HEAT-RELATED ILLNESS IN NEW ORLEANS:

Review of Emergency Department Data from 2010-2020

March 2023

LOUISIANA DEPARTMENT OF HEALTH

AUTHORS:

This report was prepared by the Louisiana Department of Health (LDH) Office of Public Health's (OPH) Occupational Heat-Related Illness Prevention Program and Tulane University School of Public Health/Disaster Management Program.

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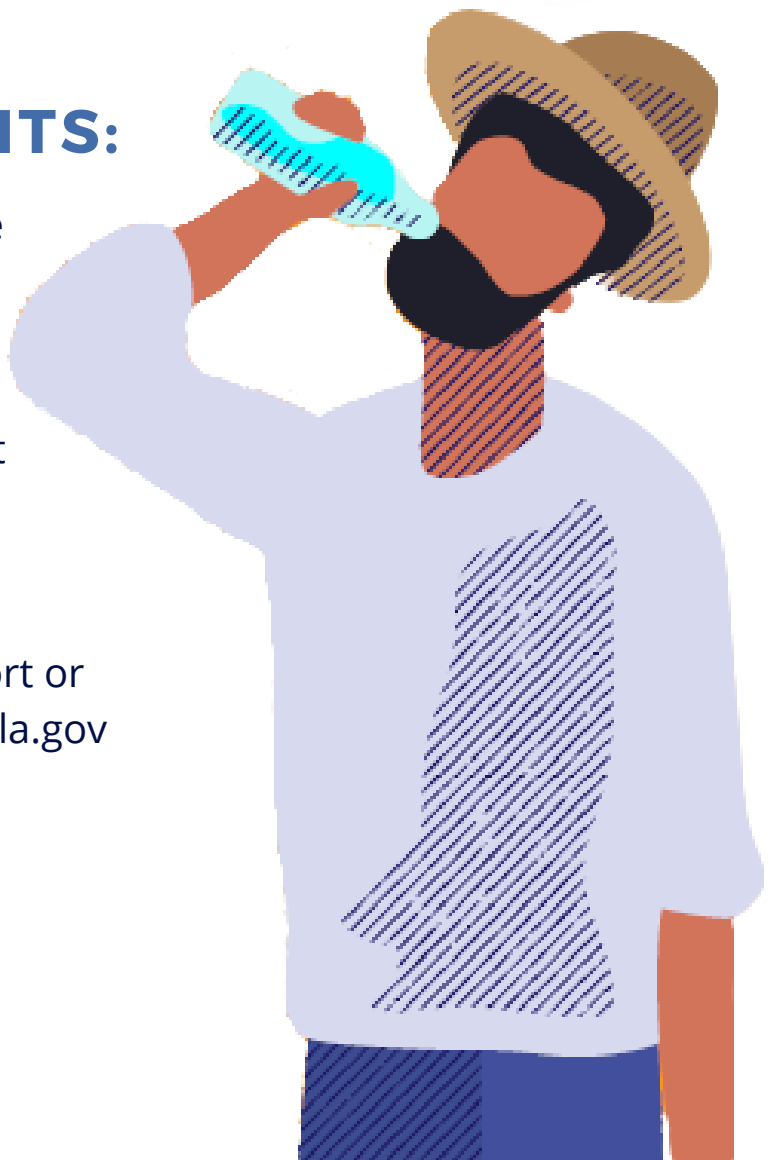
For more information about the report or the program, contact workerhealth@la.gov



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OVERVIEW

This report summarizes information about residents and visitors to Orleans Parish from 2010 to 2020 who were treated in the emergency department (ED) with a diagnosis indicating heat exposure.

Heat exposure is intensifying as the frequency, severity, and duration of extreme heat events increases due to climate change. These changes are of concern for New Orleans because the city experiences some of the highest average summer temperatures in the nation. New Orleans' hot summers are compounded by high humidity which worsens the impact of heat by impairing the body's ability to cool by evaporation. **Understanding variations in heat-related ED visits can inform and target public education programs and policy and prevention efforts, such as heat-health alert protocols and action plans.**

