ARIZONA DEPARTMENT OF HEALTH SERVICES

Don Herrington, Interim Director

BUREAU OF EMERGENCY MEDICAL SERVICES AND TRAUMA SYSTEM

EMERGENCY MEDICAL SERVICES

2021 ANNUAL REPORT

PREPARED BY

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The Arizona Department of Health Services' Bureau of Emergency Medical Services and Trauma System wishes to acknowledge the continued hard work and dedication of all the individuals involved in working to provide emergency medical services.

Special thanks are extended to the members of the Emergency Medical Services Council, Medical Direction Commission, State Trauma Advisory Board, Protocols Medications and Devices Standing Committee, Trauma and EMS Performance Improvement Committee, Education Committee, Pediatric Advisory Council for Emergency Services Committee, participating EMS agencies, medical directors, and EMS professionals across the state who contribute to the system. Their dedication to protecting the health and safety of patients requiring emergency medical services and continuously improving data collection makes it possible to fully evaluate and advance Arizona's EMS system.

2020 SUBMITTING AGENCIES

GROUND AGENCIES

ABC Ambulance
Action Medical Svc. - Ganado
Action Medical Svc. - Winslow
Ajo Ambulance
American Medical Response Maricopa, LLC
AMR Pinal
AMR Tucson
Arivaca Fire Dist.
Arizona Ambulance Transport (AMR Cochise County)
Arizona City Fire Dist.
Arizona State University EMS
Arrowhead Mobile Healthcare
Avondale Fire & Medical Department
Avra Valley Fire District
Beaver Dam-Littlefield Fire District
Bisbee Fire Dept.
Blue Ridge Fire Dept.
Bouse Volunteer Fire Dist.
Buckeye Fire Department
Buckeye Valley Fire District
Buckskin Fire Department
Bullhead City Fire Department
Casa Grande Fire Dept., City of
Central Arizona Fire Medical Authority
Chandler Fire Department
Colorado City Fire Dept.
Colorado River Indian Tribes Fire Department
Congress Fire Dist.
Copper Canyon Fire and Medical District
Corona de Tucson Fire Department
Cottonwood Fire and Medical Dept.
Daisy Mountain Fire District
Desert Hills Fire Dist.
Douglas Fire Department
Drexel Heights Fire District
El Mirage Fire Dept.
Elfrida Ambulance Svc.
Eloy Fire District Ambulance Svc.
Flagstaff Fire Dept.
Florence Fire Dept.
Fort Mojave Mesa Fire Dept
Fry Fire District
Gila Bend Rescue / Ambulance
Gilbert Fire & Rescue Department

Glendale Fire Dept.
Globe Fire Dept.
Golden Valley Fire Dist.
Golder Ranch Fire District
Goodyear Fire Dept.
Grand Canyon Nat. Park Fire Dept.
Green Valley Fire District
Greenlee County Ambulance Svc.
Greer Fire District
Groom Creek Fire Dist.
Guardian Medical Transport
Healthcare Innovations
Heber-Overgaard Fire District
Hellsgate Fire Dist.
Helmet Peak Fire Department
High Country Fire Rescue
Holbrook EMS
Hualapai Nation Emergency Services
Kingman Fire Dept., City of
Lake Havasu City Fire Rescue & EMS
Lake Mohave Ranchos Fire District
Life Line Ambulance Service
Life Line Central
Life Line Payson
Life Line Pinal
Life Line Safford
Maricopa Ambulance LLC
Maricopa County Sheriff's Office (MCSO)
Maricopa Fire Dept.
Mayer Fire Department
McMullen Valley Fire Dist.
Mesa Fire and Medical Department
Mohave County Airport Authority
Mohave Valley Fire Dept
Mormon Lake Fire Dist.
Navajo Nation EMS - Fort Defiance
Navajo Nation EMS - Inscription House
Navajo Nation EMS - Kayenta
Navajo Nation EMS - Pinon
Navajo Nation EMS - Red Mesa
Navajo Nation EMS - Winslow
Nogales Ambulance Svc. (Nogales Fire)
North County Fire & Medical District
Northern Arizona Consolidated Fire Dept (NACFD)

Northwest Fire Rescue Dist.
Page Fire Department
Palo Verde NGS Fire Dept.
Palominas Fire Dist.
Parker Fire Dist.
Pascua Pueblo Fire Dept.
Payson Fire Dept.
Peoria Fire- Medical Department
Picture Rocks Fire & Medical District
Pima Volunteer Fire Department
Pine/Strawberry Fire Dept.
Pinetop Vol. Fire District
Pleasant Valley Fire Dist.
Ponderosa Fire District
Prescott Fire Dept.
Puerco Valley Ambulance Svc.
Quartzsite Fire Dist.
Queen Creek Fire Dept
Regional Fire and Rescue Dept.
Rincon Valley Fire District
Rio Rico Fire District
Rio Verde Fire District
River Medical, INC
Rural Metro Fire Maricopa
Rural Metro Fire Pima
Rural Metro Fire Yuma
Sacred Mountain Medical Svc.
San Luis Fire Department
Scottsdale Fire Department
Sedona Fire District
Sierra Vista Fire & Medical Department
Somerton Fire Dept.
Sonoita-Elgin Fire District
South County Fire and Medical District
St. Johns Emergency Svcs.
Sun City Fire & Medical Department
Sunsites-Pearce Fire District
Superstition Fire/Medical District
Surprise Fire-Medical Department
Taylor-Snowflake Fire Department
Tempe Fire Dept.
Three Points Fire District
Timber Mesa Fire and Medical District
Tohono O'odham Nation EMS
Tolleson Fire Dept.

Tombstone Fire Dept.
Tri - City Fire District
Tri-Valley Ambulance Svc.
Tubac Fire District Ambulance Svc.
Tucson Airport Authority Fire Dept.
Tucson Fire Department
Twin Arrows EMS
University of Arizona Emergency Medical Services
Verde Valley Ambulance Co.
Verde Valley Fire District
Vernon Fire Dist.
Water Wheel Fire and Medical District
White Mountain Ambulance Svc.
White Mountain Apache Tribe EMS
Wickenburg Fire Department
Williamson Valley Fire Dist.
Winslow Indian Health Care Center Medical Transport
Yarnell Fire Dist.
Yucca Fire Dist.
Yuma Fire Department

AIR AGENCIES

Air EMS, Inc.
Air Evac Svcs.
Arizona Lifeline
Classic Air Medical
DPS - Department of Public Safety (Air Rescue AZ)
Guardian Air (Flagstaff)
Guardian Flight
LifeNet (Arizona)
Native American Air Ambul. - OMNI Flight
REACH Air Medical Svcs. (California)
Reva, Inc.
Sunrise Air Ambulance LLC
Tri State Care Flight, LLC

The 2021 Annual Report demonstrates the continued growth of Arizona's EMS system as the state has experienced a population boom in recent decades, now exceeding over seven million residents in addition to a steady stream of winter visitors each year. Currently, the Bureau of EMS and Trauma System regulates 96 certificated ground ambulance providers and 19 licensed air ambulance providers, including 952 registered ground ambulance vehicles and 131 aircraft in the state of Arizona. Furthermore, the Bureau is responsible for certification of approximately 19,921 emergency medical care technicians, 50 base hospitals, and 61 training programs that are currently active in Arizona. The Arizona Prehospital Information & EMS Registry System (AZ-PIERS) database was implemented in November 2011 and began with 3 EMS agencies initially submitting data to the registry. Over the last five years, the number of EMS agencies participating in AZ-PIERS increased from 93 agencies in 2015 to 166 agencies in 2020 voluntarily submitting data to the registry. Although it is challenging to conduct a trend analysis on the data within AZ-PIERS due to the increased number of EMS agencies reporting to the registry, it is important to continue to utilize AZ-PIERS to track and report on statewide EMS trends on an annual basis in order to better understand and improve health outcomes.

This report illustrates how Arizona's EMS system has evolved and remained resilient throughout a changing landscape during the beginning of the COVID-19 pandemic from January 1, 2020 to December 31, 2020. With COVID-19 cases on the rise, EMS and trauma continue to represent a growing health concern and economic burden across the state. Despite significant changes in behavior observed statewide due to the Stay-Home-Stay Healthy campaign and executive orders in early 2020, which resulted in a significant reduction in mobility and motor vehicle traffic, the annual volume of 911 and EMS incidents reported to AZ-PIERS remained relatively consistent from 2019 to 2020. Although AZ-PIERS is not representative of all EMS agencies and call volume statewide, during 2020 there was a notable increase in interfacility transports and EMS incident rates in rural counties compared to urban counties. While injuries such as falls comprise the majority of EMS calls, in 2020 there was an increase in time sensitive incidents and deaths reported for cardiac arrest, STEMI, stroke, drug overdoses, and suicides compared to past years. Consequently, continuing to monitor statewide EMS trends and patient outcomes through AZ-PIERS provides visibility into current and emerging health threats that significantly impact Arizona communities.

The 911 and EMS system provides an essential service that must maintain a constant state of readiness and capabilities to respond 24/7 during disasters and pandemics. In response to the pandemic, in early 2020, the Department initiated the following actions in order to prepare, assist, and stabilize the EMS and Health care system:

- The Director issued a number of rule waivers to allow providers to operate with as few non-essential regulatory barriers as possible.
- The Department hosted webinars for providers to learn about COVID-19 and immediately developed 911 and EMS COVID-19 guidelines to prevent the spread of the virus and protect responder health and safety.
- At the recommendation of the State Disaster Medical Advisory Committee, the Department implemented the state's Crisis Standards of Care Plan, which included contingency measures and support provided by a Good Samaritan executive order to ensure the protection of frontline responders.
- The Department encouraged EMS agencies to become Treat and Refer providers to promote community paramedicine and alternative transport destinations for patients when medically appropriate.

- The Department issued an emergency measure to allow all levels of EMTs to administer immunizations and viral testing. In addition, the Medical Direction Commission continues to provide recommendations to the Department regarding scope of practice and drug table updates consistent with national standards and the changing COVID-19 landscape.
- The Department continued to track EMS call volume closely and monitor increasing trends in 911 calls related to drug overdoses and cardiac events. In response, the Department developed Safe to Seek Care messaging and public service announcements to educate patients on the risks of delaying medical care and encouraging patients and Good Samaritans to call 911 if they think they are experiencing a health emergency. The Department also reissued a standing order for naloxone administration and continues to promote the Naloxone Leave Behind program to reduce fatal overdoses.
- The Arizona Surge Line was implemented to facilitate a centralized patient transfer service for hospitals to provide COVID-19 patient load balancing across the health care system and ensure appropriate level of care. The Surge Line remains operational and has also helped to contract and coordinate critical care staffing for hospitals during shortages.
- The Department continues to work with the EMS and hospital system to ensure that timely and quality care is available to patients by maintaining the designation of 47 trauma centers, certification of 37 cardiac receiving centers, as well as Triage, Treatment and Transport Guidelines that are routinely reviewed by statutory committees.

While the pandemic continues to impact the health care system in 2021, the Bureau will remain focused on supporting Arizona's EMS system to ensure that the population has access to timely, high quality emergency medical care for all health threats. It is critical that we continue to track EMS education and workforce trends in the state and also explore AZ-PIERS linkages with other public health disease, syndromic, and death surveillance databases to better understand 2020 trends and emerging health threats. Additional system wide analyses are needed to assess the impacts of the Arizona Surge Line centralized transfer service, Treat and Refer community paramedicine programs that support alternative transport destinations, as well as any changes in patient dispositions and outcomes due to increased patient refusals and transfers from licensed health care system institutions.

Arizona's EMS system is composed of many talented and dedicated professionals, in addition to the multi-disciplinary leadership of the statutory and standing committees, that have remained resilient over the challenges of the last year. Going forward, it will be important to continue to engage the EMS community to further evaluate trends and outcomes and develop recommendations to improve the EMS and Trauma system. The Department will continue to strongly encourage EMS providers to participate in AZ-PIERS in order to conduct an ongoing assessment of the system and assure the highest level of care in Arizona.

