Arizona Annual Performance Review for State Unintentional Drug Overdose Reporting System (SUDORS)

Arizona State Unintentional Drug Overdose Reporting System

(AZ-SUDORS)

September 2020 – August 2021

October 2021

Center for Violence Prevention and Community Safety
Arizona State University

Arizona Annual Performance Review for State Unintentional Drug Overdose Reporting System (SUDORS), September 2020 – August 2021

By
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SECTION A: Annual Report Summary

Establish relationships with ADHS and coroners/medical examiners

Update existing memorandum of understanding (MOU) documentation with ADHS and coroners/medical examiners to include SUDORS-specific data elements

CVPCS has established data sharing and use agreements with ADHS, which provides statewide coverage of death certificate data for all eligible deaths on a routine basis. Data sharing agreements are signed with medical examiners from seven counties (Coconino, Maricopa, Mohave, Pima, Pinal, Yavapai, and Yume), with an eighth (Navajo) currently in finalization. These seven counties also provide medical examiner related data (e.g., autopsies, toxicology, etc.) for at least some portion of deaths in the other Arizona counties. Currently, we receive full ME decedent data for Cochise, Gila, Graham, Greenlee, and Santa Cruz counties from the signed agreements with the other counties. We receive partial data from Apache, La Paz, and Navajo counties. Where data gaps exist in these counties, we plan to expand recruitment and coverage. For example, a handful of deaths occur on sovereign tribal lands and are handled by those jurisdictions, independent of regular county medical examiners. AZ-SUDORS does not currently have data use agreements (DUAs) with any tribal entity for these cases. Appendix A includes all currently executed DUAs related to acquiring data for AZ-SUDORS.

Establish data collection, request, and exchange protocols with key stakeholders, including scheduled data extraction or system access

DUAs have been established with six Arizona counties to provide data on drug overdose deaths. These six counties collectively also serve as medical examiners, either wholly or in part, for eight other counties. The final county, Yuma, provides data upon request, but did not want an amended DUA to provide SUDORS data separately from AZ-VDRS.

The table below shows the participating counties, the data request and provision schedule, and the manner in which data are exchanged.

Exhibit 1: Participating Medical Examiners

County	Schedule	Receipt
Coconino	Monthly	MS Teams
Apache (partial), Navajo (partial)	Monthly	MS Teams
Maricopa	Monthly	Secure email
Mohave	Monthly	Secure email
Navajo (DUA finalization in progress)	Monthly	Secure email
Pima	Monthly	Secure email
Apache (partial), Cochise, Graham, Greenlee, La Paz (partial), Navajo (partial), and Santa Cruz	Monthly	Secure email
Pinal	Monthly	Secure email
Gila	Monthly	Secure email
Yavapai	Monthly	Secure email
Yuma	Monthly	Secure email

Establish AZ-SUDORS

Obtain secure ASU/CDC standard-compliant data storage

ASU's University Technology Office (UTO) maintains secure computing environments, utilizing two-factor authentication for any user access. Data received are housed in a secure network environment behind ASU security. The network environment uses user identification for authorized user lists. As data are abstracted, any records are subject to routine data destruction/deletion.

As outlined in the DUA, CVPCS and ASU abide by the following minimum safeguard data security protocols related to protected health information. ASU and the Steering Group shall carefully restrict use and access of ADHS Public Health Data shared under their data use and sharing agreement/MOU solely to Authorized Persons and shall ensure that the following minimum safeguards to prevent a security breach are implemented in a manner consistent with the requirements of this MOU or applicable law. ASU and the Steering Group safeguards shall, at minimum, require that ASU and its Authorized Persons:

- 1.1. Prohibit Public Health Data supplied under the terms of this MOU from being released or disclosed to anyone not working on ASU data analysis as an Authorized Person.
- 1.2. Ensure that any Authorized Persons, including any agent or subcontractor to ASU, to whom ASU provides Public Health Data shared under this MOU, agrees to the same restrictions and conditions that apply through this MOU to ASU with respect to such information.

- 1.3. Secure all printouts containing PII or PHI in a locked vault, file cabinet or other method reasonably necessary to protect the PII or PHI.

- 1.4. Store all Public Health Data shared pursuant to this MOU and containing PII or PHI only on secured servers or encrypted devices within ASU.

- 1.5. The Steering Group shall provide ASU and ADHS with a description of the security measures that are in place to maintain the confidentiality of each separate data set being received under this MOU. The Steering Group will consider the items described in the document titled "Security Considerations for Applicants" prepared by the ADHS HSRB (See http://www.azdhs.gov/ops/oacr/documents/HSRB_SecurityChecklist.pdf).

- 1.6. ASU shall provide the Steering Group and ADHS, on an agreed periodic basis and upon request, with evidence that all Authorized Persons who have access to the Public Health Data shared under this MOU have participated in any required training and signed any documents that are necessary to keep both ASU and ADHS in compliance with applicable laws.