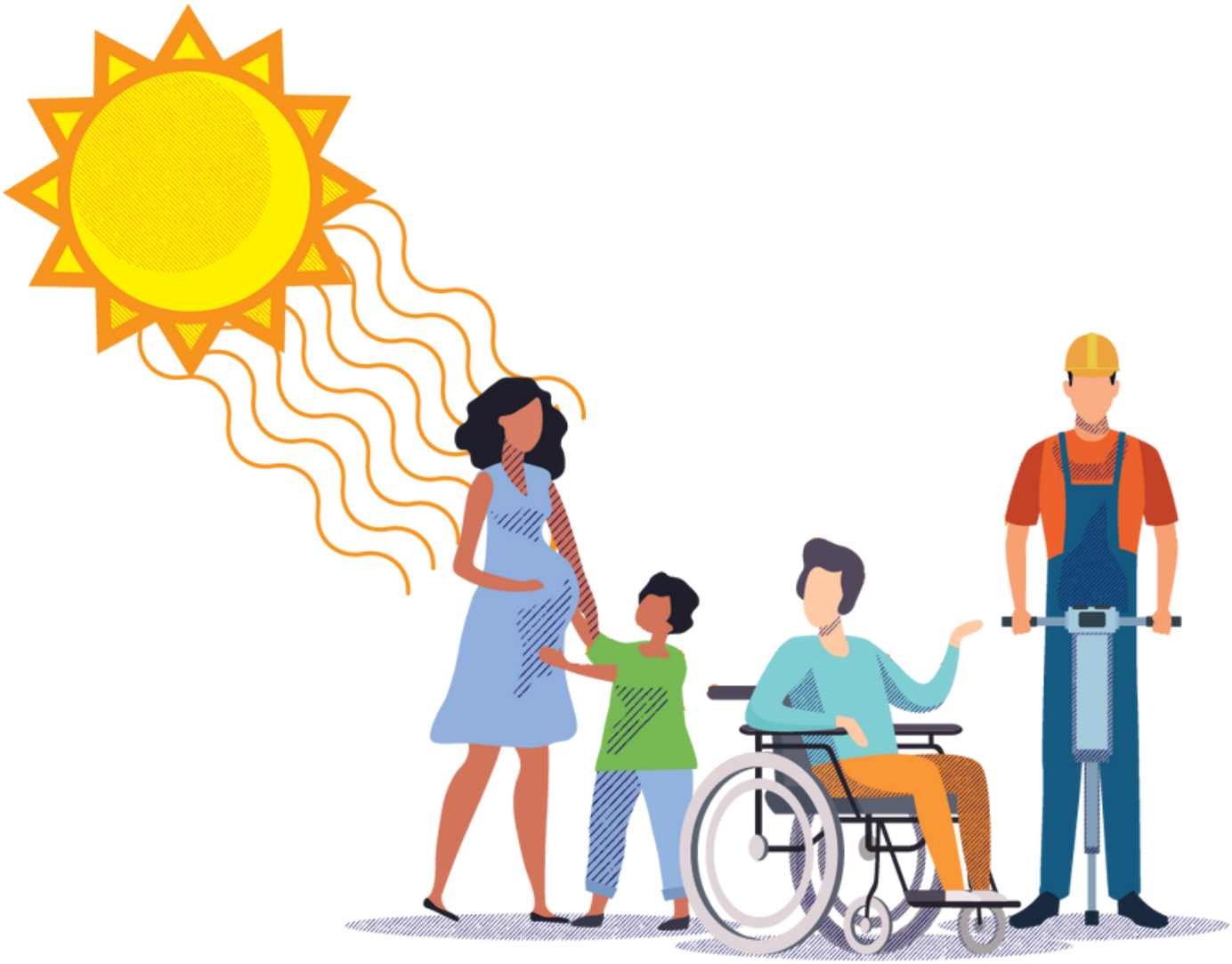
The human body maintains an internal temperature within a very narrow range. **Heat-related illness can occur when someone is exposed to high temperatures and his or her body is unable to cool itself sufficiently through sweating**. Heat-related illness (or hyperthermia) is a broad term for conditions directly related to an increase in body temperature. These conditions occur along a continuum of severity ranging from mild cramps, swelling and rashes to potentially fatal heat exhaustion and heat stroke. Heat also has indirect health impacts: it can exacerbate chronic conditions such as respiratory, cardiovascular, and kidney disease, increase injuries and accidents, and strain mental health.

Progression of Heat-Related Illness

Illness	Symptoms
Heat Stroke	Confusion Altered mental status Slurred speech Loss of consciousness Seizures Very high body temperature Fatal if treatment delayed
Heat Exhaustion	Headache Nausea Dizziness Weakness Irritability
Heat Syncope	Fainting Dizziness/lightheadedness
Heat Cramps	Tightness or spasm of muscles
Heat Rash	Red clusters of pimples or small blisters

Anyone can develop heat-related illness, but some people are at greater risk.

- Workers in outdoor settings, and some indoor work settings without adequate climate-controlled environments.
- Infants and young children. They are sensitive to the effects of high temperatures and rely on others to control their environments.
- Pregnant women. They are under more bodily stress and are more likely to become dehydrated. Heat exposure can also contribute to premature birth, stillbirth, and lower infant birthweight.
- Older adults (65+). As people age, their sweat cooling mechanism becomes less efficient.
- People with chronic health conditions such as heart or kidney disease, breathing conditions, high blood pressure, diabetes, and obesity. Certain medications can also put people at risk because they interfere with their ability to thermoregulate.
- People who exercise outside.



METHODS

DATA SOURCES

Data analyzed in this report are from ED billing records for Orleans and Jefferson Parish hospitals, excluding the Veterans Affairs Hospital. The Louisiana Hospital Association provided data.

CASE SELECTION

- **Resident status:**
  - Orleans Parish Residents: This refers to patients who lived in Orleans parish based on the address listed on their medical record and were treated in an ED located in Orleans or Jefferson Parish. Patients treated in Jefferson parish EDs were included because a large portion of New Orleanians receive medical care in Jefferson Parish. (Refer to Appendix A: Summary Table: Orleans Parish Resident Heat-Related Illness Data, 2010-2020).
  - Non-Orleans Parish Residents: This refers to people who did not live in Orleans parish based on the address listed on their medical record but were treated in a ED located in Orleans Parish. These people are included because heat-health safety plans need to consider individuals visiting and working in Orleans Parish. (Refer to Appendix A: Summary Table: Non-Orleans Parish Resident Heat-Related Illness Data, 2010-2020).
- **Diagnosis:** Primary or secondary diagnosis directly indicating heat exposure. Diagnoses include those for heat-related stroke, exhaustion, syncope, cramps, fatigue, and edema (Refer to Appendix C: Diagnostic codes: Heat-Related Illness).
- **Time period:** Warm season: April through October, 2010-2020.

CALCULATIONS

Age-adjusted rates were calculated to determine differences by year, sex, age, race, and ZIP code. Orleans Parish population estimates were obtained from the U.S. Census 2020 Population estimates, ZIP code populations used the 2010 Decennial Census and American Community Survey (ACS) 5-year estimates for 2011-2015 and 2016-2020. All rates were adjusted to the U.S. 2000 standard population. Age-adjustment removes the influence of differing age distributions among groups, allowing for a more accurate comparison of rates.

Non-Orleans Parish residents were included in counts by year, month, and day of the week but were excluded from sex, age, race, and ZIP calculations because the population estimates for these calculations only includes Orleans Parish residents.

Cases who were working when they developed heat-related illness were flagged. Cases were considered work-related if workers' compensation paid the medical bill or the medical record contained a work-related diagnostic code (Refer to Appendix D: Diagnostic codes: Work-Relatedness).