Gail Bradley, MD FACEP FAEMS ,Medical Director

Rachel Zenuk Garcia, MPH,MCHES Bureau Chief

BACKGROUND & METHODS

BACKGROUND

The purpose of this report is to systematically describe EMS calls reported in Arizona Prehospital Information & EMS Registry System (AZ-PIERS) during the year 2020. This report provides descriptive statistics of EMS run volume and rates for 911 incidents and interfacility transfer by various patient demographics, including age, gender, county, etc. Aggregate data on EMS response times and workforce demographics are also provided by the Bureau of EMS and Trauma System to demonstrate the resiliency of the statewide system during the beginning of the Covid-19 pandemic.

Arizona Prehospital Information & EMS Registry System (AZ-PIERS) is a free, electronic Patient Care Records (ePCRs) registry that allows EMS agencies to collect and transmit records to the State. The primary purpose of AZ-PIERS is to optimize prehospital care through a data driven, quality assurance approach. AZ-PIERS captures agency information, patient demographics, response times, incident location, and prehospital treatment. In order to obtain the final hospital outcome for EMS runs a deterministic linkage between AZPIERS and the Hospital Discharge Database (HDD) was performed.

METHODS

In 2020, 166 EMS agencies submitted data to the AZ-PIERS. A total of 1,003,624 EMS incidents were submitted to AZ-PIERS from January 1, 2020 to December 31, 2020. False calls (6), Cancelled (86,891), and Stand-by (3,098) EMS incidents were excluded from the analysis. EMS run rates per 100,000 Arizona residents were calculated using population estimates from the Arizona Health Status and Vital Statistics database.[1] Data were analyzed using SAS software, version 9.4 (SAS Institute, Cary, NC) and the graphs were created in Tableau, version 2020.3.0.

The primary and secondary impressions from the EMS diagnosis field were categorized using ICD-10 and Clinical Classifications Software (CCS) criteria in Appendix B.[2] In order to obtain the final hospital outcome for EMS incidents with an incident disposition of Treated and Transported, a deterministic linkage between AZ-PIERS and the Hospital Discharge Database (HDD) was performed. A total of 525,247 Treated and Transported EMS incidents qualified for linkage between AZ-PIERS and the HDD. Incidents not qualifying for linkage consisted of patients who were transported to facilities not reporting to the HDD, facilities outside of Arizona, or had missing data on all linkage variables. For linkages completed successfully, 493,916 (94%) EMS incidents were successfully matched to their respective records in the HDD.

Data Limitations:

- Since submitting data to AZ-PIERS is voluntary, in 2020 not all agencies submitted data to the registry, and while the data provide a snapshot of the EMS system the numbers may not be a true representation of the entire state.
- The analysis in this report does not include data linkages to any public health disease, syndromic, or death surveillance databases during 2020, and supplemental analyses will be needed to better understand EMS trends during the beginning of the COVID-19 pandemic.

1. Arizona Department of Health Services, Population Health and Vital Statistics. Population Denominators: 2020. http://pub.azdhs.gov/health-stats/menu/info/pop/index.php
2. https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp

2020 Arizona EMS System Snapshot

ADHS PREPAREDNESS

Total 2020 EMS Incidents Reported
1,003,623

Total 2020 EMS Incidents Included in Analysis*
888,224

166
EMS agencies submitted data

153 ground providers
13 air providers

2,433
Average number of EMS incidents reported per day

19,921 active EMCT certifications

2,468 new EMCT certifications completed

871,045 (98%)
ground incidents

17,179 (2%)
air incidents

50% incidents were among patients ages > 55 years

5% (33,963) incidents included pediatric patients (0 - 17 years)

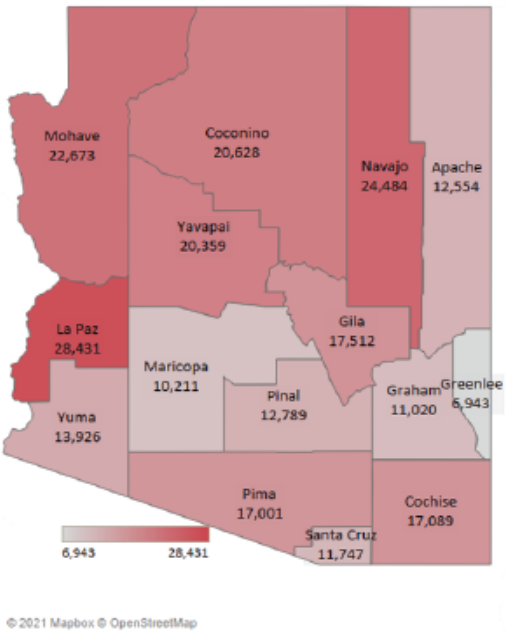
80% of EMS incidents were **911 response calls**

13% of EMS incidents were **traumatic injuries**

5,140 Arizona Surge Line Transfers facilitated by centralized COVID-19 Call Center**

90% to a higher level of care
9% to a skilled nursing facility
1% to a lower level of care or discharged to home

County based EMS incident rate per 100,000 Arizona residents



Median Time Intervals for 911 EMS Ground Incidents

8 minutes
Response Time

11 minutes
Scene Time

11 minutes
Transport Time

Prevalence of Primary and Secondary Impression Categories of Interest

Injury
133,578 (18.8%)

Substance Abuse
36,805 (5.18%)

Psychiatric Disorders
23,878 (3.36%)

Seizures
18,914 (2.66%)

Opioids
18,854 (2.65%)

Mortality by Primary and Secondary Impression Category

Cardiac Arrest
8,537 (58.0%)

STEMI
297 (6.7%)

Opioids
1,109 (5.3%)

Stroke
455 (3.8%)

Diabetes
284 (1.9%)

*Canceled, False, and Standby Incidents were excluded from the analysis. These data provide a snapshot of EMS incidents based on voluntary reporting submitted to AZ-PIERS, and the numbers do not represent total statewide EMS volume since not all agencies submitted data to the registry during 2020.
**The Arizona Surge Line centralized call center data includes suspected or confirmed COVID-19 patient transfers from April 16, 2020 to December 31, 2020.

N = 1,003,623

Table 1: Patient disposition of EMS incidents

Patient Disposition	N	%
Treated,Transported	586,966	58.48%
Treated and Transferred	139,172	13.87%
Cancelled	86,891	8.66%
Treated without Transport	73,926	7.37%
No Treatment Required	33,638	3.35%
Refused Treatment	30,077	3.00%
Missing	25,404	2.53%
Assist	14,992	1.49%
Dead At Scene	5,133	0.51%
Other	4,021	0.40%
Standby	3,098	0.31%
Treated and Released	299	0.03%
False Call	6	0.00%
Grand Total	1,003,623	100.00%

Data source : AZ-PIERS 2020

N = 888,224

Table 2:EMS incidents by response type

Response Type	N	%
911 Response (Scene)	710,560	80.00%
Interfacility Transport	70,036	7.88%
Medical Transport	105,293	11.85%
Other/Missing	2,335	0.26%
Grand Total	888,224	100.00%

Data Source : AZ-PIERS 2020

Figure 1: Types of EMS Responses (Ground)

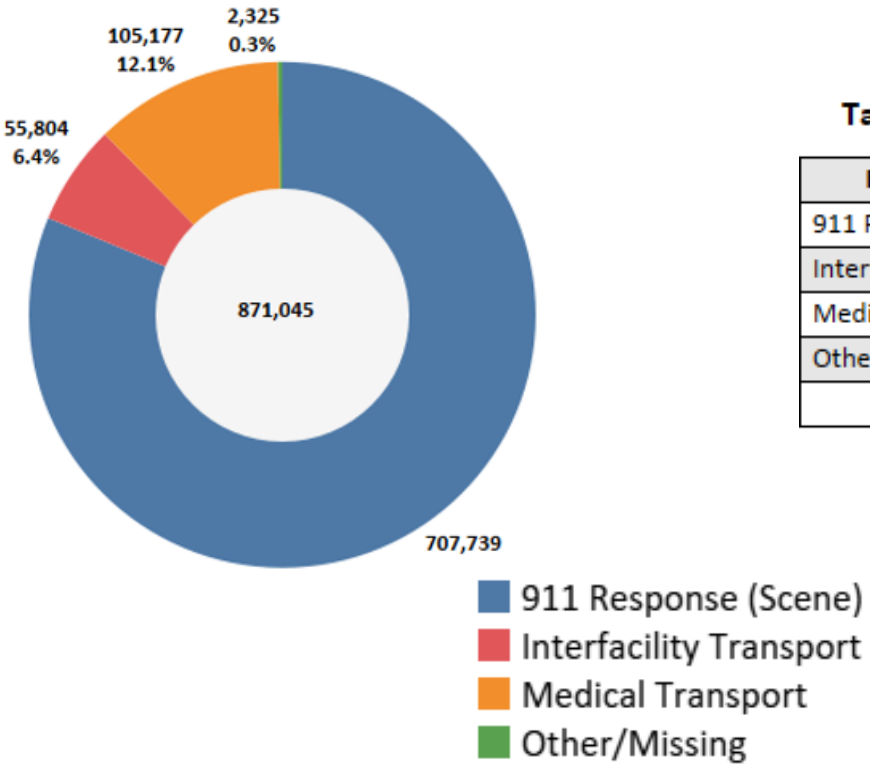


Table 3: EMS Responses (Ground)

Response Type	N	%
911 Response (Scene)	707,739	81.3%
Interfacility Transport	55,804	6.4%
Medical Transport	105,177	12.1%
Other/Missing	2,325	0.3%
Grand Total	871,045	100.0%

Data Source: AZ-PIERS 2020

* Refer to Appendix A f Definition

Figure 2: Types of EMS Responses (Air)

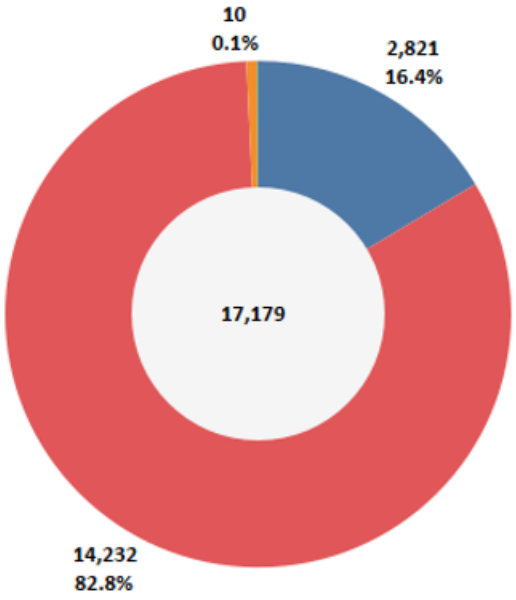


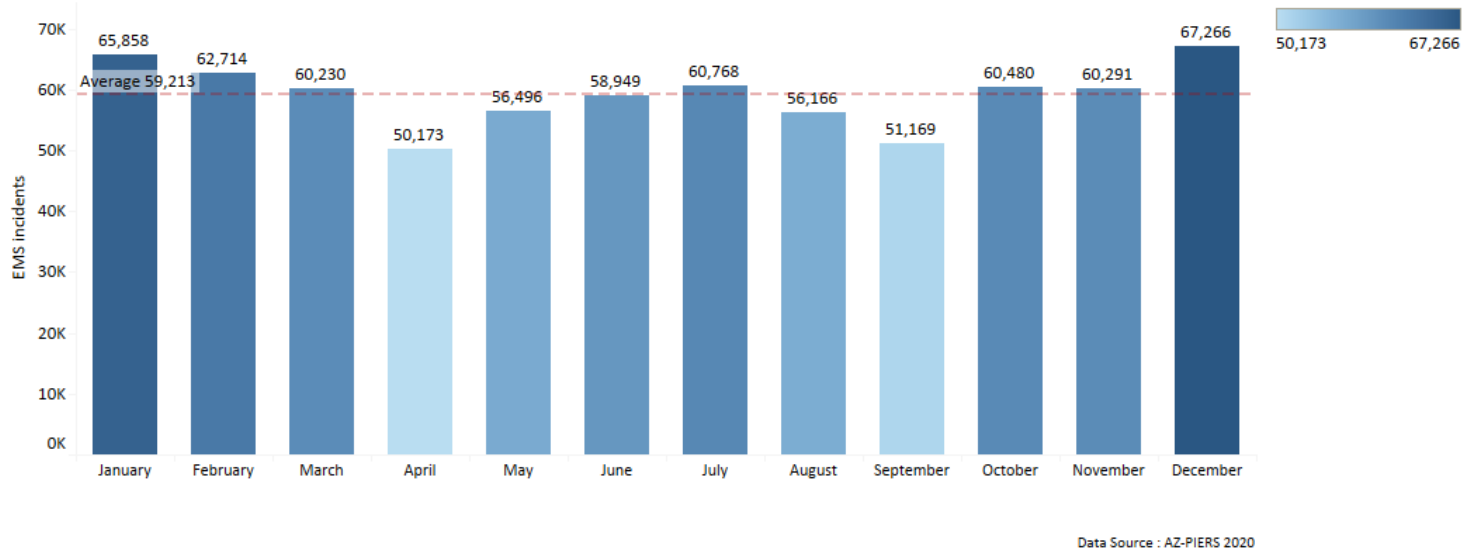
Table 4: EMS Responses (Air)

