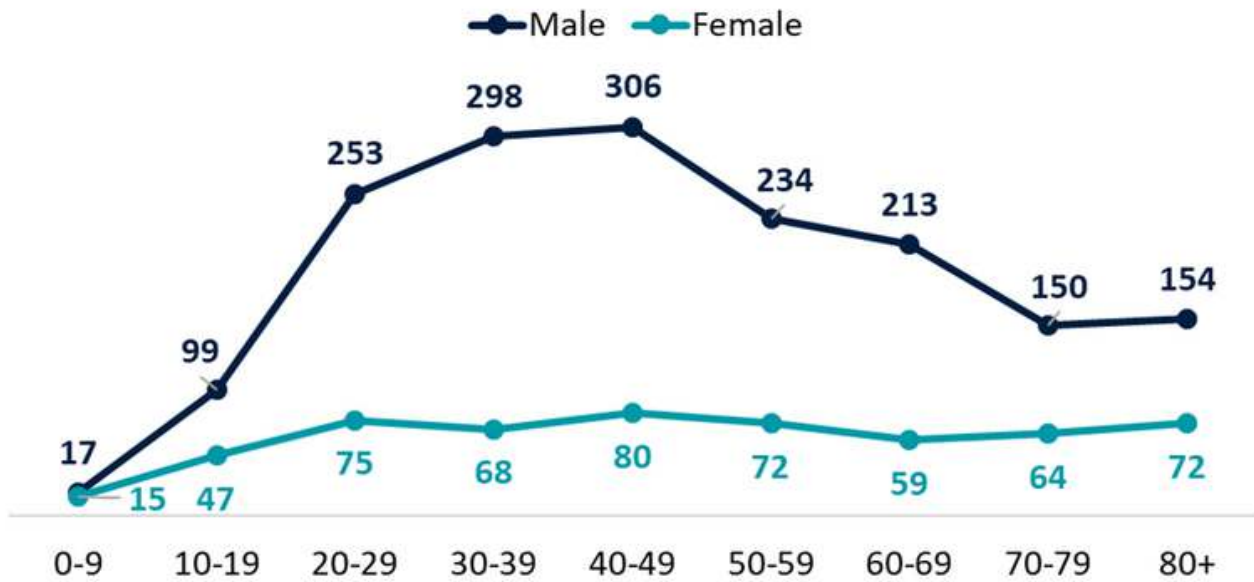


* Eight visits were missing either age or sex



Males had a higher rate than females for every age group. The male rate was approximately 4.4 times the female rate for ages 30 to 39. The elevated rate among males is partially influenced by heat exposure among workers. Outdoor occupations are male dominated.