LIMITATIONS

This report only includes information about individuals who had a diagnosis of heat-related illness listed on their medical record. This approach does not reflect the total burden of heat. Heat-related illness is underdiagnosed and underreported, and ascertainment can vary by time and place. In addition, heat can exacerbate chronic conditions, contribute to injuries such as a fall or trip, and have other indirect health impacts.

This report underestimates work-related cases. Many workers do not have workers' compensation insurance, they have workers' compensation but don't use it, or the healthcare provider doesn't record the case as work-related on the medical record.

This report may underestimate non-Orleans Parish residents who developed heat-related illness when they were visiting or working in Orleans Parish but received treatment in an ED located in Jefferson Parish.

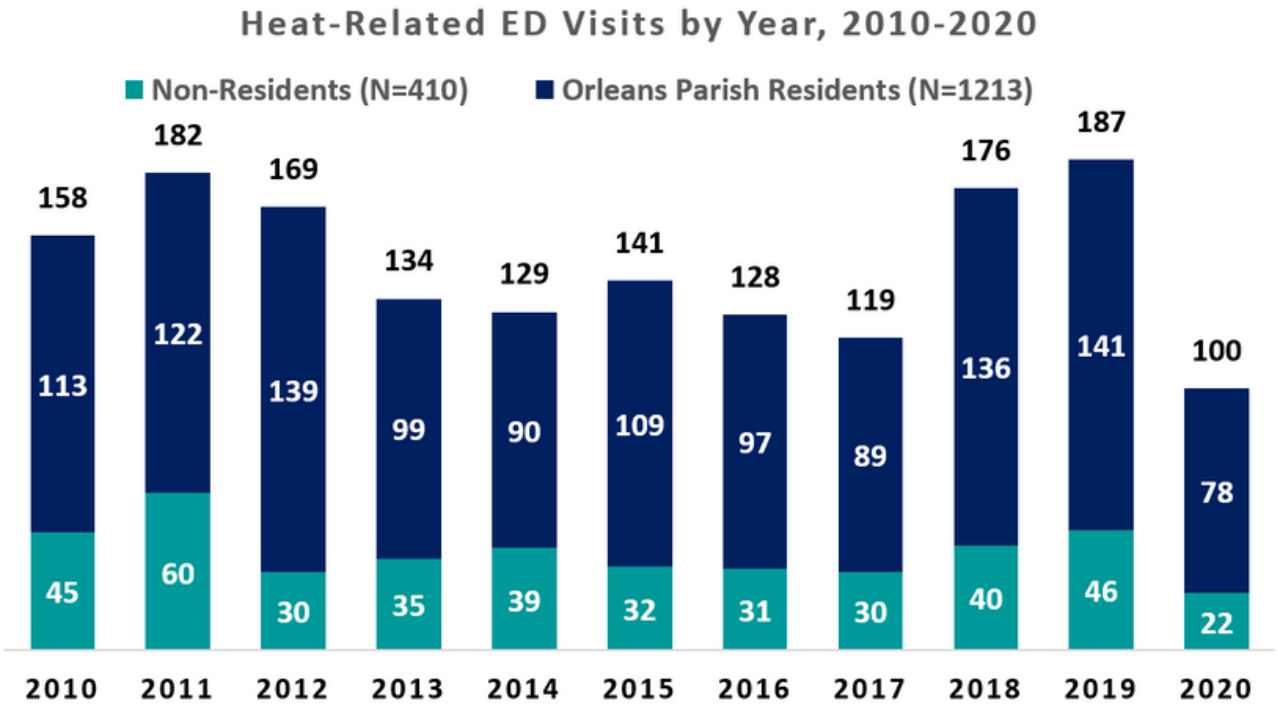
RESULTS

ANNUAL COUNTS AND RATES

From 2010 to 2020, there were 1,213 Orleans Parish residents who were treated in an ED in Orleans or Jefferson Parish, and 410 non-Orleans Parish residents who were treated in an Orleans Parish hospital.

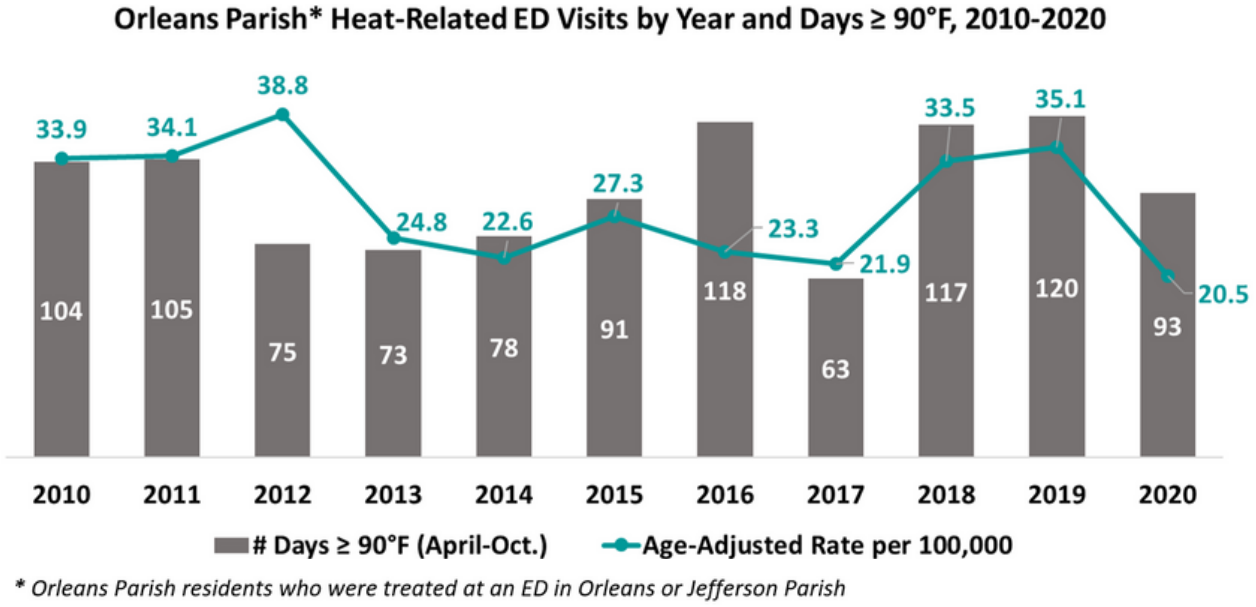
On average, there were 148 ED visits for heat-related illness every year.