Response Type	N	%
Interfacility Transport	14,232	82.8%
911 Response (Scene)	2,821	16.4%
Medical Transport	116	0.7%
Other/Missing	10	0.1%
Grand Total	17,179	100.0%

Data Source: AZ-PIERS 2020

DISTRIBUTION OF 911 EMS INCIDENTS BY MONTH

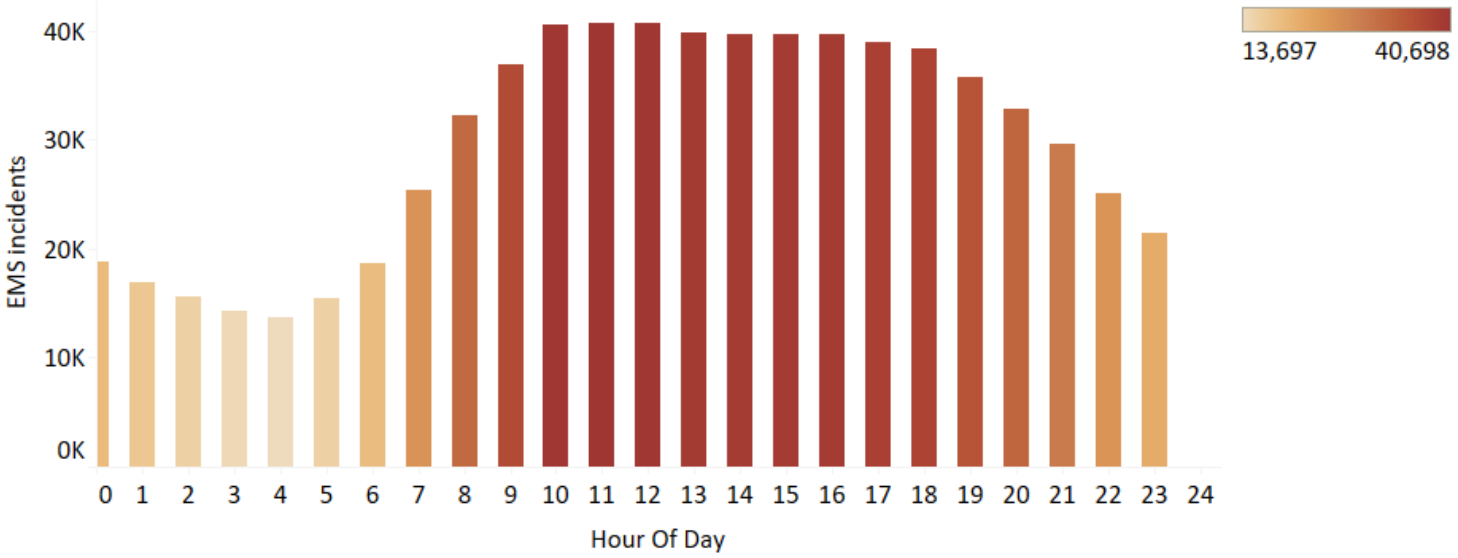
Figure 3: EMS incidents by month



Data Source : AZ-PIERS 2020

DISTRIBUTION OF 911 EMS INCIDENTS BY HOUR OF THE DAY

Figure 4: EMS incidents by hour of the day



Data Source : AZ-PIERS 2020

DISTRIBUTION OF 911 EMS INCIDENTS BY HOUR OF DAY AND DAY OF THE WEEK

Figure 5: EMS incidents by time and day of the week

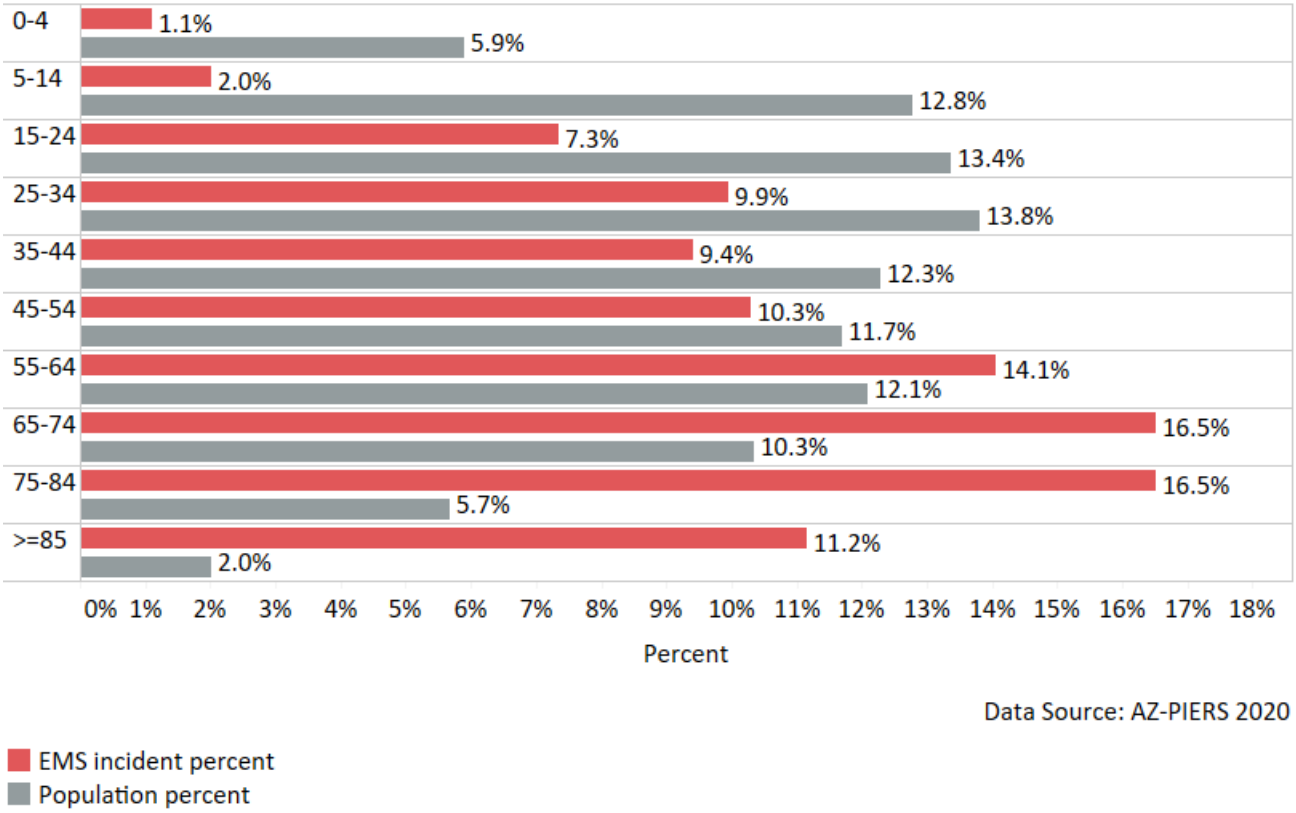
Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
12.01am - 4am	11,357	10,645	10,915	10,838	10,812	11,935	12,753
4.01am - 8am	13,918	13,611	13,597	13,328	13,019	12,281	12,012
8.01am - 12pm	23,818	23,319	23,505	23,663	23,303	21,226	20,016
12.01pm - 4pm	23,800	22,715	23,511	23,517	23,386	21,612	20,323
4.01pm - 8pm	20,699	20,245	20,914	21,003	21,251	21,489	20,159
8.01pm - 12am	10,384	10,421	10,351	10,765	11,486	11,825	10,833

10,351 23,818

Data Source : AZ-PIERS 2020

DISTRIBUTION OF 911 EMS INCIDENTS AND ARIZONA POPULATION

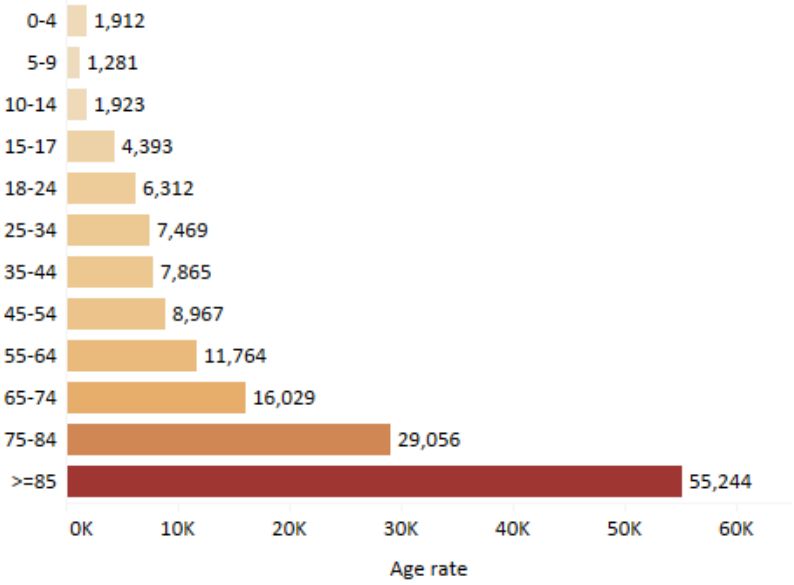
Figure 6: Age - specific distribution of 911 EMS incidents and Arizona population



Data Source: AZ-PIERS 2020

911 EMS INCIDENT RATE PER 100,000 BY AGE

Figure 7: Age - specific 911 EMS incident rate per 100,000



Data Source: AZ-PIERS 2020

Table 5: Age - specific 911 EMS incidents and EMS incident rate per 100,000

Age	N	Incident %	Incident Age rate
Missing	9,509	1.3%	
0-4	7,969	1.1%	1,912
5-9	5,648	0.8%	1,281
10-14	8,813	1.2%	1,923
15-17	11,533	1.6%	4,393
18-24	40,810	5.7%	6,312
25-34	70,882	10.0%	7,469
35-44	67,030	9.4%	7,865
45-54	73,375	10.3%	8,967
55-64	100,150	14.1%	11,764
65-74	117,736	16.6%	16,029
75-84	117,620	16.6%	29,056
>=85	79,485	11.2%	55,244
Grand Total	710,560		