HRI ED VISITS CRUDE RATES (PER 100,000) BY AGE AND SEX



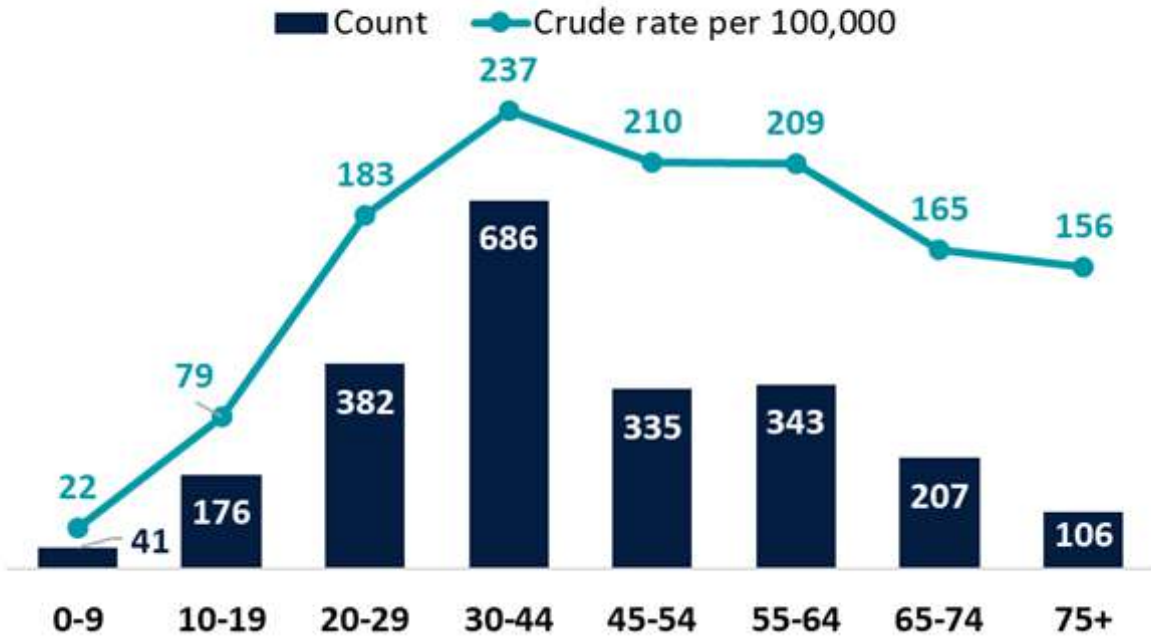
HRI ED VISITS BY RACE

The racial breakdown of patients was 49% White and 38% Black. Four percent of patients indicated another race, and race was missing for 8% of the visits.

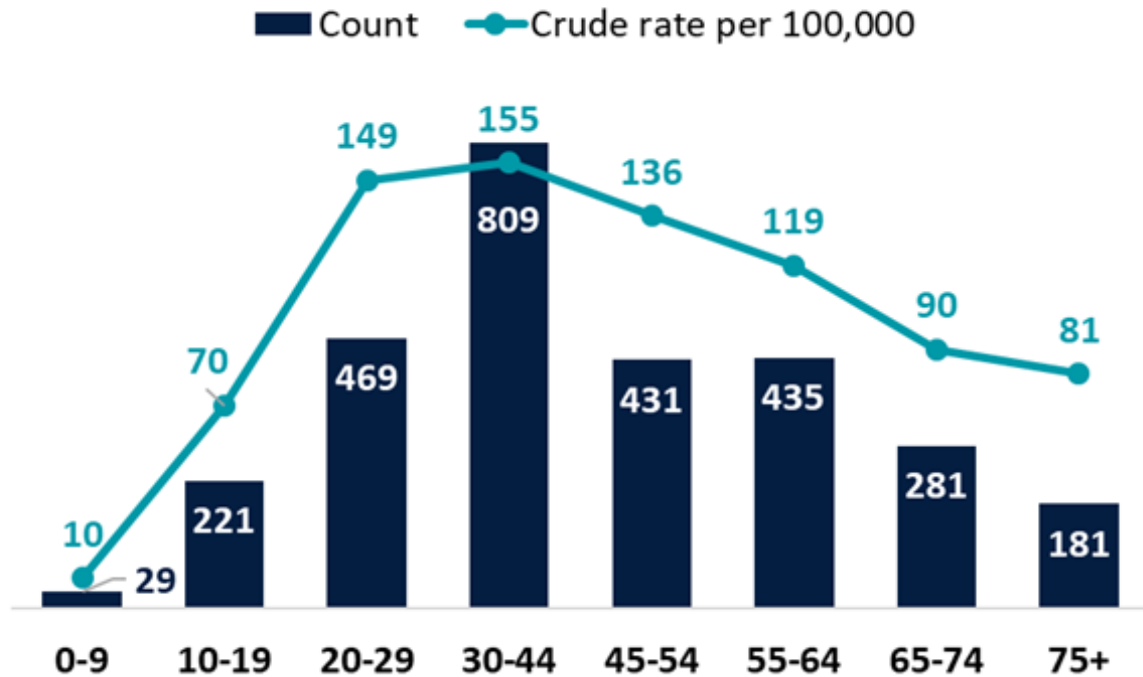
Race	Total Visits (N=6,142)	LA Resident Visits (N=5,840)	Non-Resident Visits (N=302)
White	3,027 (49%)	2,856 (49%)	171 (57%)
Black	2,356 (38%)	2,276 (39%)	80 (26%)
Other Race	248 (4%)	228 (4%)	20 (7%)
Missing/Not Reported	511 (8%)	480 (8%)	31 (10%)

Black Louisianans had a higher overall rate of HRI ED visits than White Louisianans (159 vs. 108 per 100,000 residents, respectively). The rate for Black residents was higher than Whites for every age group. The highest rate and count for both Blacks and Whites was in the 30 to 44 age group.