Although most ED visits were for Orleans Parish residents (75%), one out of every four ED visits for heat-related illness in Orleans Parish was for someone who did not live in Orleans Parish. This included individuals from other Louisiana parishes and other states. Because New Orleans is a popular destination for tourists, sports events, and conferences, it is important to consider how heat impacts visitors to the city.



TEMPERATURE

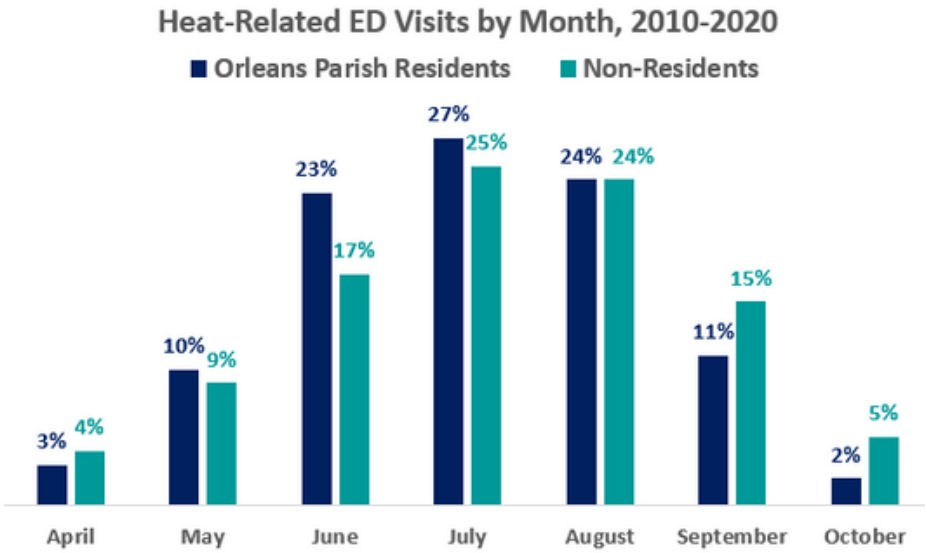
Annual fluctuations in heat-related ED visits generally corresponded to variations in the numbers of hot days. The graph below shows the annual number of days greater than or equal to 90°F, for April through October, and the age-adjusted rate of heat-related ED visits for Orleans parish residents.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish*

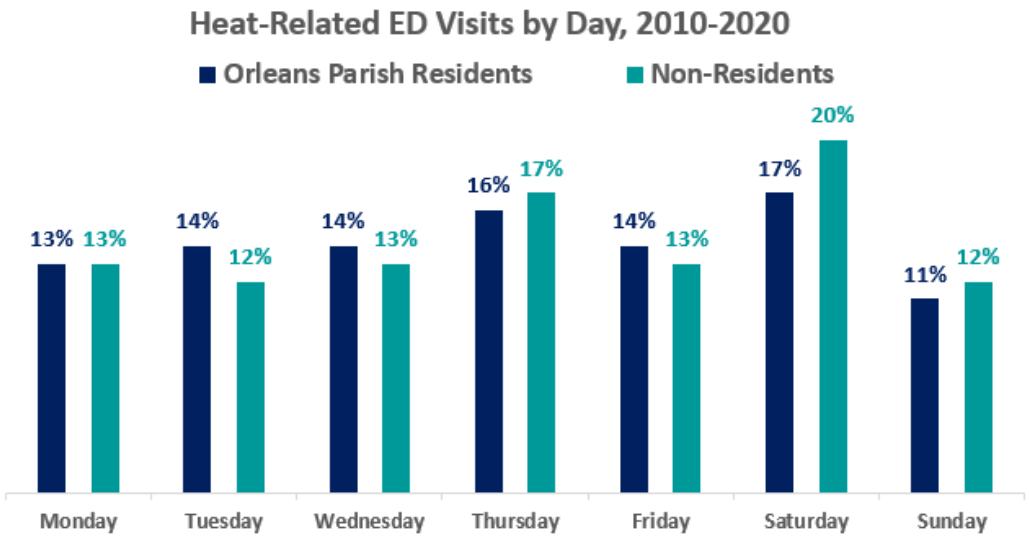
MONTH

Although most cases occurred during the summer months, warm spring and fall temperatures contributed to over one-quarter of all resident ED visits and one-third of all non-resident visits. As the climate warms, more cases will occur in the fall and spring months.