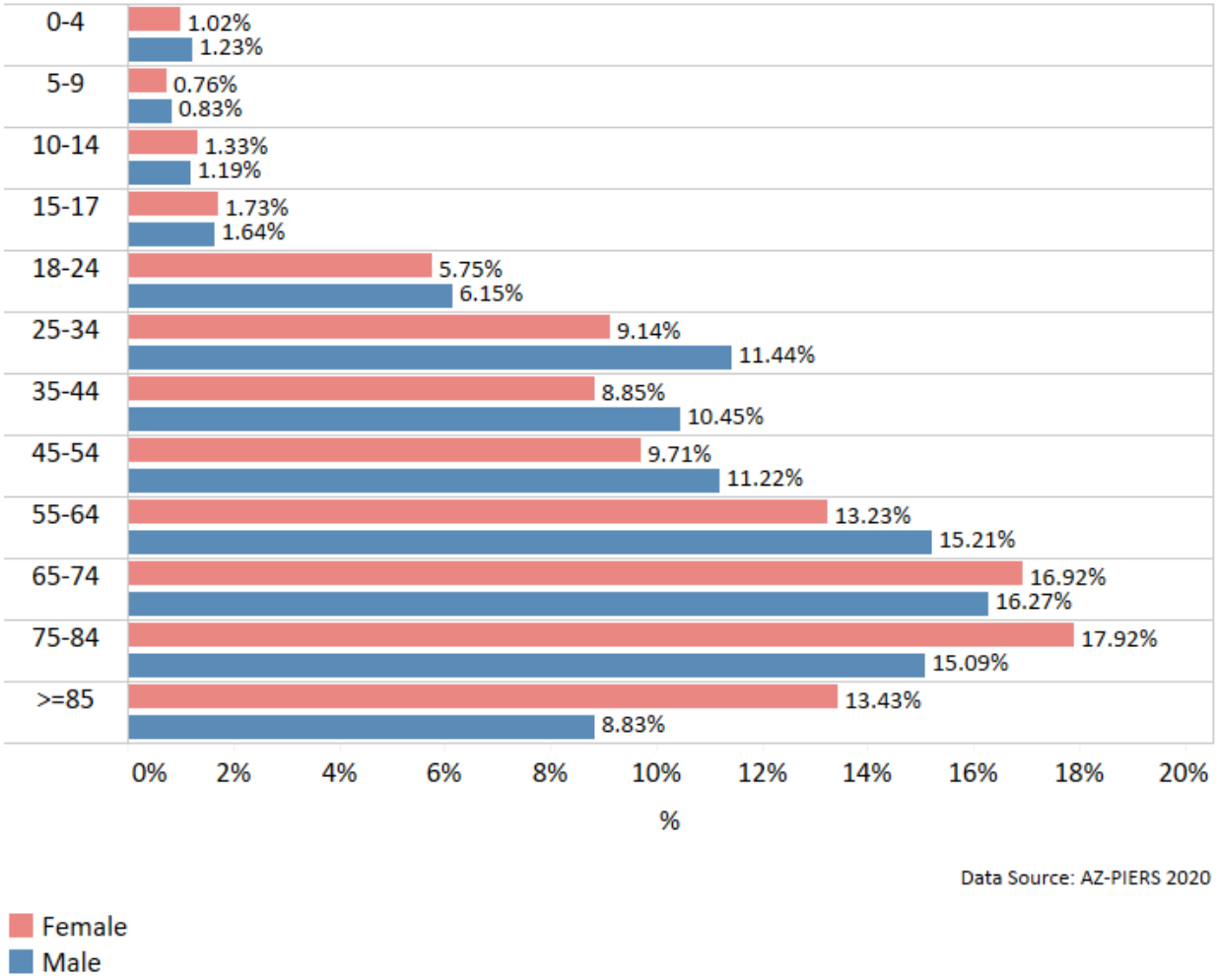
Data Source : AZ-PIERS 2020

Table 6: Gender - specific 911 EMS incidents and EMS incident rate per 100,000

Gender	N	%	Gender rate
Female	345,493	48.62%	9,711
Male	354,649	49.91%	10,206
Other, neither exclusively male or female	12	0.00%	N/A
Missing/Not Recorded/NA	10,406	1.46%	N/A
Grand Total	710,560	100.00%	N/A

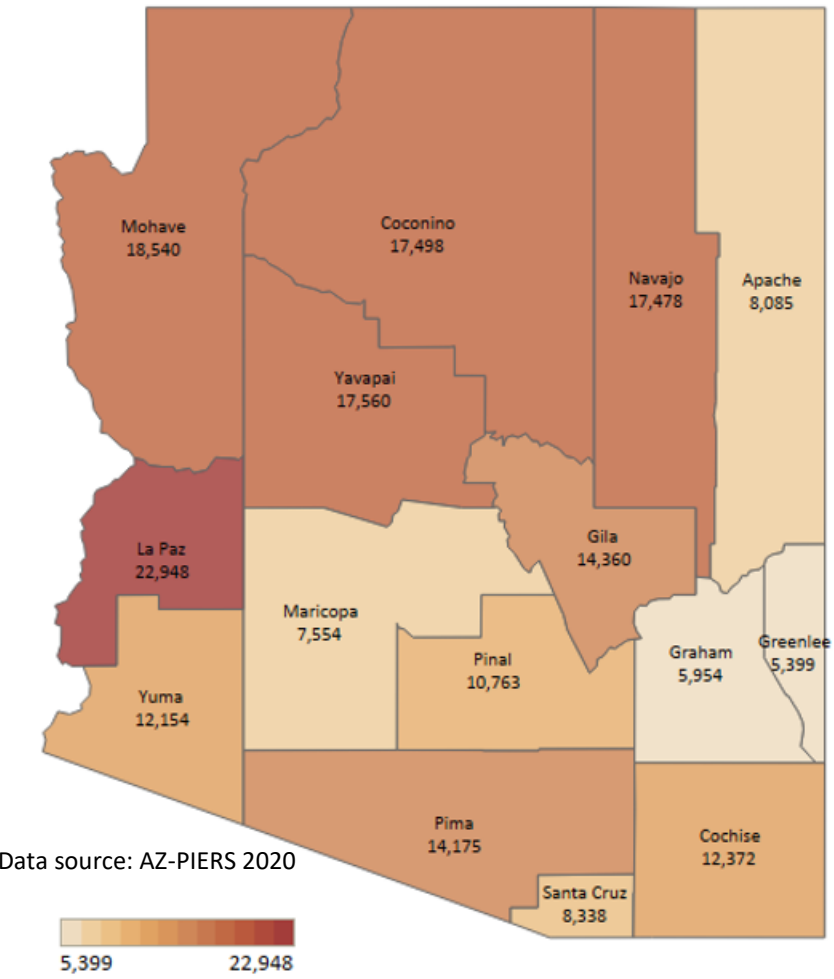
Data Source : AZ-PIERS 2020

Figure 8 : Gender - specific 911 EMS incident percent



Data Source: AZ-PIERS 2020

Figure 9: County - specific 911 EMS incident rate per 100,000



Data source: AZ-PIERS 2020

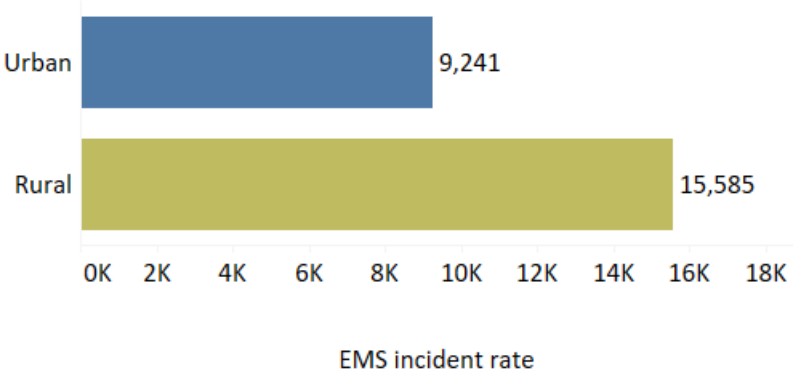
Table 7: County - specific 911 EMS incidents and EMS incident rate per 100,000

County	N	%	County rate
Apache	4,832	0.68%	8,085
Cochise	13,335	1.88%	12,372
Coconino	24,825	3.49%	17,498
Gila	7,731	1.09%	14,360
Graham	2,188	0.31%	5,954
Greenlee	523	0.07%	5,399
La Paz	4,927	0.69%	22,948
Maricopa	324,896	45.72%	7,554
Mohave	39,297	5.53%	18,540
Navajo	19,220	2.70%	17,478
Pima	145,566	20.49%	14,175
Pinal	48,546	6.83%	10,763
Santa Cruz	4,302	0.61%	8,338
Yavapai	39,356	5.54%	17,560
Yuma	27,940	3.93%	12,154
Out of State	1,410	0.20%	N/A
Missing	1,666	0.23%	N/A

Data Sorce : AZ-PIERS 2020

911 EMS INCIDENTS DISTRIBUTION BY URBAN/RURAL COUNTIES

Figure 10: Urban/Rural 911 EMS incident rate per 100,000



Data Source : AZ-PIERS 2020

Table 8: Urban/Rural 911 EMS incidents and EMS incident rate per 100,000

	N	%	Incident rate
Rural	160,536	22.6%	15,585
Urban	546,948	77.0%	9,241
Out of State	1,410	0.2%	N/A
Missing	1,666	0.2%	N/A
Grand Total	710,560	100.0%	N/A

Data Source : AZ-PIERS 2020

911 EMS INCIDENTS DISTRIBUTION BY EMS REGION

Figure 11 : 911 EMS incidents by region

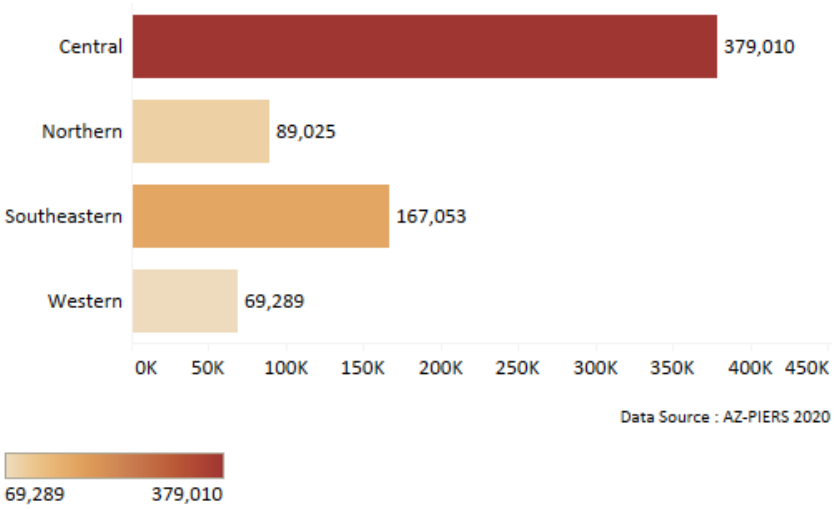


Table 9 : 911 EMS incidents by region

Region	N	%
Central	379,010	53.34%
Northern	89,025	12.53%
Southeastern	167,053	23.51%
Western	69,289	9.75%
Grand Total	710,560	100.00%

Data source : AZ-PIERS 2020

Table 10 : Region - specific 911 EMS incidents by Gender

Region	Gender	N	%
Central	Female	189,511	50.00%
	Male	186,267	49.15%
Northern	Female	39,223	44.06%
	Male	48,469	54.44%
Southeastern	Female	81,339	48.69%
	Male	80,451	48.16%
Western	Female	32,872	47.44%
	Male	35,980	51.93%

Data Source : AZ-PIERS 2020

The EMS Region assigned for an EMS agency is based on the agency's main office address of record (e.g., the address on their CON application).