- 1.7. The Steering Group shall provide or continue to provide the ADHS with a copy of ASU's procedure for the notification of ADHS of any Security Breach, which shall include a requirement that Authorized Users of the Public Health Data shared under this MOU shall immediately notify a designated individual at ASU and ADHS of any known or reasonably suspected Security Breach.

- 1.8. ASU shall maintain a log of all encrypted devices and identification numbers of those devices that are authorized to transmit, receive, or store the Public Health Data shared under this MOU, including the Public Health Data they were authorized to transmit, receive, or store until the data is destroyed. The Steering Group and ADHS may request a copy of the log at any time during the term of the MOU or until the Public Health Data is destroyed.

- 1.9. ASU shall make clear to all Authorized Persons and other ASU employees with a need to know that ASU is prohibited from storing Public Health Data on non-encrypted flash drives, CDs, external drives, smart phones, or other non-networked hard drives.

- 1.10. ASU shall provide the Steering Group and ADHS with proof of either a) the complete destruction of the original data and any copies or subsidiary data sets containing Personally Identifying Information or Protected Health Information that are developed from the original data or b) a statement that destruction of that data infeasible within thirty (30) days after the conclusion of any approved project under this MOU, upon termination of this MOU or at such time that such destruction or return of the data is required by applicable law, whichever is earlier.

- 1.11. ASU shall take reasonable steps to ensure that Authorized Persons who have access to the Public Health Data shared under this MOU maintain the same in strict confidence after the termination of this MOU.

Exemptions to Confidentiality Requirements:

ASU's obligations to maintain Data received from ADHS in confidence hereunder shall not apply to information that:

- 2.1. Was already known to the receiving party prior to the time of first disclosure, as demonstrated by contemporaneous, written documentation; or
- 2.2. Is received without any obligation of confidentiality from a third party having a legal right to disclose the same; or
- 2.3. Is independently developed by the receiving party by individuals without access to such information, as demonstrated by contemporaneous, written documentation; or
- 2.4. Is required to be disclosed by the receiving party pursuant to a legally enforceable order, subpoena, or other regulation (ORDER), provided, however, that the receiving party promptly notifies the disclosing party in advance of such disclosure, and discloses only that information necessary to comply with said ORDER.

Any other provision of this MOU to the contrary notwithstanding, the parties acknowledge that ASU is a public institution and, as such, is subject to the Arizona Public Records Act, Section 39-101, et seq, Arizona Revised Statutes. To the extent not limited by the Health Insurance Portability and Accountability Act, any provision regarding confidentiality is limited to the extent necessary to comply with the provisions of state law or other applicable federal law. ASU agrees to keep confidential any and all information and/or documents designated as confidential or proprietary through this MOU or other written communication by the other party to the fullest extent permitted by law. In the event a public records request is made for information and/or documents designated as confidential or proprietary, ASU will notify ADHS within two (2) working days, forty-eight (48) hours, excluding weekends and holidays, prior to disclosure. Any public records request for data shared under this MOU that are owned by ADHS will be referred to ADHS. Data shared under this MOU may not be released by ASU in response to public records requests unless ADHS first approves the release.

Security Breach:

In the event of a Security Breach, pursuant to A.R.S. § 44-7501, ASU and ADHS agree to collaborate with each other on the investigation, mitigation, remediation, and, if necessary, breach notification of citizens. If required by A.R.S. § 41-3507, ASU and ADHS shall notify the Arizona Strategic Enterprise Technology (ASET) Statewide Information Security and Privacy Office (SISPO) immediately upon becoming aware or receiving notice of a Security Breach.

Develop and finalize data exchange protocols with participating agencies.

Data exchange protocols are listed above in section 4.1.2 (see Exhibit 1).

Implement and maintain AZ-SUDORS

Current Staffing

Project Management

Arizona's AZ-SUDORS data collection, management, and analyses are conducted by a research unit of Arizona State University (ASU). Thus, we have developed a staffing plan that relies on faculty, staff, and students. The project management staff is as follows: the Principal Investigator (PI) is Charles M. Katz, Ph.D., the project manager is Taylor Cox, Ph.D., the lead abstractor is Madeline Saunders, and the lead analyst and report writer is David Choate. Dr. Katz oversees all project activities and personnel and is primarily responsible for outreach and education. In this role, he serves as the liaison between ASU/CVPCS and the Arizona Department of Health Services (ADHS). He also has responsibilities as the principal liaison and recruiter to data provider agencies. Dr. Cox, as the project manager for SUDORS and AZ-VDRS, manages all of the death certificate data from ADHS. Dr. Cox processes case files for eligibility between the two programs and serves as a liaison to participating data provider partners for recruitment and routine data collection requests. Ms. Saunders, as the lead abstractor, serves as the direct supervisor for all abstractor staff and principal liaison to participating data partners. She also handles case tracking, data quality assurance, and some data management responsibilities. Mr. Choate's primary responsibilities focus on data management, analyses, and dissemination.