HRI ED VISITS FOR BLACK RESIDENTS BY AGE



HRI ED VISITS FOR WHITE RESIDENTS BY AGE

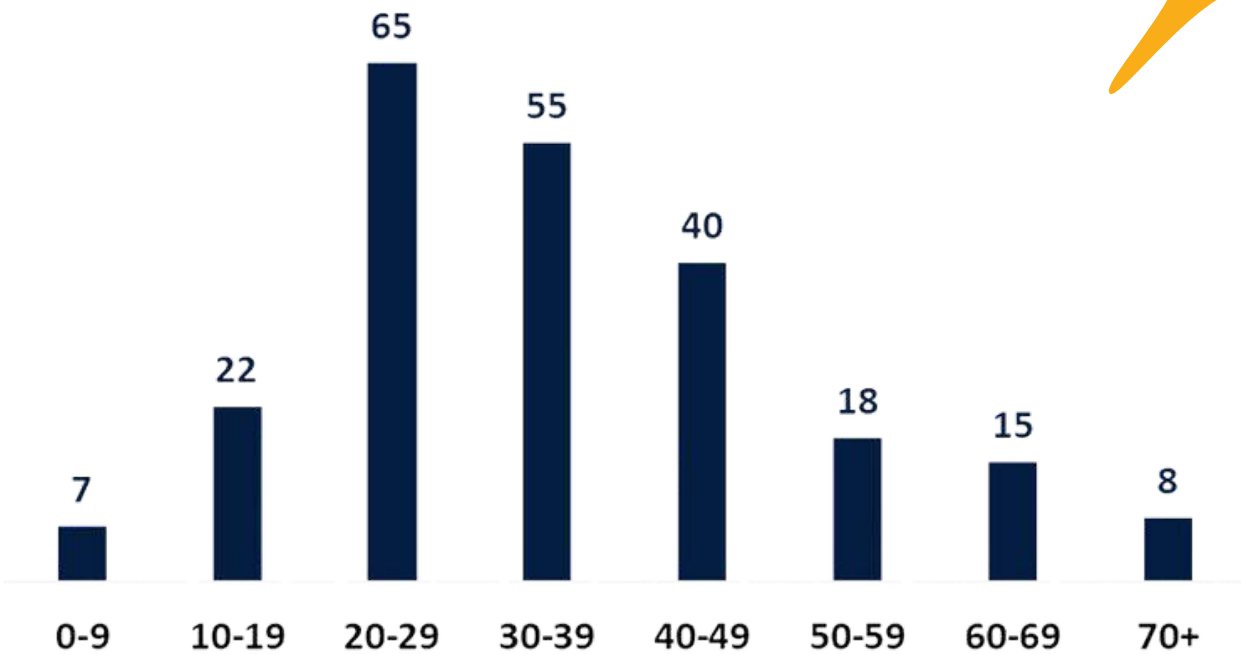


HRI ED VISITS BY HISPANIC ETHNICITY



There were 230 visits by Hispanic patients. Eighty-eight percent of Hispanic patients were male (203 visits). About half of the visits occurred among individuals 20 to 49 years old. This count likely underestimates the actual number of Hispanic visits. Ten percent of all visits were missing ethnicity data, and ethnicity information is historically under-captured in syndromic surveillance data.

HRI ED VISITS BY AGE AND HISPANIC ETHNICITY



HRI ED VISITS BY CIRCUMSTANCE OF EXPOSURE

To assess the activities or circumstances of exposure contributing to individuals becoming overheated, we analyzed text fields and ICD activity codes related to the reason for the visit and discharge diagnosis. Although a substantial portion of records (approximately 68%) lacked adequate exposure detail, those with exposure information offer valuable insights into a variety of exposure-related activities. Among these records, work emerged as the most commonly reported circumstance of exposure, accounting for 23% of all visits. Other notable activities included sport/exercise (3%), walking (1%), being unhoused (1%), engaging in yard work (1%), or having no or limited access to air conditioning (1%).