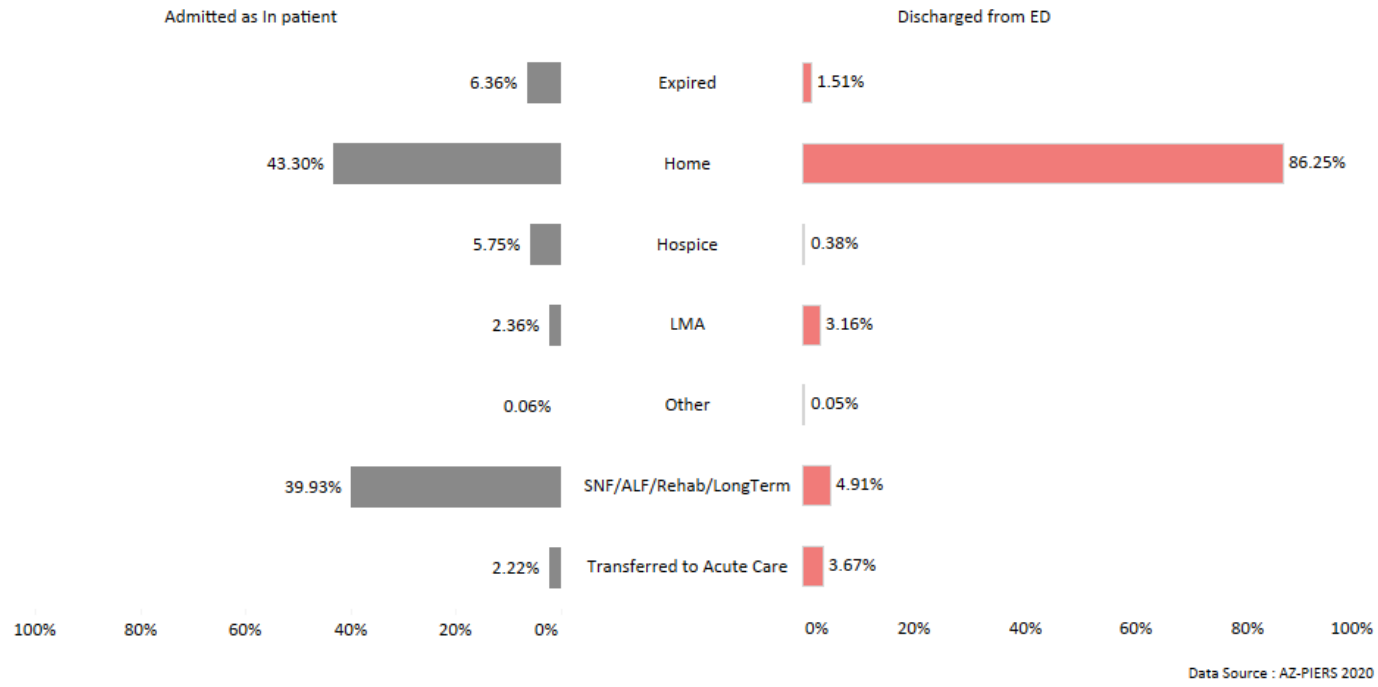
Table 11 : Region - specific 911 EMS incidents by age

Region	Age group	N	%
Central	0-4	4,778	1.26%
	5-9	3,165	0.84%
	10-14	5,038	1.33%
	15-17	6,836	1.80%
	18-24	22,338	5.89%
	25-34	38,254	10.09%
	35-44	35,362	9.33%
	45-54	38,911	10.27%
	55-64	50,454	13.31%
	65-74	62,165	16.40%
	75-84	63,800	16.83%
	>=85	45,235	11.94%
Northern	0-4	875	0.98%
	5-9	689	0.77%
	10-14	1,173	1.32%
	15-17	1,345	1.51%
	18-24	4,830	5.43%
	25-34	10,884	12.23%
	35-44	10,355	11.63%
	45-54	10,617	11.93%
	55-64	12,518	14.06%
	65-74	13,352	15.00%
	75-84	12,252	13.76%
	>=85	7,771	8.73%
Southeastern	0-4	1,543	0.92%
	5-9	1,177	0.70%
	10-14	1,625	0.97%
	15-17	2,097	1.26%
	18-24	9,825	5.88%
	25-34	15,719	9.41%
	35-44	15,167	9.08%
	45-54	16,534	9.90%
	55-64	24,994	14.96%
	65-74	27,977	16.75%
	75-84	26,809	16.05%
	>=85	19,490	11.67%
Western	0-4	696	1.00%
	5-9	553	0.80%
	10-14	887	1.28%
	15-17	1,138	1.64%
	18-24	3,439	4.96%
	25-34	5,450	7.87%
	35-44	5,619	8.11%
	45-54	6,724	9.70%
	55-64	11,266	16.26%
	65-74	13,103	18.91%
	75-84	13,670	19.73%
	>=85	6,403	9.24%

Data Source : AZ-PIERS 2020

911 EMS INCIDENTS TREATED AND TRANSPORTED - HOSPITAL DISCHARGE STATUS

Figure 12: 911 EMS incidents - Hospital discharge status



Data Source : AZ-PIERS 2020

Of all the EMS incidents eligible for linkage in HDD **493,916** (94%) EMS incidents were successfully matched to their respective records in HDD. **240,534(64%)** of the EMS incidents were discharged from ED while **135,108(35.9%)** were Admitted as Inpatient in the destination hospital. 40,457 EMS incidents had missing Hospital Discharge status.

Table 12: 911 EMS Incidents - Hospital discharge status

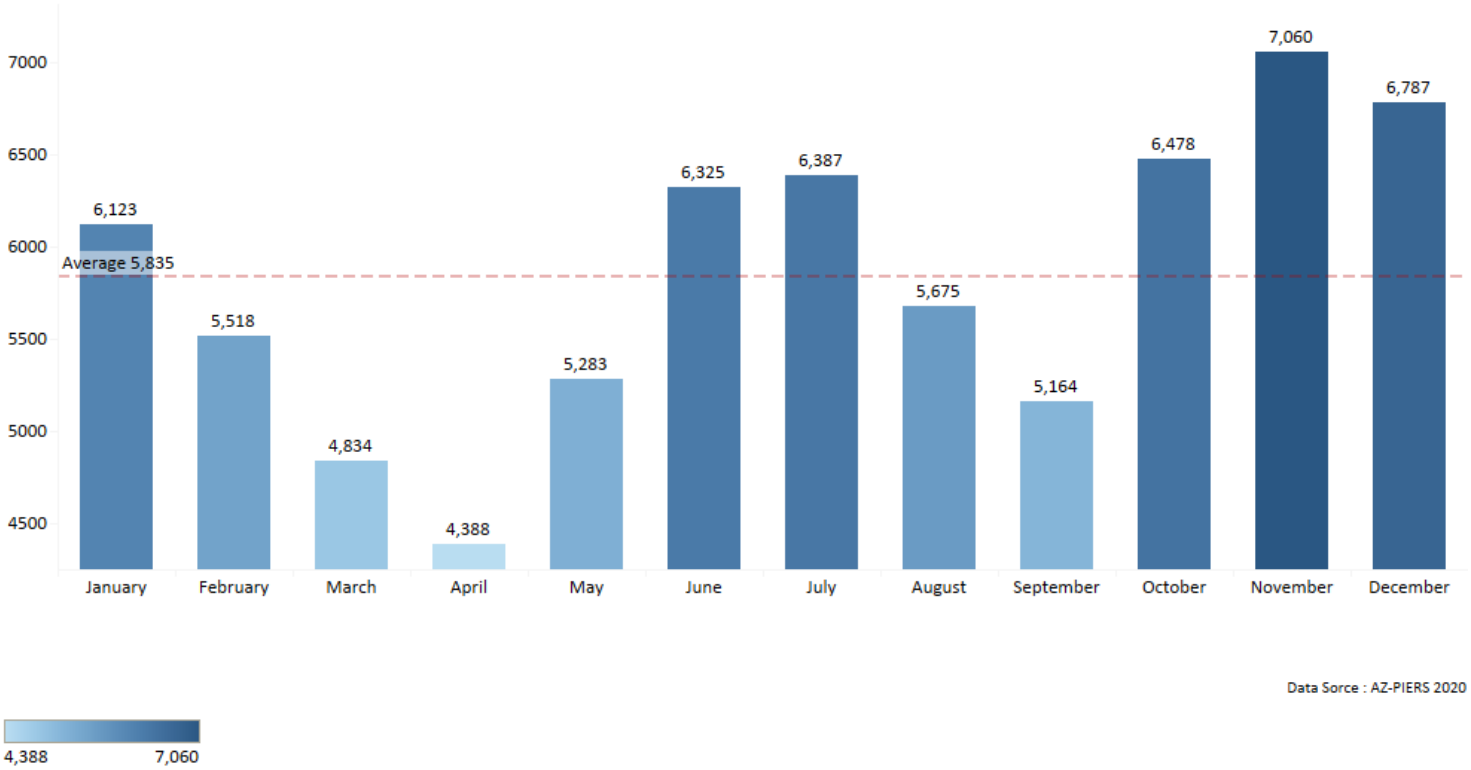
	Discharged from ED		Admitted as an Inpatient	
	N	%	N	%
Expired	3,637	1.51%	8,589	6.36%
Home	207,452	86.25%	58,506	43.30%
Hospice	908	0.38%	7,774	5.75%
LMA	7,603	3.16%	3,188	2.36%
SNF/ALF/Rehab/LongTerm	11,822	4.91%	53,942	39.93%
Transferred to Acute Care	8,833	3.67%	3,000	2.22%
Discharged to Cancer Center or Children's Hospital	160	0.07%	22	0.02%
Other	119	0.05%	87	0.06%
Grand Total	240,534	100.00%	135,108	100.00%

Data Source : AZ-PIERS 2020

INTERFACILITY TRANSPORTS (N = 70,036)

INTERFACILITY TRANSPORTS - DISTRIBUTION BY MONTH

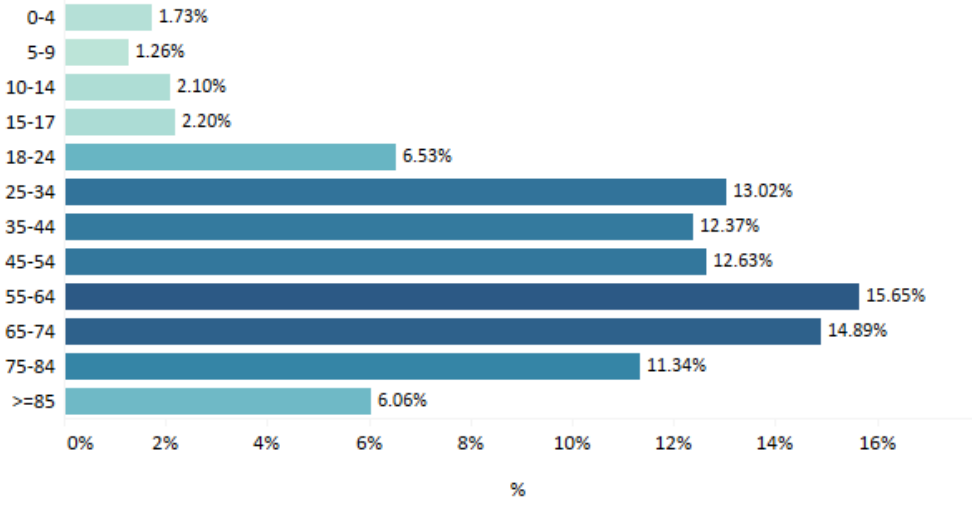
Figure 13: Interfacility transports by month



Data Sorce : AZ-PIERS 2020

INTERFACILITY TRANSPORTS - AGE

Figure 14: Age - specific interfacility transports



Data Source : AZ-PIERS 2020

Table 13: Age - specific Interfacility Transports

Age	N	%
Missing	107	0.2%
0-4	1,204	1.7%
5-9	896	1.3%
10-14	1,465	2.1%
15-17	1,503	2.1%
18-24	4,538	6.5%
25-34	9,104	13.0%
35-44	8,680	12.4%
45-54	8,863	12.7%
55-64	10,953	15.6%
65-74	10,464	14.9%
75-84	7,970	11.4%
>=85	4,289	6.1%
Grand Total	70,036	100.0%