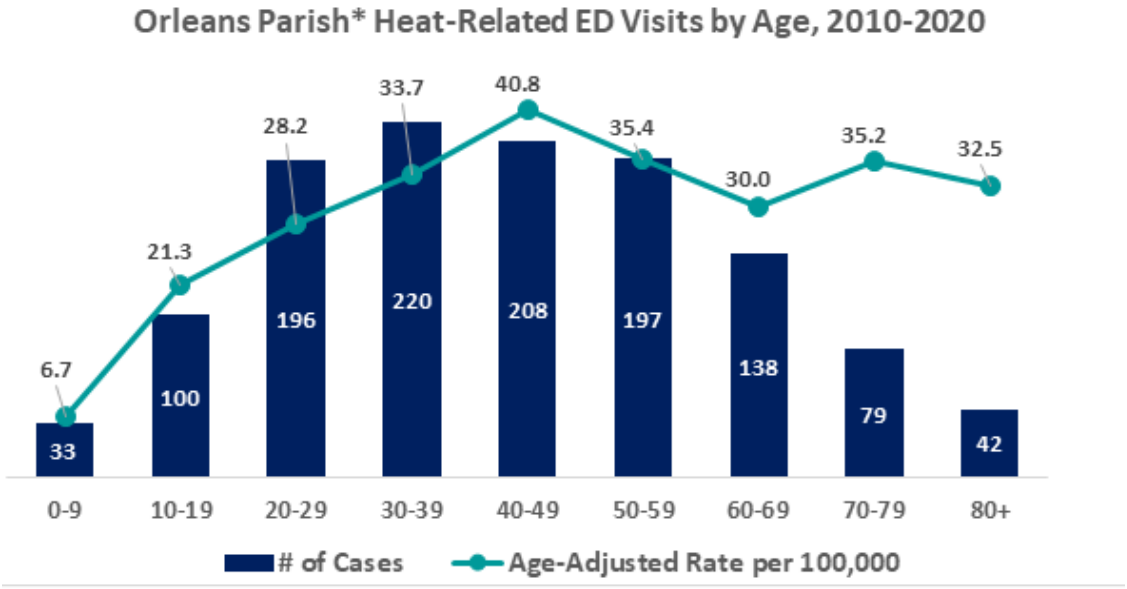
DAY

Heat-related ED visits were summarized according to the day of the ED visit. **For both residents and non-residents, Thursday and Saturday had the highest percentage of cases, and Sunday had the fewest cases.**



AGE

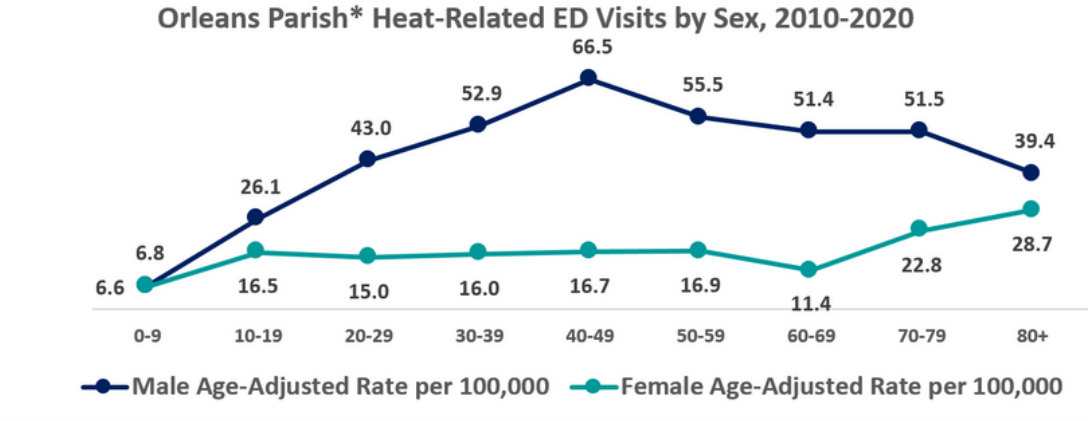
Individuals 40 to 49 years old have the highest rate, followed by the 50 to 59 age group. The smallest number and rate were for children under 10 years of age.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish*

SEX

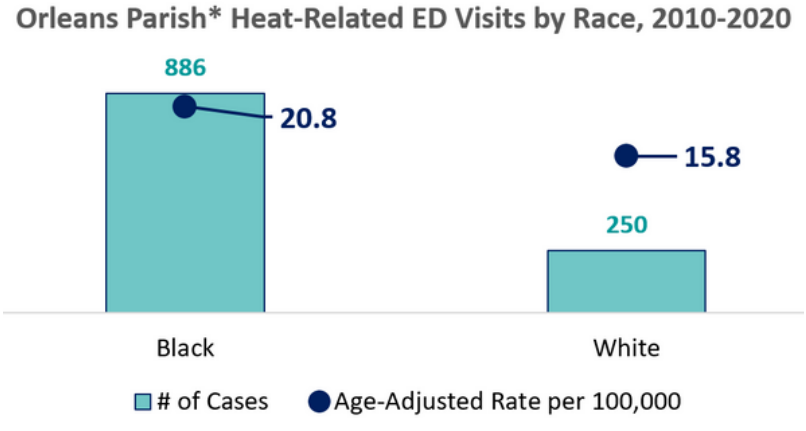
Males made up 72% of all ED visits for heat-related illness. The average annual rate for males was 2.5 times the female rate: 42.2 cases per 100,000 vs 16.7 cases per 100,000. Males have an increased risk of heat-related illness due to employment in outdoor occupations, activities such as yardwork and house repair including post-storm clean up, and sports such as football and golf. The difference in rates is less acute for the younger and older age groups.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish.*

RACE

The rate of ED visits for heat-related illness for Black residents was 1.3 the rate for White residents (20.8 cases per 100,000 vs. 15.8 cases per 100,000). Racial inequities in heat-related illness and other health outcomes are influenced by structural determinants of health including income and housing. Communities that experienced historical redlining have hotter temperatures than neighboring areas due to factors like proximity to large roadways and lack of tree cover. Neighborhoods with less trees have more sun exposure, resulting in hotter temperatures.