Abstractor Staffing

We currently have five part-time undergraduate students as well as one full-time staff member who primarily conducts data abstraction and re-abstraction. This staffing plan yields 130 hours per week of labor dedicated exclusively to abstractions. The project manager (8 hours weekly) and lead abstractor (40 hours weekly) collectively contribute about 10 hours per week to abstractions and re-abstraction data quality assurance checks. The lead abstractor then spends the remainder of her time being primarily responsible for the direct supervision of the abstractor staff, managing data requests, and assisting with data dissemination products. The lead analyst and report writer then expend 6 hours per week focusing primarily on data quality and management, analyses, and report production.

Future Staff Activities

For the remainder of the current funding period, the AZ-SUDORS will increase the percentage of cases re-abstracted and will continue to explore possible approaches to further improve the quality of circumstance abstraction from medical examiner reports. The work platform *Slack* has been employed to encourage abstractor discussion of coding issues; it was used successfully to improve abstraction quality with AZ-VDRS and is proving to do so with AZ-SUDORS as well. Regular review of the entire coding manual as a refresher has also been implemented. Due to staff rotation, we routinely conduct enhancement training and discuss cases, providing feedback and training to each abstractor on those data elements that were found to be most problematic.

We continue to utilize monthly abstractor evaluation reports. Along with the planned increase in re-abstraction, we have also implemented a protocol of discussion between original abstractor and re-

abstractor to reach agreement on discrepancies and allow for feedback on errors as an opportunity to continually develop abstraction skills.

Train staff to meet CDC standards and pass abstractor and Collaborative Institutional Training Initiative (CITI) test

All abstractor staff undergo a variety of training prior to beginning any abstractions. A series of human subjects' protection and data security trainings are initiated immediately following their hiring. ASU offers an internal data security training course for all students and employees. This training covers a very broad range of information security issues. The ASU information security awareness training course is renewed annually, and abstractors are expected to maintain current completion status as the course is made available. The information security course teaches the laws and policies that apply when handling sensitive information; protecting systems, accounts, and information; how encryption plays a vital role in protection; using security software that updates automatically; and what to do when you have an information security event. Abstractors also complete an ASU course on HIPAA for Researchers. This course was developed specifically for researchers and employees who routinely work with protected health information.

Finally, all SUDORS staff also complete a comprehensive course through the Collaborative Institutional Training Initiative (CITI). The CITI courses cover a wide range of human subjects' protection training for a variety of research and data-handling environments. These courses cover a range of issues, but for AZ-SUDORS purposes, we focus on ethical behavior in research and privacy compliance standards and procedures.

Develop and implement data security checks and audits

Data security storage standards, maintenance, and audits are all the responsibility of ASU's University Technology Office (UTO). The UTO sets and maintains the dedicated network servers for CVPCS and its data storage security. UTO conducts system health screening and data back-ups every 24 hours. Further, they conduct routine and ad hoc audits for data security and potential breaches.

Evaluate the project for data quality, data comprehensiveness, and impact for improvement

The CDC maintains a web-portal system for data abstraction and management of the AZ-SUDORS program. The Secure Access Management System (SAMS) web-portal allows for both batch uploads of datafiles and manual data entry on a case-by-case basis. The use of both options is necessary for AZ-SUDORS data abstraction. Once data are received, de-identified abstractions are input into the SAMS web-portal. As data are collected, dashboard tools embedded into SAMS can be used for on-

demand reporting for certain data quality elements. Additionally, a comprehensive download of all current data can be carried out for more in-depth analyses and reporting.

Review 100% cases for complete information per CDC requirements

All abstracted data are routinely subjected to review for systematic errors. Abstracted data are reviewed for inconsistent responses, inappropriate missing values in required variables, or inaccurate coding decisions. This review process includes 100% of cases abstracted into the system. This review serves as the first level of data quality assurance and is supplemented with other data quality assurance procedures.

As data quality assurance occurs, individual abstractors are reviewed for error rates and error patterns, and individual patterns are aggregated to team-level patterns. This process identifies those abstractors needing additional training or attention regarding particular error types and/or categories. Further, it identifies enhancement training needs for the staff at large when common errors occur across abstractors. Error rates by abstractor are posted in a central location near the abstractor work stations.

Review and report on the percentage of cases with high data quality and standardization as defined by CDC standards

All 2019 and 2020 DC data have been initiated. Additionally, 2021 DC data from January 1 through September 27 have been initiated. As an ongoing process of data entry, quality assurance, and re-abstraction review, new DC data are reviewed as they are received. Exhibit 2 below shows the number of AZ-SUDORS cases by year, the percentage of those cases initiated within 120 days, the percentage of cases with completed demographic data abstraction, the percentage of cases with completed ME data abstraction, and the percentage of cases with completed toxicology data abstraction. Also included are the performance ratings for each data completeness percentage assigned by the CDC. Data are presented as preliminary estimates derived from the SAMS online portal dashboard and not from the formal data quality reports provided by the CDC to individual SUDORS states.