Data Source : AZ-PIERS 2020

INTERFACILITY EMS RUN DISTRIBUTION BY COUNTY

Figure 15: County - specific interfacility transports rate per 100,000

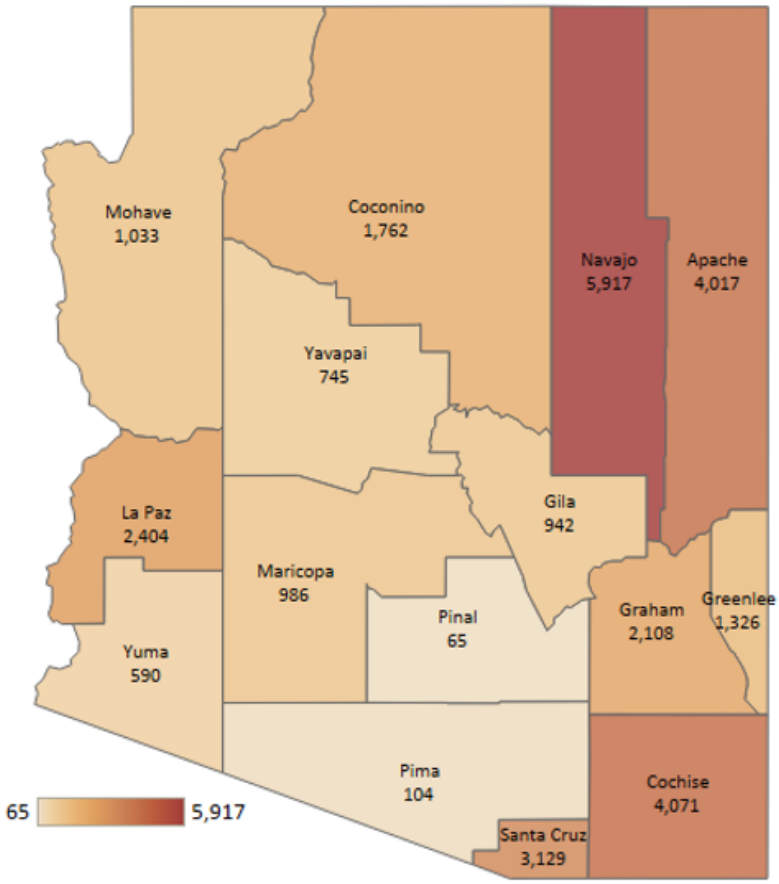


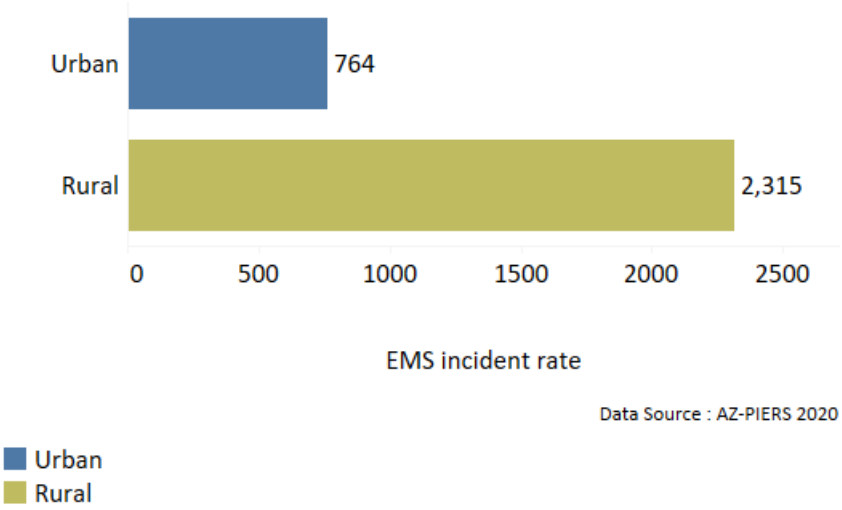
Table 14 : County - specific interfacility transports and transport rate per 100,000

County	N	%	County rate
Apache	2,778	3.97%	4,017
Cochise	5,258	7.51%	4,071
Coconino	2,454	3.50%	1,762
Gila	504	0.72%	942
Graham	759	1.08%	2,108
Greenlee	136	0.19%	1,326
La Paz	490	0.70%	2,404
Maricopa	43,041	61.46%	986
Mohave	1,778	2.54%	1,033
Navajo	6,517	9.31%	5,917
Pima	1,067	1.52%	104
Pinal	271	0.39%	65
Santa Cruz	1,642	2.34%	3,129
Yavapai	1,633	2.33%	745
Yuma	1,317	1.88%	590
Out of State	311	0.44%	
Missing	80	0.11%	
Grand Total	70,036	100.00%	29,199

Data Source : AZ-PIERS 2020

URBAN/RURAL

Figure 16: Urban/Rural interfacility transports rate per 100,000



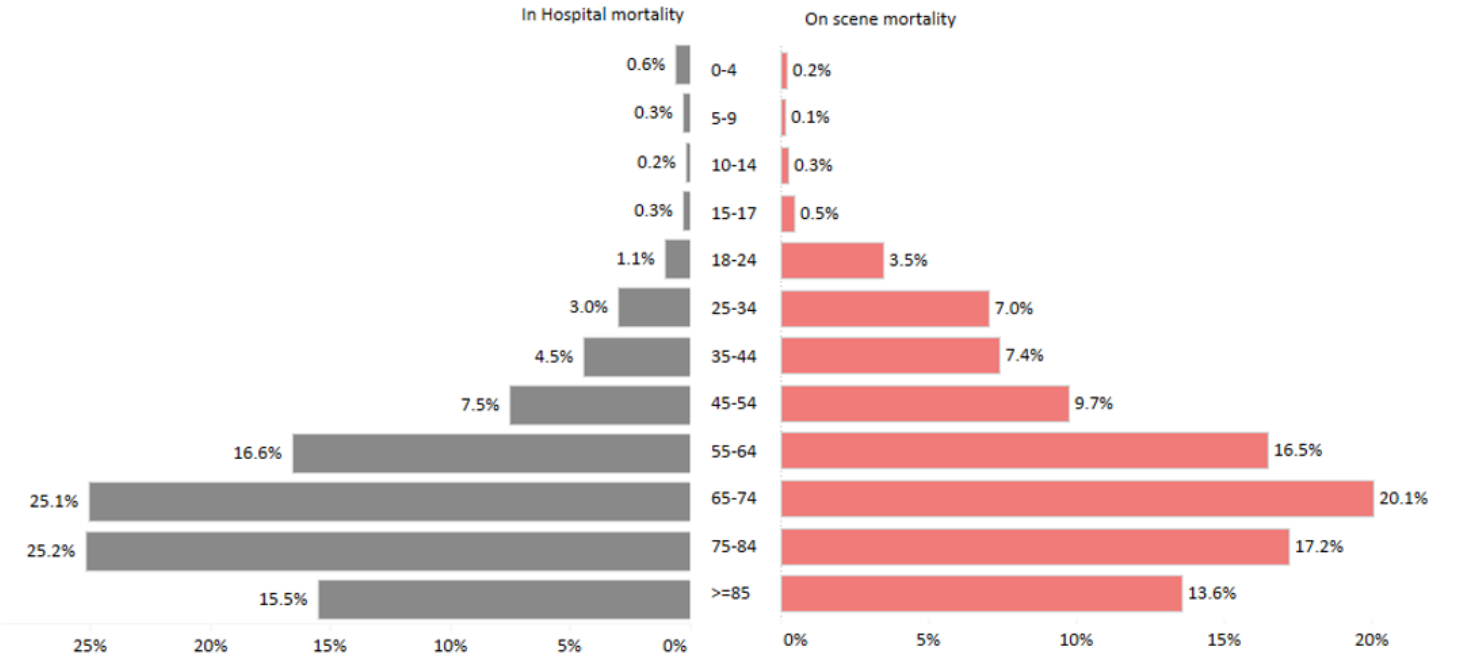
Data Source : AZ-PIERS 2020

Table 15: Urban/Rural interfacility transports rate per 100,000

	N	%	Incident rate
Rural	23,949	34.2%	2,315
Urban	45,696	65.2%	764
Out of State	311	0.4%	0
Missing	80	0.1%	0
Grand Total	70,036	100.0%	

Data Source : AZ-PIERS 2020

Figure 17: In hospital vs On scene mortality by age



Data Source : AZ-PIERS 2020

Table 16 : On Scene vs In hospital mortality

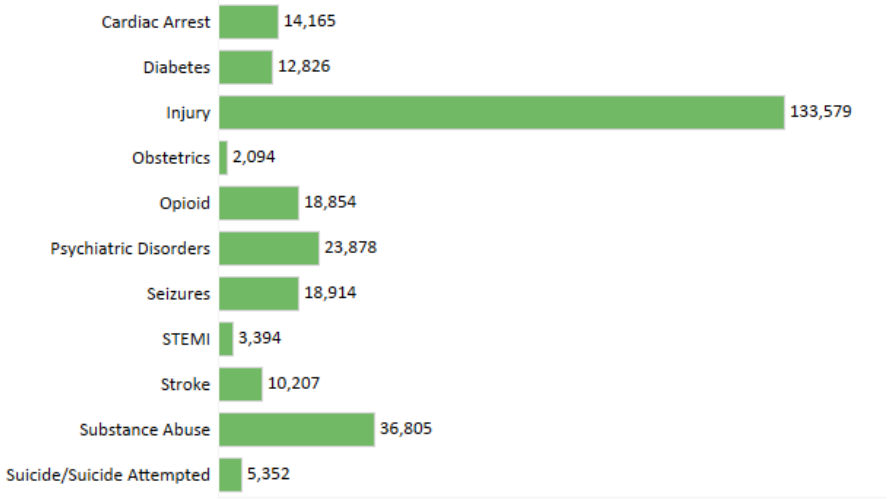
Age	In Hospital Mortality		On Scene Mortality	
Missing	24	0.15%	201	3.92%
0-4	97	0.61%	10	0.19%
5-9	47	0.30%	7	0.14%
10-14	27	0.17%	14	0.27%
15-17	52	0.33%	24	0.47%
18-24	168	1.06%	179	3.49%
25-34	479	3.02%	361	7.03%
35-44	709	4.48%	381	7.42%
45-54	1,193	7.53%	500	9.74%
55-64	2,627	16.59%	847	16.50%
65-74	3,971	25.08%	1,030	20.07%
75-84	3,987	25.18%	882	17.18%
>=85	2,455	15.50%	697	13.58%
Grand Total	15,836	100.00%	5,133	100.00%

Data Source : AZ-PIERS 2020

The impression categories included in the report have been obtained based on ICD-10 codes and CCS category descriptions. Refer to Appendix B for criteria of these impression categories. The categories are not mutually exclusive, i.e., A single patient may have 1 or more impression category as the EMS diagnosis.