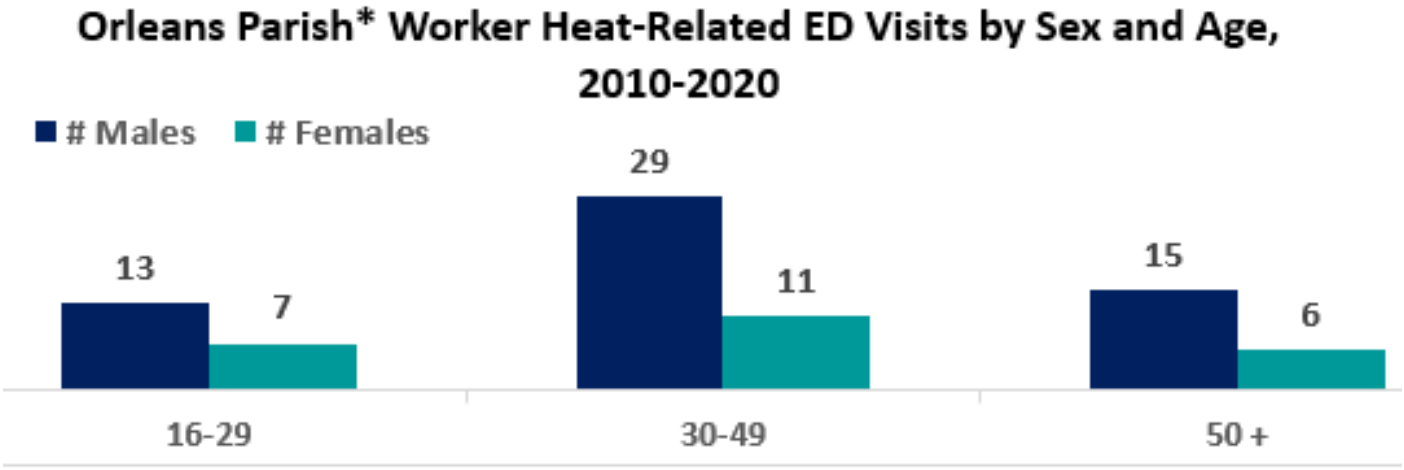


** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish*

WORKERS

Many workers are at risk of heat exposure due to outdoor and physically demanding work in industries including construction, landscaping, agriculture, transportation, utilities, sanitation, and manufacturing. Indoor workers are also at risk if they work in a setting with inadequate air conditioning such as warehouses, kitchens, and garages. These at-risk indoor and outdoor occupations are male dominated.

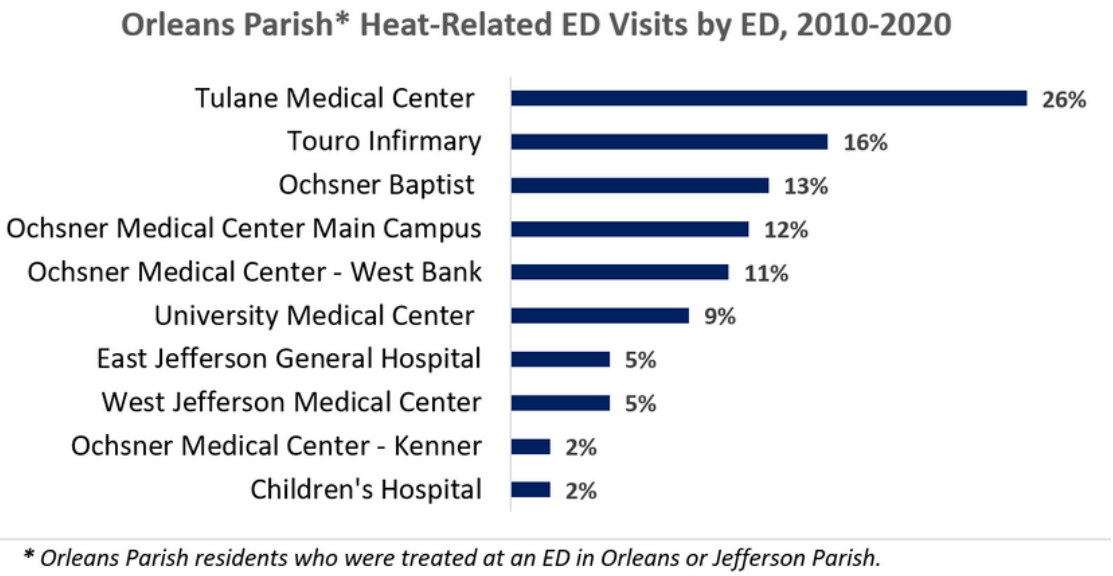
Eighty-one Orleans Parish residents were working when they developed heat-related illness. Most of these workers were male (70%) and Black (69%). Workers age 30 to 49 years old accounted for almost 50% of the cases.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish.*

HOSPITAL

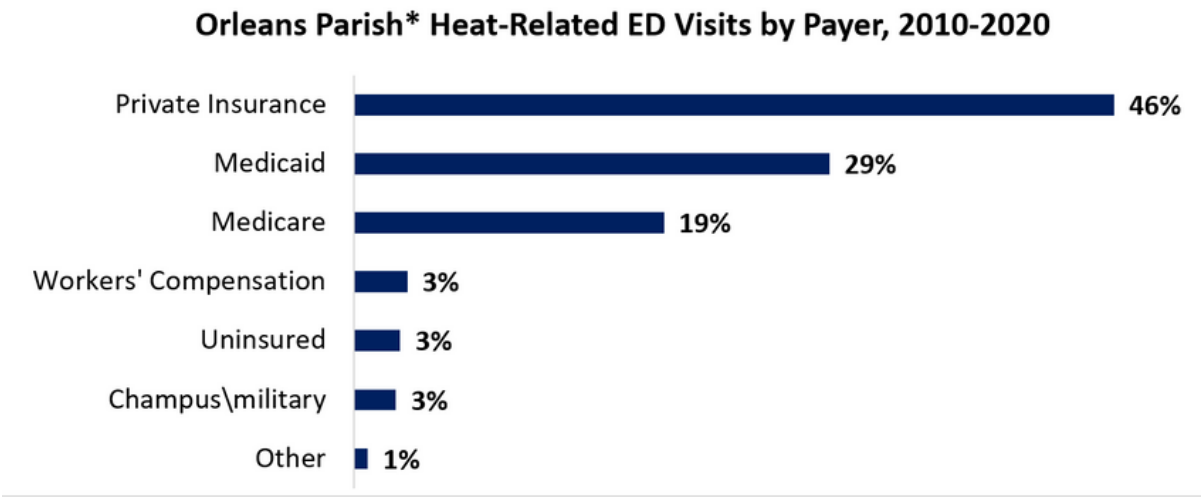
The ED with the most heat-related visits was Tulane University Hospital accounting for approximately one-quarter of all ED visits. The ED with the fewest visits was Children's Hospital, which corresponds to the low rate of heat-related illness for the youngest age group.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish.*