It is important to note that the AZ-SUDORS data collection did not begin until April 2020; therefore, essentially all of 2019 and a substantial portion of 2020 case initiation occurred after the standard 120-day performance window. Moreover, the numbers presented for 2021 are incomplete, including only those deaths through August 30, 2021, due to the timing of the writing of this report.

Exhibit 2: Incident Data Completeness by Year of Overdose Death, 2019–2021 †

Deaths		% Initiated w/in 120 Days		% Demographics		% ME		% Tox	
Year	n	%	Rating	%	Rating	%	Rating	%	Rating
2019 ††	1,751	0.9	Poor	99.4	Excellent	96.9	Excellent	94.7	Excellent
2020 ††	2,308	92.2	Excellent	100.0	Excellent	98.7	Excellent	95.8	Excellent
2021	1,387	98.4	Excellent	85.2	Good	84.2	Fair	81.0	Fair

† Data collection for the 2021 data year is still ongoing, and the numbers represented in the table include only those cases through August 30, 2021; thus, they should be regarded as preliminary.

†† Data collection for AZ-SUDORS did not begin until April 2020; therefore, the timeliness for both 2019 and 2020 were substantially impacted.

Perform a formal evaluation of data following 2019 data closeout

The data closeout for 2019 has not yet been finalized by the CDC, and as such, no formal evaluation can be conducted on final 2019 closeout data.

SECTION B: Quarterly Reports on Data Collection

Share deidentified surveillance data with the CDC in compliance with CDC guidance and reporting deadlines

Data sharing conducted through the abstraction process is deidentified and loaded into the CDC's SAMS NVDRS/SUDORS web-portal. Quarterly reports are attached in their entirety in Appendix A.

SECTION C: Monthly sets of raw abstracted data

Share identified surveillance data with ADHS in compliance with CDC guidelines and reporting deadlines

Data files submitted via SFTP portal.

Inventory of Monthly Sets of Abstracted Raw Data	
SUDORS Incident data	
2019	January - December
2020	January - December
2021	January - August
SUDORS Victim data	
2019	January - December
2020	January - December
2021	January - August
SUDORS Toxicology data	
2019	January - December
2020	January - December
2021	January - August
SUDORS Prescription Drug Overdose (PDO) Module data	
2019	January - December
2020	January - December
2021	January - August
Comprehensive Data Dictionary	
Official SUDORS Coding Manual	

SECTION D: Reports for FY September 2020 through August 2021

Create surveillance products, such as reports, dashboards, and outbreak alerts, when requested by ADHS

Reports attached in Appendix B.

Inventory of In-Depth Reports

Special Topics Reports for General Consumption

1) Kovacs, Melissa, Katz, Charles, M., and Cox, Taylor (2021). Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona. Arizona State University: Phoenix, Arizona.

2) Kovacs, Melissa, Katz, Charles, M., and Cox, Taylor (2021). Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona. Arizona State University: Phoenix, Arizona.

3) Kovacs, Melissa, Katz, Charles, M., and Cox, Taylor (2021).: Geographic Prevalence and Characteristics of Unintentional Overdose Deaths. Arizona State University: Phoenix, Arizona.

4) Kovacs, Melissa, Katz, and Charles, M. (2021).: Pilot Study of Prior Hospital Discharge Data and Overdose Death Data in Arizona. Arizona State University: Phoenix, Arizona.

Technical Reports

1) Daniulaityte, Raminta, Ruhter, Lance, and Katz, Charles, M. (2021). Characteristics of Non-Pharmaceutical Fentanyl-Related Overdose Deaths in Arizona, July 2019 – June 2020. Arizona State University: Phoenix, Arizona.

2) Daniulaityte, Raminta, Ruhter, Lance, and Katz, Charles, M. (2021). Drug Overdose Deaths in Arizona During the Early Stages of the COVID-19 Pandemic. Arizona State University: Phoenix, Arizona.

APPENDIX A: Quarterly Reports

AZ-SUDORS Quarterly Report
July 2019 – June 2020

Arizona State Unintentional Drug Overdose Reporting System
(AZ-SUDORS)
July 2019 – June 2020