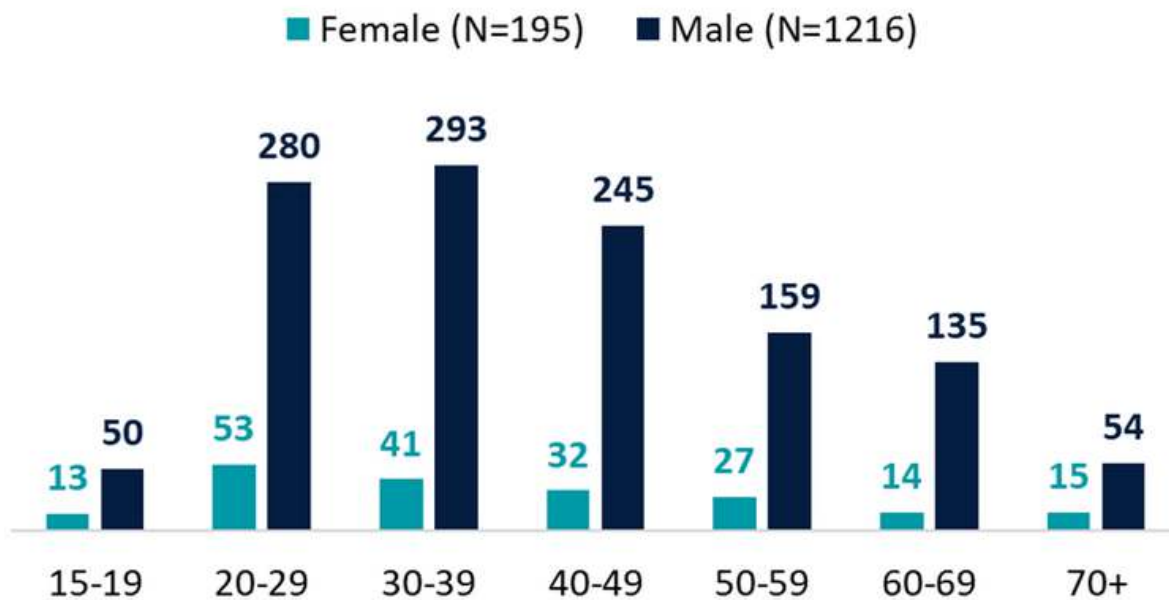
Most Commonly Reported Activities	
Activity	% of all visits
Work	23%
Sport/Exercise	3%
Walking	1%
Unhoused	1%
Yardwork	1%
No or Limited AC	1%

HRI ED VISITS BY WORK

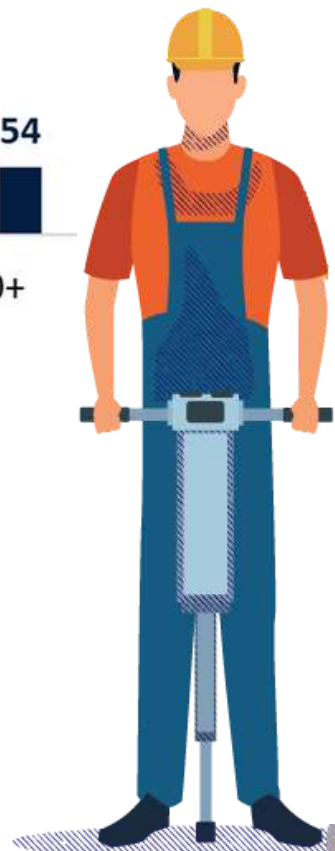
Twenty-three percent (1,412 visits) of all HRI visits indicated they were working when they developed HRI. Heat is a well-documented occupational hazard for outdoor and some indoor workers. There are two sources of heat that raise the body's temperature: environmental heat, and metabolic heat, or the heat that is generated internally with physical activity. Workers who engage in physical activity while exposed to conditions of extreme heat and humidity will rapidly increase their body temperature through both mechanisms simultaneously, leaving them vulnerable to HRI.

Eighty-six percent of work-related HRI visits were males. The majority of visits (58%) were males between the ages of 20 to 49. For females, the highest number of visits occurred among patients 20 to 29 years old. Hispanic workers accounted for 7% of all workers (93 visits) and 69% of Hispanic workers were males ages 20 to 49. Overall, 40% of Hispanic visits were work-related.