PAYER

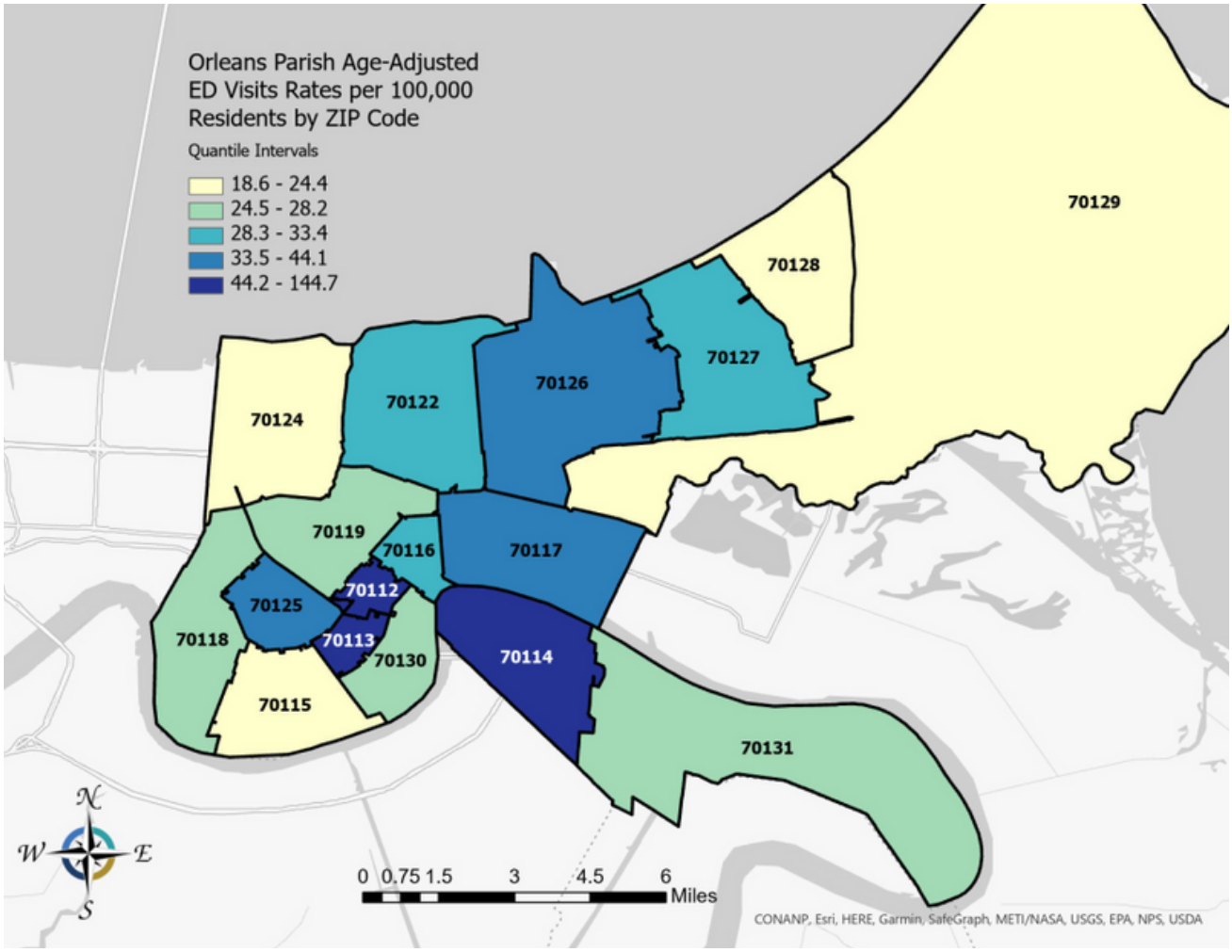
Payer reflects the source of payment for the ED visit. **Private health insurance was the most common payment source, followed by Medicaid and Medicare.**



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish.*

LOCATION

ED cases were mapped based on patients' ZIP codes. ZIP codes with the highest rates of ED visits for heat-related illness include 70112, 70113, and 70114, followed by 70117, 70125, and 70126.



** Orleans Parish residents who were treated at an ED in Orleans or Jefferson Parish.*

APPENDICES

APPENDIX A: SUMMARY TABLE: ORLEANS PARISH RESIDENT HEAT-RELATED ILLNESS DATA, 2010-2020

Characteristic	Total (2010-2020)	Percent
Overall	**1,213**	**100.0%**
Age		
0-9	33	2.6%
10-19	100	8.2%
20-29	196	16.0%
30-39	220	17.9%
40-49	208	18.0%
50-59	197	16.2%
60-69	138	11.2%
70-79	79	6.4%
80+	42	3.5%
Sex		
Female	338	27.95%
Male	875	72.1%
Race		
Black	147	73.0%
White	223	20.6%
Other	47	3.9%
Unknown	30	2.5%

Month		
April	39	3.2%
May	125	10.3%
June	274	22.6%
July	324	26.7%
August	288	23.7%
September	137	11.3%
October	26	2.1%
Day		
Monday	156	12.9%
Tuesday	175	14.4%
Wednesday	169	13.9%
Thursday	194	16.0%
Friday	174	14.3%
Saturday	207	17.1%
Sunday	138	11.4%
Work-related Cases		
Yes	81	6.7%
No	1,132	93.3%
ED Name		
Children's Hospital*	21	1.7%
East Jefferson General Hospital**	66	5.4%
Ochsner Baptist*	152	12.5%