911 EMS INCIDENTS IMPRESSIONS PREVALENCE (N = 710,557)

Figure 18: Prevalence of primary and secondary impression categories of interest



Data Source : AZ-PIERS 2020

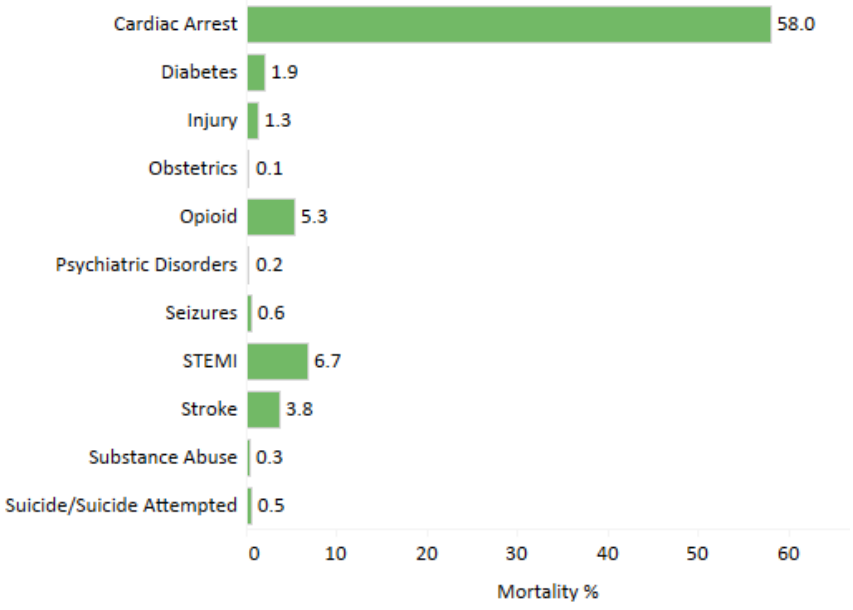
Table 17: Prevalence of primary and secondary impression categories of interest

Population Type	N	%
Cardiac Arrest	14,165	1.99%
Diabetes	12,826	1.81%
Injury	133,579	18.80%
Obstetrics	2,094	0.29%
Opioid	18,854	2.65%
Psychiatric Disorders	23,878	3.36%
Seizures	18,914	2.66%
STEMI	3,394	0.48%
Stroke	10,207	1.44%
Substance Abuse	36,805	5.18%
Suicide/Suicide Attempted	5,352	0.75%

Data Source : AZ-PIERS 2020

DEATHS IN EACH IMPRESSION CATEGORY

Figure 19: Mortality percentage by primary and secondary impression category



Data Source : AZ-PIERS 2020

Table 18 : Mortality by primary and secondary impression category

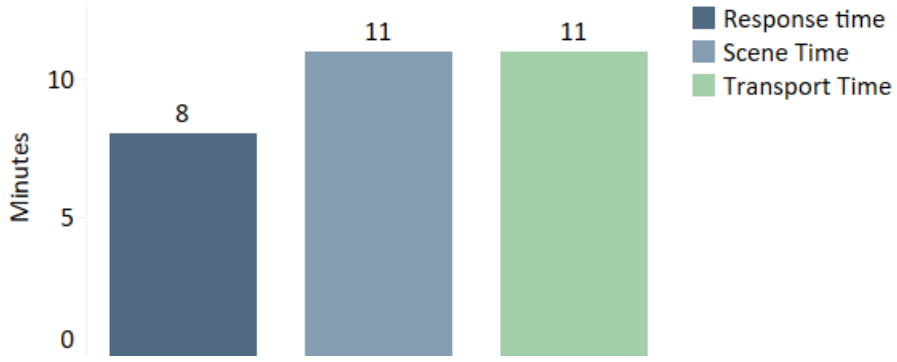
Population Type	Mortality count	Mortality %
Cardiac Arrest	8,537	58.0
Diabetes	284	1.9
Injury	1,899	1.3
Obstetrics	4	0.1
Opioid	1,109	5.3
Psychiatric Disorders	67	0.2
Seizures	130	0.6
STEMI	297	6.7
Stroke	455	3.8
Substance Abuse	134	0.3
Suicide/Suicide Attempted	48	0.5

Data Source : AZ-PIERS 2020

911 EMS INCIDENTS RESPONSE TIME - STATEWIDE (N = 419,559)

Figure 20 : Median Time (in minutes) Intervals for 911 EMS Incidents (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)

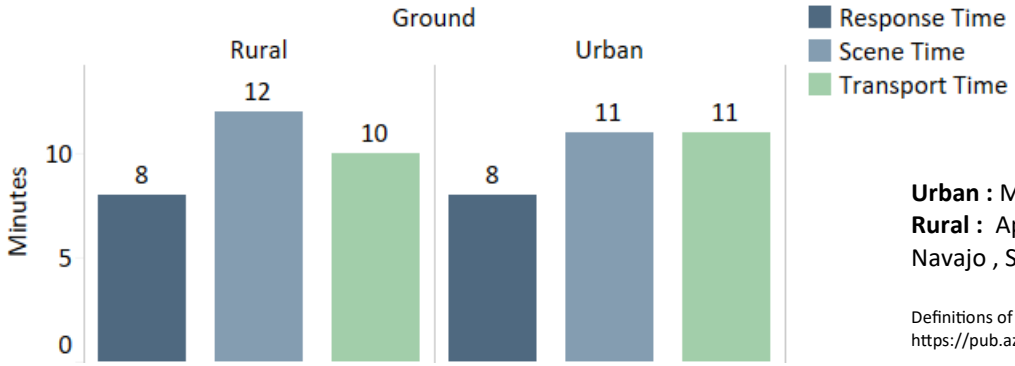


****Response Time :*** Calculated as difference between Dispatch Notified Time and Unit Arrived at Patient Time
(if Unit Arrived at Patient Time is missing then calculated as difference between Dispatch Notified Time and Patient Arrived Onscene Time
****Scene time :*** Includes only Treated and Transported incidents. Calculated as difference between Scene Left Time and Unit Arrived at Patient Time
(if Unit Arrived at Patient Time is missing then calculated as difference between Scene Left Time and Onscene Arrived Time)
****Transport Time :*** Includes only Treated and Transported incidents. Calculated as difference between Unit Scene Left Time and Patient Arrived at Destination Time

911 EMS INCIDENTS RESPONSE TIMES BY URBANICITY

Figure 21 : Median Time (in minutes) Intervals for 911 EMS Incidents by Urbanicity (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)



Urbanicity	N
Rural	108,070
Urban	309,545

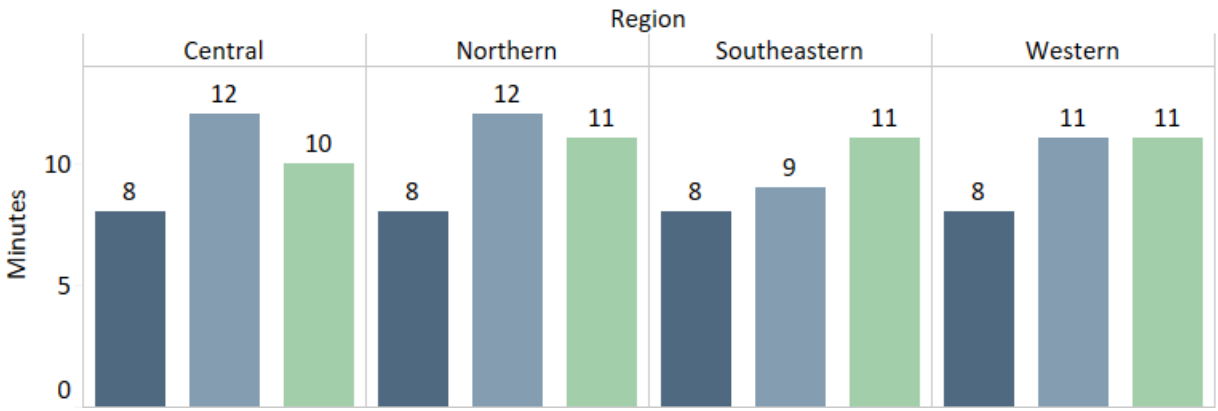
Urban : Maricopa, Pima, Pinal , Yuma
Rural : Apache, Cochise , Gila, Graham , La Paz, Mohave , Navajo , Santa Cruz , Greenlee , Yavapai , Coconino

Definitions of Urban/Rural from Population Health and Vital Statistics website https://pub.azdhs.gov/health-stats/menu/info/pop/index.php

911 EMS INCIDENTS RESPONSE TIMES BY EMS REGION

Figure 22 : Median Time (in minutes) Intervals for 911 EMS Incidents by EMS Region (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)



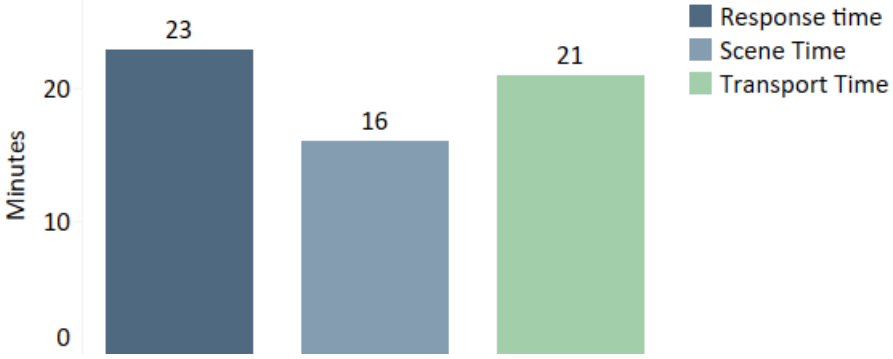
EMS Region	N
Central	223,443
Northern	61,748
Southeastern	87,990
Western	45,270

The EMS Region assigned for an EMS agency is based on the agency's main office address of record (e.g., the address on their CON application).

INTERFACILITY TRANSPORTS RESPONSE TIME - STATEWIDE (N = 53,597)

Figure 23 : Median Time (in minutes) Intervals for Interfacility Transports (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)

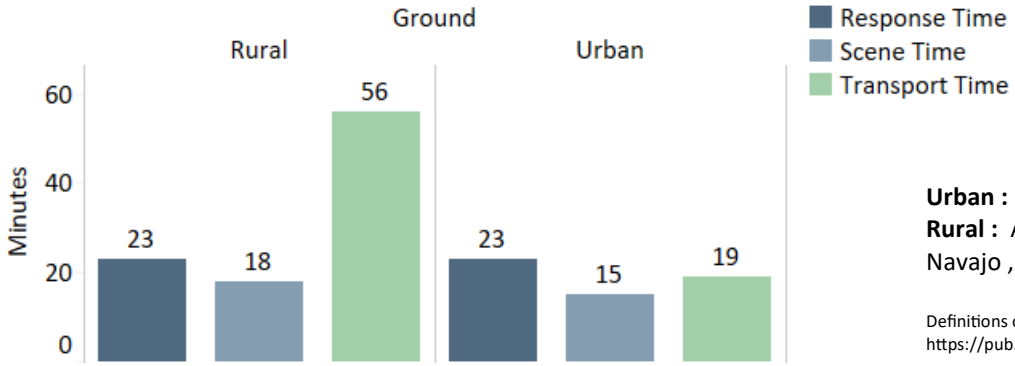


****Response Time :*** Calculated as difference between Dispatch Notified Time and Unit Arrived at Patient Time
(if Unit Arrived at Patient Time is missing then calculated as difference between Dispatch Notified Time and Patient Arrived Onscene Time
****Scene time :*** Includes only Treated and Transported incidents. Calculated as difference between Scene Left Time and Unit Arrived at Patient Time
(if Unit Arrived at Patient Time is missing then calculated as difference between Scene Left Time and Onscene Arrived Time)
****Transport Time :*** Includes only Treated and Transported incidents. Calculated as difference between Unit Scene Left Time and Patient Arrived at Destination Time

911 EMS INCIDENTS RESPONSE TIMES BY URBANICITY

Figure 24 : Median Time (in minutes) Intervals for Interfacility Transports by Urbanicity (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)



Urbanicity	N
Rural	11,282
Urban	42,175

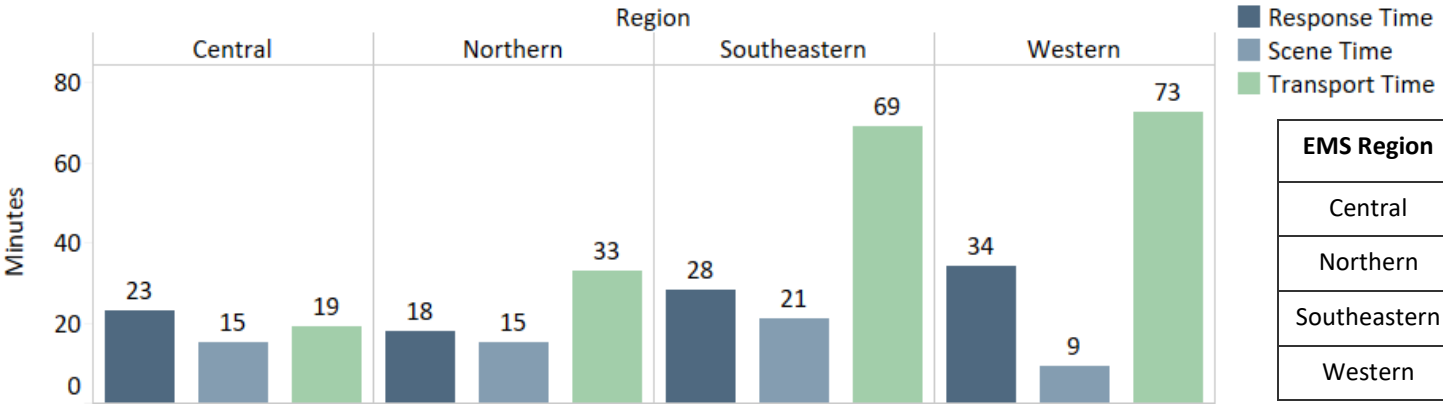
Urban : Maricopa, Pima, Pinal , Yuma
Rural : Apache, Cochise , Gila, Graham , La Paz, Mohave , Navajo , Santa Cruz , Greenlee , Yavapai , Coconino

Definitions of Urban/Rural from Population Health and Vital Statistics website https://pub.azdhs.gov/health-stats/menu/info/pop/index.php

911 EMS INCIDENTS RESPONSE TIMES BY EMS REGION

Figure 25 : Median Time (in minutes) Intervals for Interfacility Transports by EMS Region (Ground)

(Incidents with time intervals < 0 and more than 120 minutes are excluded)



EMS Region	N
Central	41,758
Northern	5,310
Southeastern	6,411
Western	118

The EMS Region assigned for an EMS agency is based on the agency's main office address of record (e.g., the address on their CON application).