HRI WORK-RELATED ED VISITS BY AGE AND SEX



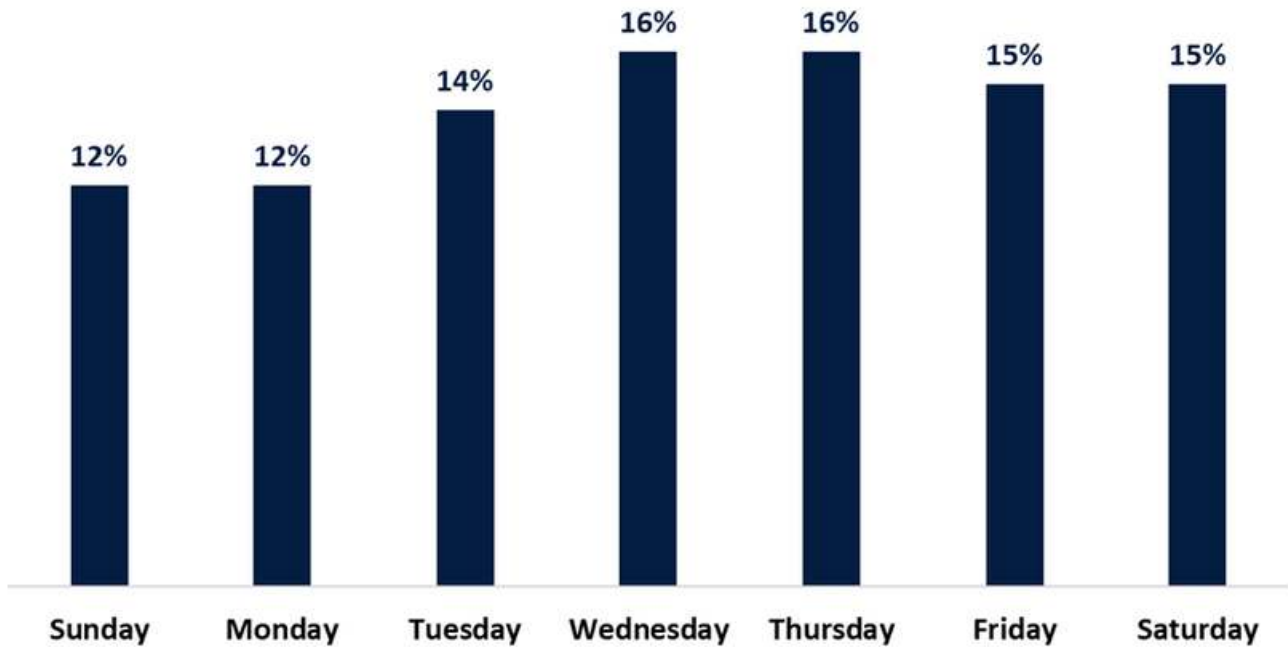
* One visit was missing sex



HRI ED VISITS BY DAY OF THE WEEK

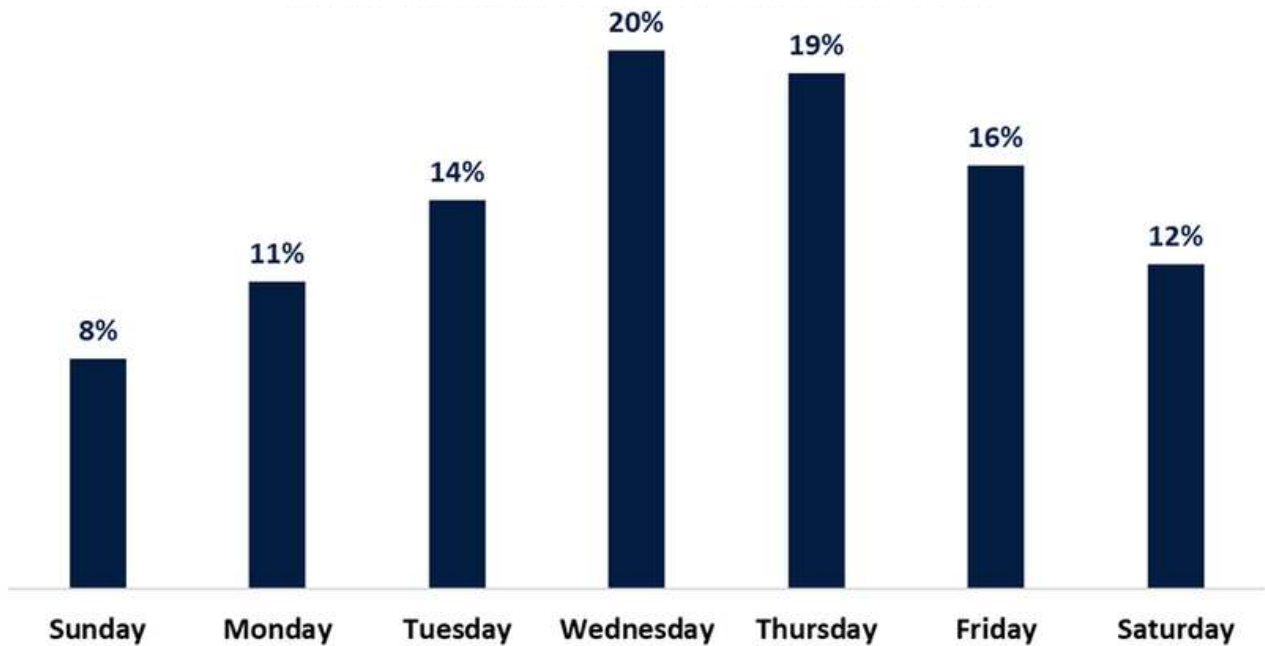
HRI visits ranged from 12% on Sunday and Monday to 16% on Wednesday and Thursday.