Ochsner Medical Center- Kenner**	26	2.1%
Ochsner Medical Center Main Campus**	144	11.9%
Ochsner Medical Center- West Bank**	128	10.6%
Touro Infirmary*	189	15.6%
Tulane Medical Center*	320	26.4%
University Medical Center New Orleans*	107	8.8%
West Jefferson Medical Center**	60	4.9%
*Orleans Parish **Jefferson Parish		
Payer		
Champus/Military	30	2.5%
Medicaid	339	27.9%
Medicare	221	18.2%
Other	10	0.8%
Private Insurance	542	44.7%
Uninsured	33	2.7%
Worker/State Compensation	38	3.1%
Zip Code		
70112	54	4.5%
70113	56	4.6%
70114	117	9.6%
70115	93	7.7%
70116	47	3.9%
70117	97	8.0%

70118	89	7.3%
70119	107	8.8%
70122	116	9.6%
70124	32	2.6%
70125	59	4.9%
70126	106	8.7%
70127	55	4.5%
70128	44	3.6%
70129	16	1.3%
70130	36	3.0%
70131	75	6.2%
Other Zip Code	14	1.2%

APPENDIX B: SUMMARY TABLE: NON-ORLEANS PARISH RESIDENTS HEAT-RELATED ILLNESS DATA, 2010-2020

Characteristic	Number	Percent
Overall	**410**	**100.0%**
Age		
0-9	10	2.4%
10-19	46	11.2%
20-29	85	20.5%
30-39	81	20.0%
40-49	71	17.3%
50-59	61	14.9%
60-69	38	9.3%
70-79	10	2.4%
80+	8	2.0%
Sex		
Female	123	30.0%
Male	287	70.0%
Race		
Black	147	35.9%
White	223	54.4%
Other	34	8.3%
Unknown	6	1.5%

Month		
April	17	4.1%
May	38	9.3%
June	71	17.1%
July	105	25.4%
August	98	24.4%
September	62	15.1%
October	19	4.6%
Day		
Monday	55	13.4%
Tuesday	50	12.2%
Wednesday	52	12.7%
Thursday	68	16.6%
Friday	54	13.4%
Saturday	84	20.2%
Sunday	47	11.5%
ED		
Children's Hospital	10	2.4%
Ochsner Baptist	68	16.6%
Touro Infirmary	75	18.3%
Tulane Medical Center	216	52.7%
University Medical Center New Orleans	41	10.0%

Payer		
Medicaid	67	16.3%
Medicare	44	10.7%
Other	9	2.2%
Private Insurance	251	61.2%
Uninsured	24	5.9%
Workers' Compensation	15	3.7%
State		
AL	10	2.4%
CA	6	1.5%
FL	11	2.7%
GA	7	1.7%
IL	5	1.2%
LA (excluding Orleans Parish)	266	64.9%
MS	20	4.9%
NJ	5	1.2%
NY	9	2.2%
OH	5	1.2%
PA	7	1.7%
TX	16	3.9%
Other states	30	7.3%
Missing/Unknown	13	3.2%

APPENDIX C: DIAGNOSTIC CODES: HEAT-RELATED ILLNESS

International Classification of Diseases (ICD)
Diagnostic and External Cause of Injury codes for Effects of Heat and Light

ICD 9th Revision	
Code	**Definition**
992.0	Heat stroke
992.1	Heat syncope
992.2	Heat cramps
992.3	Heat exhaustion, anhidrotic
992.4	Heat exhaustion due to salt depletion
992.5	Heat exhaustion, unspecified
992.6	Heat fatigue
992.7	Heat edema
992.8	Other specified heat effects
992.9	Unspecified effects of heat and light
E900.0	Excessive heat due to weather conditions
E900.1	Excessive heat of man-made origin
E900.9	Excessive heat of unspecified origin

ICD 10th Revision	
Code	**Definition**
T67.01XA	Heatstroke and sunstroke, initial encounter
T67.02XA	Exertional heatstroke, initial encounter
T67.1XXA	Heat syncope, initial encounter
T67.2XXA	Heat cramp, initial encounter
T67.3XXA	Heat exhaustion, anhydrotic, initial encounter
T67.4XXA	Heat exhaustion due to salt depletion, initial encounter
T67.5XXA	Heat exhaustion, unspecified, initial encounter
T67.6XXA	Heat fatigue, transient, initial encounter
T67.7XXA	Heat edema, initial encounter
T67.8XXA	Other effects of heat and light, initial encounter
T67.9XXA	Effect of heat and light, unspecified, initial encounter
X30.XXXA	Exposure to excessive natural heat, initial encounter
W92.XXXA	Exposure to excessive heat of man-made origin, initial encounter

APPENDIX D: DIAGNOSTIC CODES: WORK-RELATEDNESS

International Classification of Diseases
External cause of morbidity: work-relatedness

Code	Definition
ICD 9th Revision	
E000.0	Civilian activity done for income
E000.1	Military activity
E800-E807	Railway accident among railway employee
E830-E838	Water transport accident among crew, dockers and stevedores
E840-E845	Air and space transport accidents among crew and ground crew
E846	Accidents involving powered vehicles used solely within the buildings and premises of industrial or commercial establishment
E849.1	Place of occurrence: farm building/land under cultivation
E849.2	Place of occurrence: mine or quarry
E849.3	Place of occurrence: industrial place and premises

ICD 10th Revision	
Y99.0	Civilian activity done for pay
Y99.1	Military activity
Y92.61	Building [any] under construction as the place of occurrence
Y92.62	Dock or shipyard as place of occurrence
Y92.63	Factory as place of occurrence
Y92.64	Mine or pit as the place of occurrence
Y92.65	Oil rig as the place of occurrence
Y92.69	Other specified industrial and construction area as the place of occurrence
Y92.71	Barn as the place of occurrence
Y92.72	Chicken coop as the place of occurrence
Y92.73	Farm field as the place of occurrence
Y92.74	Orchard as the place of occurrence
Y92.79	Other farm location as the place of occurrence
Z04.21[1]	Encounter for examination and observation following work accident
Z57.61[1]	Occupational exposure to extreme temperature
Z57.81[1]	Occupational exposure to other risk factors

[1] Z codes fall under the category of Factors influencing health status and contact with health services.