AZ SUDORS
State Unintentional Drug Overdose Reporting System

June 2021

Center for Violence Prevention and Community Safety

Arizona State University

AZ SUDORS

State Unintentional Drug Overdose Reporting System

AZ-SUDORS Quarterly Report

July 2019 – June 2020

By

Kayla Freemon, MS, Melissa Gutierrez, BS, Taylor Cox, PhD, Charles Katz, PhD

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AZ-SUDORS Quarterly Report

July 2019 – June 2020

Kayla Freemon, MS, Melissa Gutierrez, BS, Taylor Cox, PhD, Charles Katz, PhD

Center for Violence Prevention and Community Safety
Arizona State University

AZ SUDORS
State Unintentional Drug Overdose Reporting System

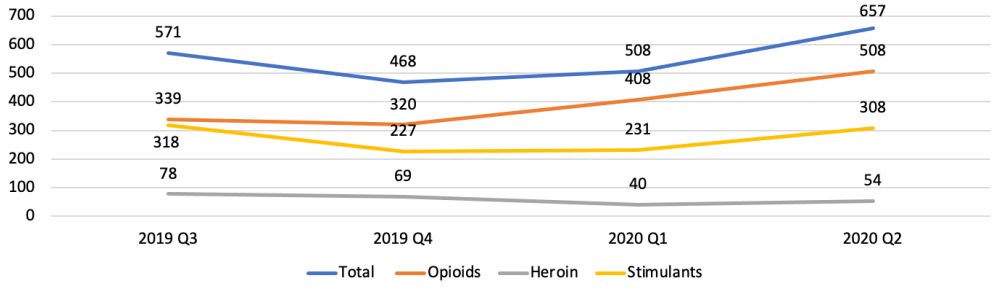
Overview. AZ-SUDORS, launched through the US Centers for Disease Control and Prevention (CDC), tracks opioid-involved and other drug-related overdose deaths occurring in the state of Arizona. Overdose death data are reported quarterly to help inform local, state, and national policy responses.

Data Sources: Comprehensive data on all accidental drug overdoses are collected from death certificates issued by the Arizona Department of Health Services and medical examiner reports, including postmortem toxicology testing. Rates are calculated using population data from the 2019 American Community Survey.

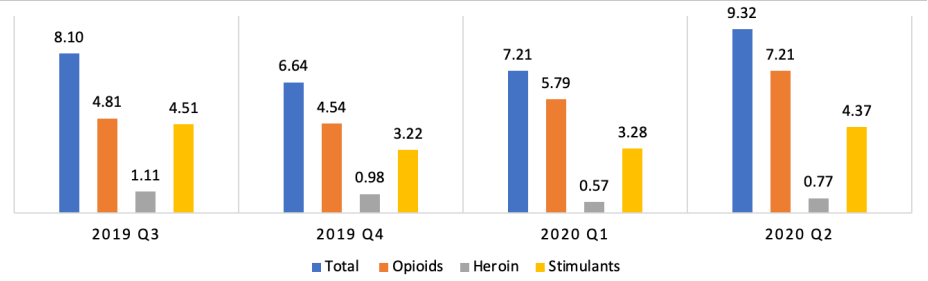
Case Definitions: All drug overdose deaths occurring and recorded in Arizona from July 2019 to December 2020 are included in the current report. Here, a drug overdose death is one that is known to be unintentional or for which the intent is unknown. Opioid-related deaths include those involving heroin. Reporting periods are quarterly: January–March (Q1), April–June (Q2), July–September (Q3), and October–December (Q4). Deaths are reported by date of death, when available, or otherwise by injury date (n = 20) or the date the death was pronounced (n = 92).

Data by county: By county, overdose fatalities are counted based on where the lethal drug was used, even if actual death occurred elsewhere. During the timeframe reported on here, La Paz County reported no drug overdose deaths; Apache, Gila, Graham, Greenlee, and Santa Cruz counties reported fewer than 10 drug overdose deaths (to maintain anonymity, data points < 10 are suppressed.) Ethnicity was missing in one case; age was missing in one case.

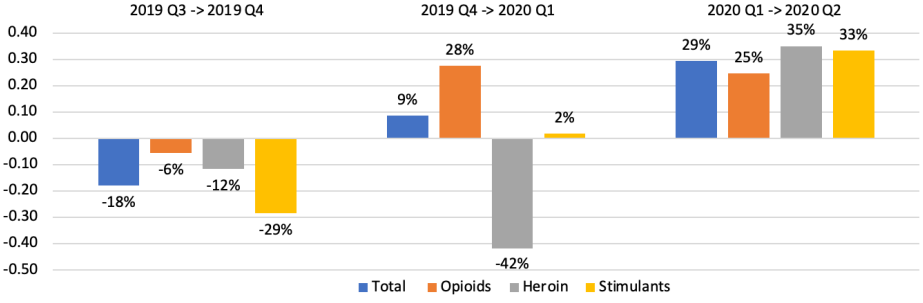
Number of Overdose Deaths in Arizona by Quarter



Overdose Death Rate in Arizona by Quarter



Percent Change in Number of Deaths by Quarter



Key Findings

From July 1, 2019, to June 30, 2020:

- 2,204 people died of a drug overdose.
- Deaths due to drug overdose increased 15%.
- Overdose deaths increased in almost all counties, around 75% involving opioids.
- The majority of decedents were 25-to-44-year-old White males.
- Arizona overdose deaths were most heavily concentrated in Maricopa County, followed by Pima County.