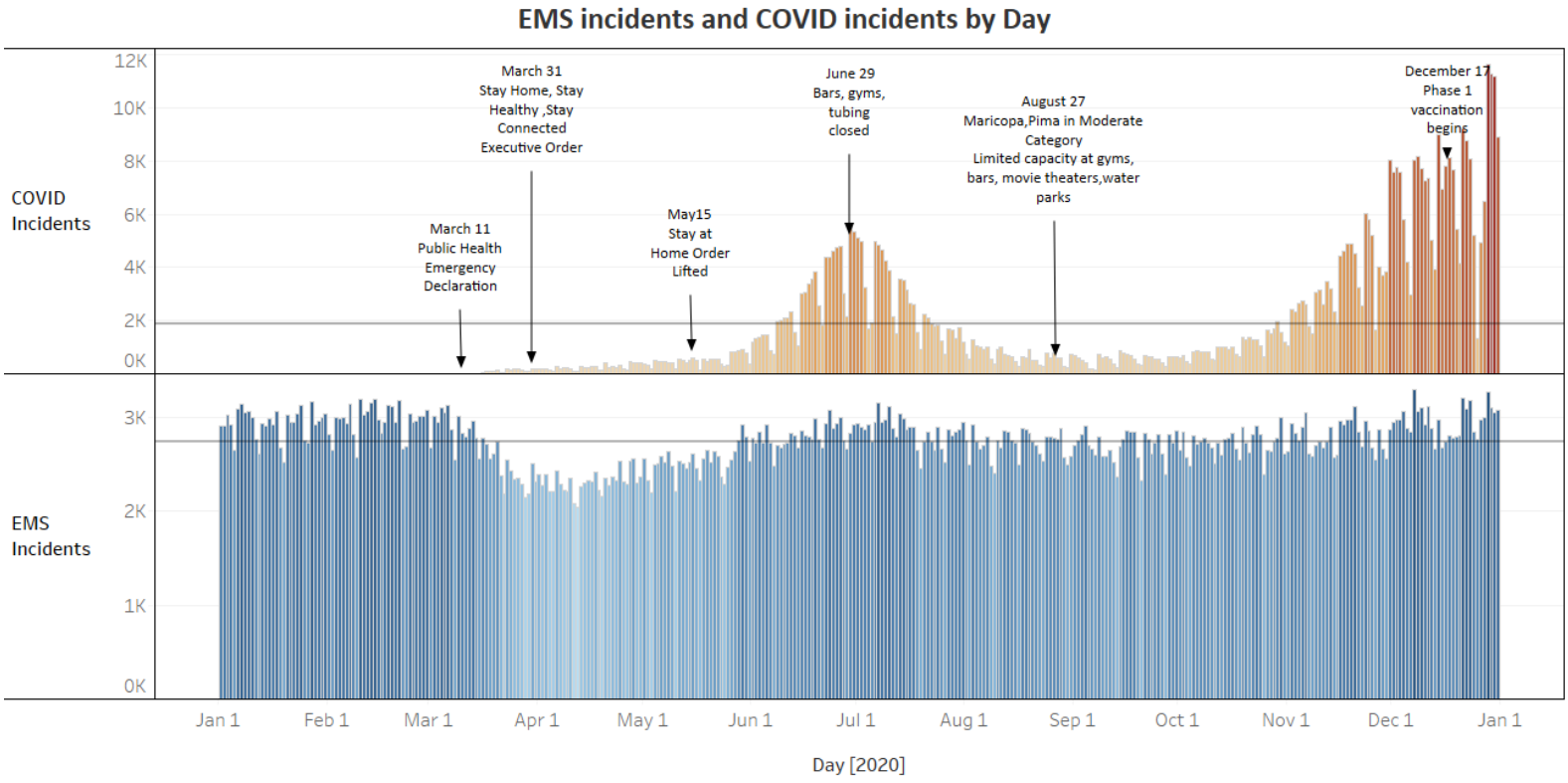
Table 19 : Arizona EMCT Certification and Training Trends, 2017-2020

Year	Number of active EMCT certifications	Number of new EMCT certifications completed	Number of EMT students	Number of paramedic students	EMT Pass Rate % (% pass at first attempt)		Paramedic Pass Rate % (% pass at first attempt)	
					National	State	National	State
2020	19,921	2,468	1,557	286	79% (70%)	79% (72%)	83% (72%)	89% (82%)
2019	19,339	2,792	2,363	118	79% (69%)	79% (73%)	85% (73%)	96% (79%)
2018	19,253	2,687	2,019	410	80% (71%)	81% (76%)	87% (74%)	93% (82%)
2017	18,702	2,726	1,955	276	80% (71%)	85% (74%)	86% (74%)	93% (82%)

Table 20 : Arizona EMCT Workforce Demographics

Total Number of Active EMCTs	Age Range (Min- Max)	Median Age	Gender (% Male, % Female
19,921	Min: 18 Max: 87	40	M: 83.15% F: 16.85%

EPI CURVE COMPARING COVID - 19 INCIDENTS AND EMS INCIDENTS



Data Source : AZ-PIERS 2020 and AZDHS

COVID Incidents

1 11,668

EMS Incidents

2,047 3,301

- **EMS Response Types:**

Note: These definitions are from the NEMSIS v3 Extended Data Definitions Dictionary

https://nemsis.org/wp-content/uploads/2018/09/Extended-Data-Definitions_v3_Final.pdf

⇒ **Medical (Convalescent) transport:** Transports that are not between hospitals or that do not require an immediate response; these are generally for the purpose of transportation to or from an appointment, performance of a procedure, or long-term care (e.g., hospital to home/ hospice/rehabilitation/long-term care facility).

- Convalescent transport is defined as "a scheduled transport other than an interfacility transport" in R9-25-901

⇒ **Interfacility transport:** Any transfer, after initial assessment and stabilization, from and to a healthcare facility, to include specialty hospitals, for the purpose of continuation of acute care, this would also include emergent transfer requests (e.g., hospital to hospital, clinic to hospital).

⇒ **911 Response on Scene:** Emergent or immediate response to an incident location, regardless of method of notification (e.g., 9-1-1, direct dial, walk-in, flagging down, air ambulance scene flight).

- **Incident Disposition:** Type of disposition treatment and/or transport of the patient by this EMS Unit.
- **Provider's Primary Impression:** The EMS personnel's impression of the patient's primary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures).
- **Provider's Secondary Impression:** The EMS personnel's impression of the patient's secondary problem or most significant condition which led to the management given to the patient (treatments, medications, or procedures).

⇒ **Urban/Rural:**

These Urban/Rural counties were grouped based on the data from the Arizona Health Status and Vital Statistics database

http://pub.azdhs.gov/health-stats/menu/info/pop/index.php

⇒ **Urban counties:** Maricopa, Pima, Pinal, Yuma

⇒ **Rural counties:** Apache, Cochise, Gila, Graham, La Paz, Mohave, Navajo, Santa Cruz, Greenlee, Yavapai, Coconino

⇒ **Out of State:** The incident did not occur in Arizona, but the EMS agencies involved where either present on the scene or were involved in the transport.

Impression Category	Criteria
Obstetrics	CCS Category description of primary or secondary impressions = Spontaneous abortion or Induced abortion or Postabortion complications or Ectopic pregnancy or Other complications of pregnancy or Hemorrhage during pregnancy; abruptio placenta; placenta previa or Hypertension complicating pregnancy; childbirth and the puerperium or Early or threatened labor or Prolonged pregnancy or Malposition; malpresentation or Fetopelvic disproportion; obstruction or Fetal distress and abnormal forces of labor or Polyhydramnios and other problems of amniotic cavity or Umbilical cord complication or OB-related trauma to perineum and vulva or Forceps delivery or Other complications of birth; puerperium affecting management of mother or Other pregnancy and delivery including normal
Psychiatric Disorders	CCS Category description of primary or secondary impressions = Adjustment disorders or Anxiety disorders or Attention-deficit conduct and disruptive behavior disorders or Developmental disorders or Disorders usually diagnosed in infancy childhood or adolescence or Impulse control disorders NEC or Mood disorders or Personality disorders or Schizophrenia and other psychotic disorders
Diabetes	CCS Category description of primary or secondary impressions = Diabetes mellitus without complication or Diabetes mellitus with complications
Substance Abuse	CCS Category description of primary or secondary impressions = Alcohol-related disorders or Substance-related disorders
Seizures	Epilepsy; convulsions
Suicide	Suicide and intentional self-inflicted injury

Impression Category	Criteria
Stroke	Primary Impression or one of the Secondary Impressions = Non traumatic intracerebral hemorrhage or Non traumatic subarachnoid hemorrhage or Other and unspecified non traumatic intracranial hemorrhage or Cerebral infarction or Transient cerebral ischemic attacks and related syndromes or National Institutes of Health Stroke Scale (NIHSS) score or Persistent migraine aura with cerebral infarction or Cerebral aneurysm, non ruptured or Cerebral atherosclerosis or Non pyogenic thrombosis of intracranial venous system or Acute cerebrovascular insufficiency or Cerebral ischemia or Other cerebrovascular vasospasm and vasoconstriction or Cerebrovascular disease, unspecified Or Destination Stroke Team Prearrival Activation = 1
STEMI	Primary Impression or one of the Secondary Impressions = ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction or Subsequent ST elevation (STEMI) and non-ST elevation (NSTEMI) myocardial infarction or Subsequent non-ST elevation (NSTEMI) myocardial infarction or Non-ST elevation (NSTEMI) myocardial infarction OR STEMI Probable = 'Yes' OR STEMI Triage Criteria = 'Yes' OR Destination STEMI Team Prearrival Activation = 1 OR Cardiac Rhythm/Electrocardiography (ECG) = STEMI Inferior Ischemia or STEMI Anterior Ischemia or STEMI Posterior Ischemia or STEMI Lateral Ischemia
Cardiac Arrest	Primary Impression or one of the Secondary Impressions = Cardiac arrest or Ventricular fibrillation or Ventricular Flutter OR Cardiac Arrest During EMS Event = ("Yes, After EMS Arrival" or "Yes, Prior to EMS Arrival") Incident Disposition = Cardiac Arrest, Resuscitation Attempted (With Transport) or Cardiac Arrest, Resuscitation Attempted (Without Transport) or Patient Dead at Scene - No Resuscitation Attempted 901H)
Injury	Situation Possible injury = 'Yes'
Opioid	Medication given description = "Naloxone or 'Narcan' or 'Naloxone Hydrochloride And primary impression = Opioid abuse or Opioid abuse with intoxication or Opioid abuse with unspecified opioid induced disorder or Opioid related disorder or Opioid use, unspecified or Poisoning by other opioids, accidental (unintentional). OR Was naloxone/Narcan administered prior to you/your entity's arrival? Is not missing OR Was naloxone/Narcan administered by you/your entity? Is not missing