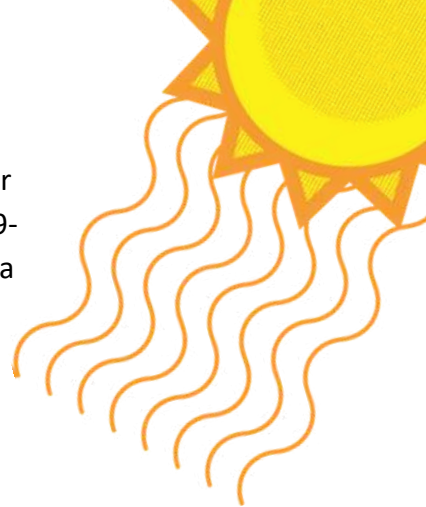
HRI ED VISITS BY DAY OF THE WEEK



For workers, visits ranged from 8% on Sunday to a high of 20% on Wednesday.

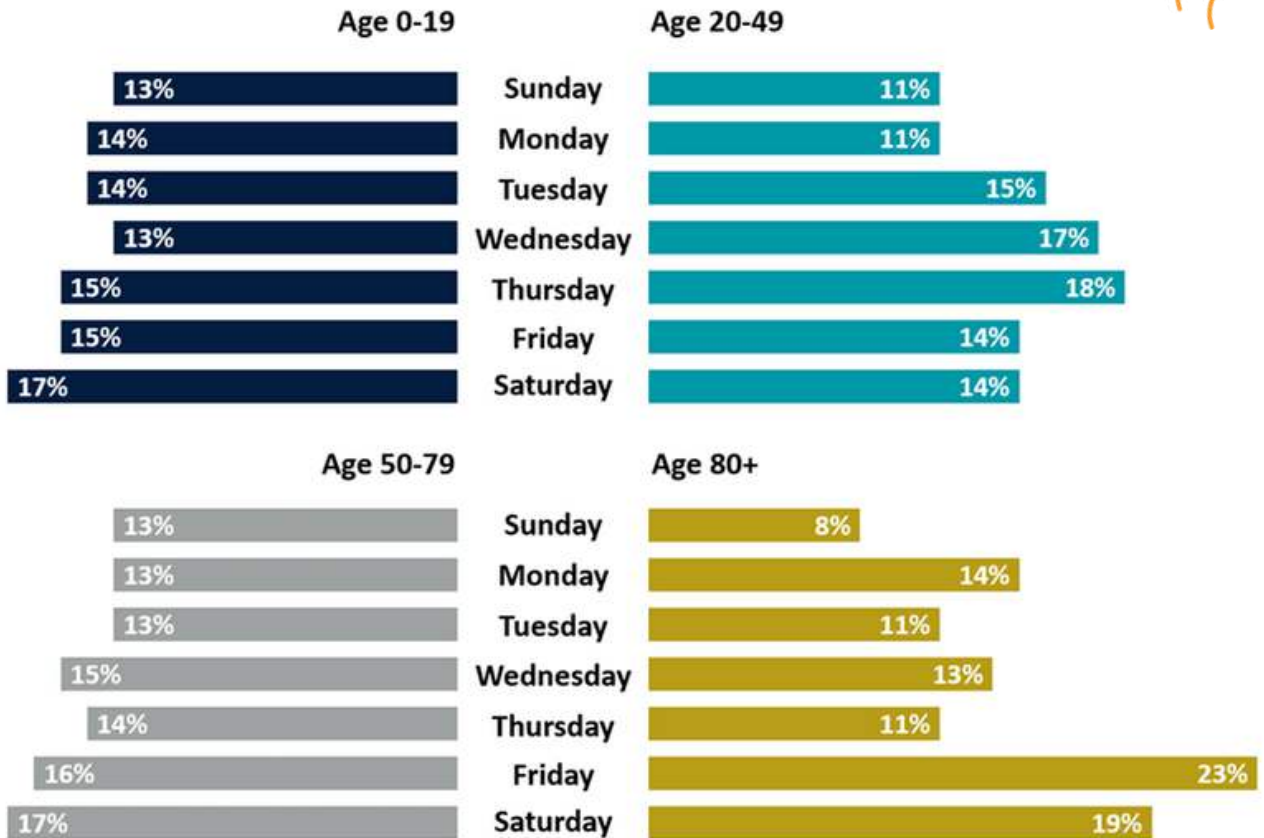
HRI WORK-RELATED ED VISITS BY DAY OF THE WEEK