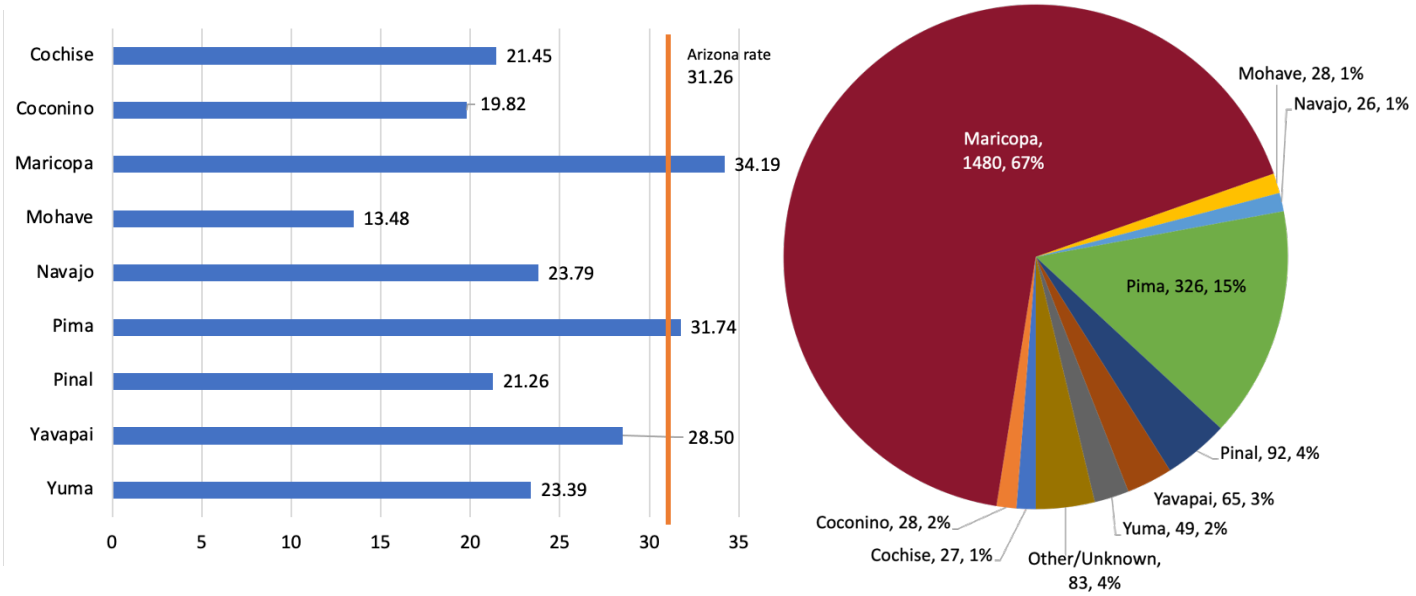
In the second quarter of 2020 (April–June):

- Overdose deaths increased by 29%.

Demographics by Quarter

	2019 Q3	2019 Q4	2020 Q1	2020 Q2
Gender				
Male	417	340	383	474
Female	154	128	125	183
Race				
Black	39	40	32	60
Am. Indian	38	23	39	45
White	446	373	420	533
Asian/Pacific Is.	10	¶	¶	¶
Other	38	26	14	16
Mixed	0	¶	¶	¶
Ethnicity				
Hispanic	145	122	165	207
Not Hispanic	425	346	343	450
Age Group				
Under 18 years	¶	10	13	17
18 to 24 years	68	63	85	86
25 to 44 years	236	203	237	320
45 to 64 years	237	164	150	217
65 years & over	22	28	23	17

Number and Rate of Overdose Deaths by County



Number and Rate of Overdose Deaths by County by Quarter

	2019 Q3		2019 Q4		2020 Q1		2020 Q2	
	n	Rate	n	Rate	n	Rate	n	Rate
Overall Drug Overdose Deaths								
Arizona	571	8.10	468	6.64	508	7.21	657	9.32
Maricopa	397	9.17	307	7.09	344	7.95	432	9.98
Mohave	¶	¶	¶	¶	¶	¶	11	5.30
Pima	78	7.59	74	7.20	75	7.30	99	9.64
Pinal	20	4.62	17	3.93	20	4.62	35	8.09
Yavapai	13	5.70	18	7.89	16	7.02	18	7.89
Yuma	10	4.77	12	5.73	11	5.25	16	7.64
Opioid Drug Overdose Deaths								
Arizona	339	4.81	320	4.54	408	5.79	508	7.21
Maricopa	272	6.28	241	5.57	284	6.56	346	7.99
Pima	44	4.28	52	5.06	57	5.55	78	7.59
Pinal	¶	¶	¶	¶	17	3.93	30	6.93
Yavapai	¶	¶	10	4.38	12	5.26	14	6.14
Yuma	¶	¶	¶	¶	13	6.21	13	6.21
Heroin Drug Overdose Deaths								
Arizona	78	1.11	69	0.98	40	0.57	54	0.77
Maricopa	51	1.18	39	0.90	24	0.55	27	0.62
Pima	17	1.65	18	1.75	11	1.07	18	1.75
Stimulant Drug Overdose Deaths								
Arizona	318	4.51	227	3.22	231	3.28	308	4.37
Maricopa	222	5.13	146	3.37	157	3.63	200	4.62
Pima	56	5.45	38	3.70	36	3.50	52	5.06
Pinal	10	2.31	¶	¶	¶	¶	13	3.00
Yavapai	¶	¶	11	4.82	10	4.38	¶	¶

*Counties were excluded when all four quarters had cell counts below 10.

AZ-SUDORS Quarterly Report
July 2019 – December 2020

Arizona State Unintentional Drug Overdose Reporting System (AZ-SUDORS)
July 2019 – December 2020

AZ SUDORS
State Unintentional Drug Overdose Reporting System

July 2021

Center for Violence Prevention and Community Safety

Arizona State University

AZ SUDORS

State Unintentional Drug Overdose Reporting System

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July 2019 – December 2020

By

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AZ-SUDORS Quarterly Report

July 2019 – December 2020

Kayla Freemon, MS, Melissa Gutierrez, BS, Taylor Cox, PhD, Charles Katz, PhD

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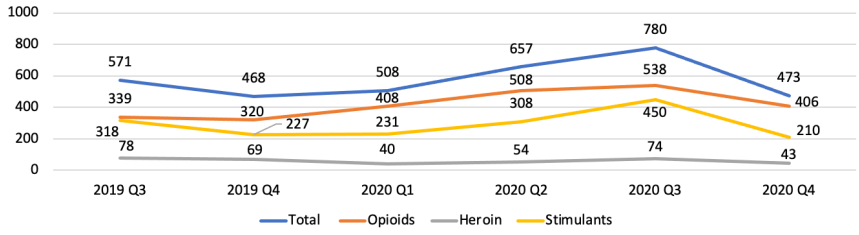
Data Sources: Comprehensive data on all accidental drug overdoses are collected from death certificates issued by the Arizona Department of Health Services and medical examiner reports, including postmortem toxicology testing. Rates are calculated using population data from the 2019 American Community Survey.

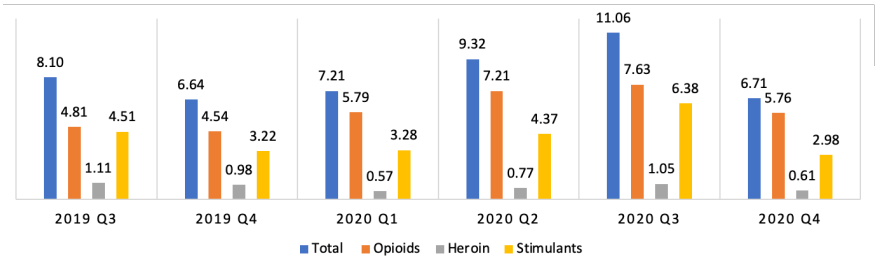
Case Definitions: All drug overdose deaths occurring and recorded in Arizona from July 2019 to December 2020 are included in the current report. Here, a drug overdose death is one that is known to be unintentional or for which the intent is unknown. Opioid-related deaths include those involving heroin. Reporting periods are quarterly: January–March (Q1), April–June (Q2), July–September (Q3), and October–December (Q4). Deaths are reported by date of death, when available, or by injury date (*n* = 21) or the date the death was pronounced (*n* = 181) otherwise.

Data by county: By county, overdose fatalities are counted based on where the lethal drug was used, even if actual death occurred elsewhere. During the timeframe reported on here, Greenlee and La Paz Counties had fewer than 10 drug overdose deaths (to maintain anonymity, data points < 10 are suppressed). Ethnicity was missing in 15 cases; age was missing in two cases.

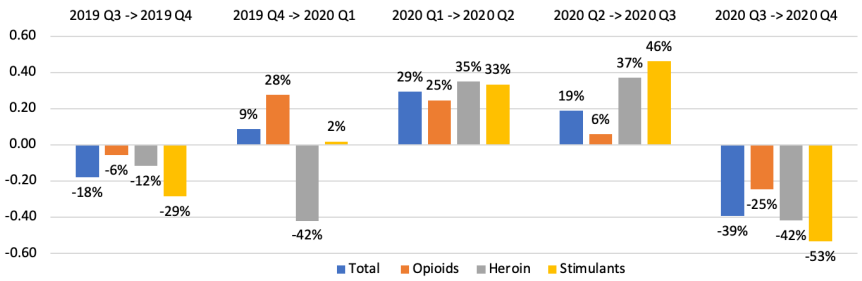
Number of Overdose Deaths in Arizona by Quarter



Overdose Death Rate in Arizona by Quarter



Percent Change in Number of Deaths by Quarter



Key Findings

From July 1, 2019, to December 31, 2020:

- 3,457 people died of a drug overdose.
- Most decedents were 25-to-44-year-old White males.
- Arizona overdose deaths were most heavily concentrated in Maricopa County, followed by Pima County.

In the third quarter of 2020 (July–September):

- Drug overdose deaths peaked for the six quarters, with 780 decedents.