There is some variation in HRI visits by age: Saturday is the most common day for patients aged birth to 19 and 50 to 79; visits are highest on Thursday for 20 to 49-year-olds, and Friday is the most common day for patients 80 and older. Almost a quarter of all patients 80 and older were seen on Fridays.

HRI ED VISITS BY AGE AND DAY OF THE WEEK



HRI ED VISITS BY COMORBIDITIES AND HEAT-RELATED HEALTH EFFECTS

We reviewed the data to assess the frequency of 1) comorbidities and 2) heat-related health impacts.

The most commonly reported comorbidities were substance use, hypertensive disease, other cardiovascular disease, mental and behavioral disorders, diabetes, and respiratory conditions. Heat can be especially dangerous for people with chronic health conditions because they may be less likely to sense and respond to changes in temperature, and they may be taking medications that limit the body's ability to thermoregulate (NIHHIS At Risk Individuals).

Most Frequently Reported Comorbidities
Substance use
Hypertensive disease
Other cardiovascular disease*
Mental and behavioral disorders
Diabetes
Respiratory

**Excludes hypertensive disease*

Most Frequently Reported Heat Health Effects
Dehydration
Syncope/dizziness
Acute renal failure
Malaise and fatigue
Nausea and vomiting
Chest pain

The most commonly reported heat-related health effects include dehydration, syncope/collapse, acute renal failure, malaise/fatigue, nausea/vomiting, and chest pain.

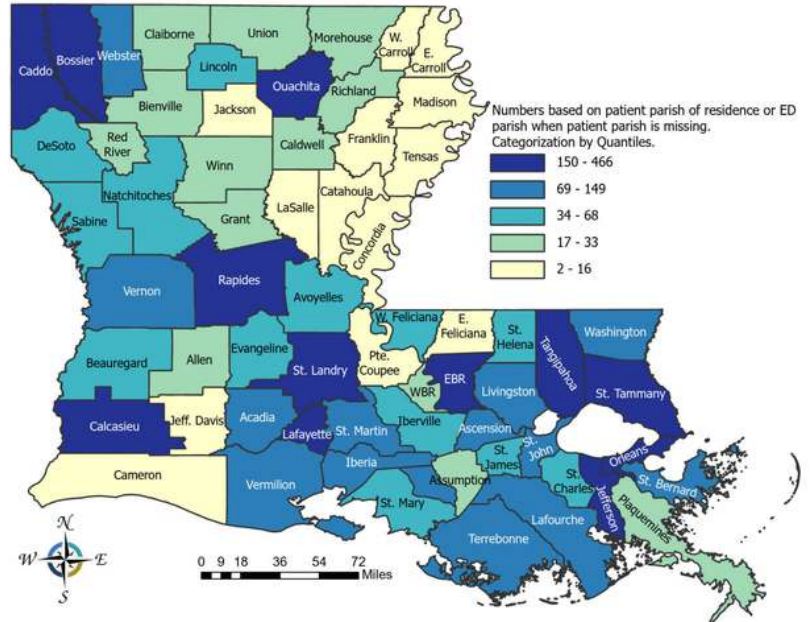
Individuals often have multiple heat-related health effects. HRI can result in long-term health effects, including an increased risk for subsequent HRI. Acute renal failure (or acute kidney injury) can lead to chronic kidney disease.

HRI ED VISITS BY PARISH

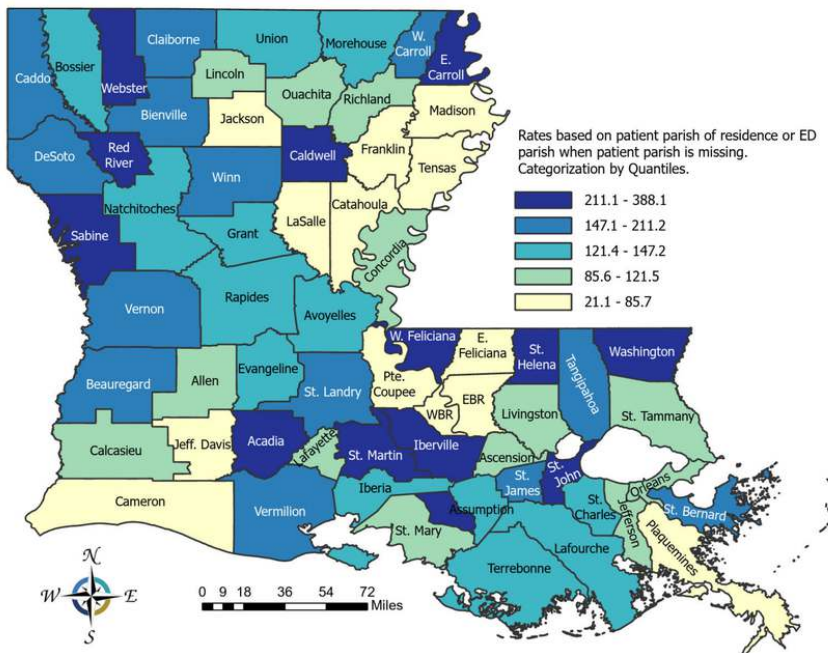
HRI ED visits were mapped for Louisiana residents according to the patient's parish of residence. For patients with missing residence (n=97), the parish of the treatment facility was used as a proxy for the parish of residence.

Parishes with the highest counts generally included urban centers: Caddo/Bossier (Shreveport), Rapides, Calcasieu (Lake Charles), St. Landry/Lafayette, East Baton Rouge, Orleans/Jefferson, and St. Tammany/Tangipahoa (Slidell/Covington).

HRI ED VISIT COUNTS BY PARISH



HRI ED VISIT RATES (PER 100,000) BY PARISH



Parishes with the highest rates were generally rural parishes: Webster, Red River, Sabine, West Feliciana, Acadia, St. Martin, Iberville, St. John, St. Helena, and Washington.

About 46% of all out-of-state visitors were treated in Caddo, Orleans, Jefferson, or St. Tammany Parish.

HRI ED VISITS BY OUT-OF-STATE RESIDENTS

Five percent of ED visits for HRI were for people who did not live in Louisiana. These people may have been visiting or working in Louisiana at the time of their ED visit. About 46% of all out-of-state visitors were treated in Caddo, Orleans, Jefferson, or St. Tammany Parish.

Parish of Treatment Facility for Out-of-State Residents (N=302)		
PARISH	N	% of all out-of-state residents
Caddo	44	15%
Orleans	35	12%
Jefferson	34	11%
St. Tammany	27	9%
Ascension	15	5%
Calcasieu	13	4%
Ouachita	11	4%
Rapides	10	3%
Bossier	8	3%
Lincoln	8	3%
Tangipahoa	8	3%
Terrebonne	8	3%
De Soto	7	2%
Lafayette	7	2%
St. Martin	7	2%
St. Charles	6	2%
East Baton Rouge	5	2%
Concordia	4	≤ 1%
Washington	4	≤ 1%
Beauregard	3	≤ 1%
Sabine	3	≤ 1%
St. Helena	3	≤ 1%
St. John the Baptist	3	≤ 1%
St. Landry	3	≤ 1%
Iberville	2	≤ 1%
Natchitoches	2	≤ 1%
Red River	2	≤ 1%
Richland	2	≤ 1%
St. Bernard	2	≤ 1%
Vermilion	2	≤ 1%
Vernon	2	≤ 1%
Webster	2	≤ 1%
Avoyelles	1	≤ 1%
Claiborne	1	≤ 1%
East Carroll	1	≤ 1%
Evangeline	1	≤ 1%
Iberia	1	≤ 1%
Lafourche	1	≤ 1%
Livingston	1	≤ 1%
St. James	1	≤ 1%
Union	1	≤ 1%
West Carroll	1	≤ 1%