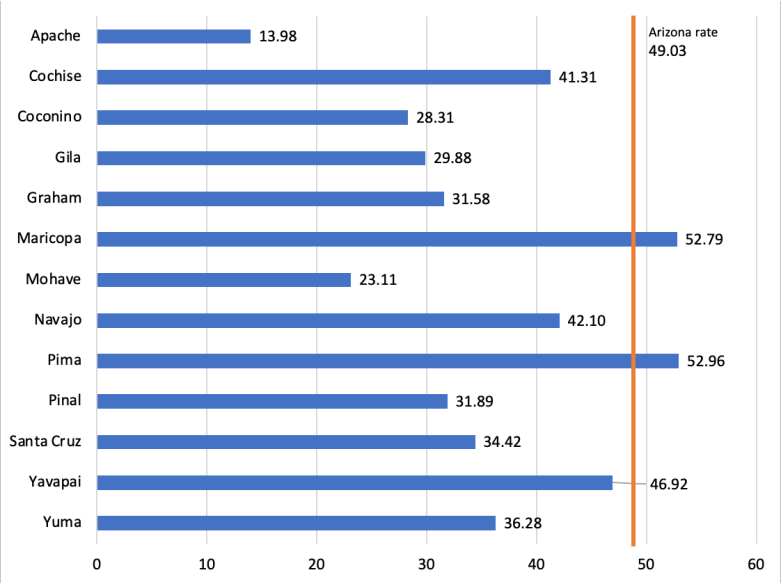
In the fourth quarter of 2020 (October–December):

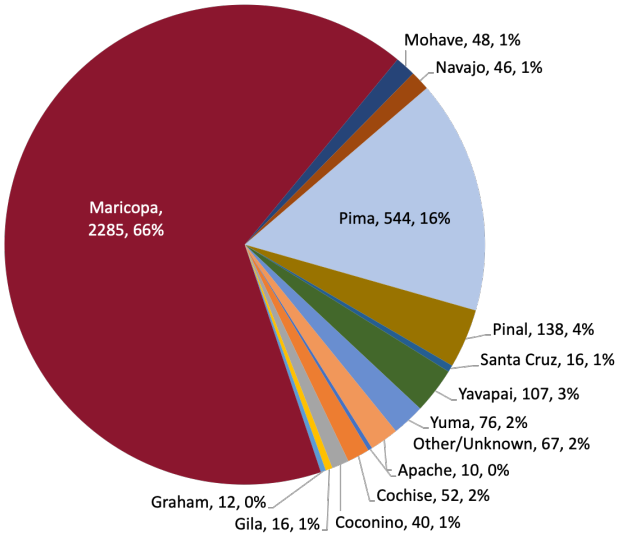
- Overdose deaths decreased by 25% from 2020 Q3, driven somewhat by a reduction in stimulant-related deaths and a reduction in overall drug overdose deaths in Maricopa County.
- 2020 Q4 deaths dropped to levels comparable to 2019 Q4 deaths.
- Cochise, Mohave, and Pinal Counties experienced increased overdose deaths from 2020 Q3 to 2020 Q4.

Demographics by Quarter

	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4
Gender						
Male	417	340	383	474	576	343
Female	154	128	125	183	204	130
Race						
Black	39	40	32	60	83	34
Am. Indian	38	23	39	45	41	33
White	446	373	420	533	626	380
Asian/Pacific Is.	10	¶	¶	¶	¶	¶
Other	38	26	14	16	20	20
Mixed	0	¶	¶	¶	¶	¶
Ethnicity						
Hispanic	145	122	165	207	192	143
Not Hispanic	425	346	343	450	579	325
Age Group						
Under 18 years	¶	¶	14	18	16	14
18 to 24 years	68	63	85	86	77	75
25 to 44 years	236	203	237	320	354	235
45 to 64 years	237	164	149	216	285	135
65 years & over	¶	28	23	17	47	14

Number and Rate of Overdose Deaths by County, All Quarters





Number and Rate of Overdose Deaths by County by Quarter

	2019 Q3		2019 Q4		2020 Q1		2020 Q2		2020 Q3		2020 Q4	
	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
Overall Drug Overdose Deaths												
Arizona	571	8.10	468	6.64	508	7.21	657	9.32	780	11.06	473	6.71
Cochise	¶	¶	¶	¶	¶	¶	¶	¶	12	9.53	13	10.33
Maricopa	397	9.17	307	7.09	344	7.95	432	9.98	519	11.99	286	6.61
Mohave	¶	¶	¶	¶	¶	¶	11	5.30	¶	¶	12	5.78
Navajo	¶	¶	¶	¶	¶	¶	¶	¶	10	9.15	10	9.15
Pima	78	7.59	74	7.20	75	7.30	99	9.64	131	12.75	87	8.47
Pinal	20	4.62	17	3.93	20	4.62	35	8.09	23	5.31	23	5.31
Yavapai	13	5.70	18	7.89	16	7.02	18	7.89	26	11.40	16	7.02
Yuma	10	4.77	12	5.73	11	5.25	16	7.64	16	7.64	11	5.25
Opioid Drug Overdose Deaths												
Arizona	339	4.81	320	4.54	408	5.79	508	7.21	538	7.63	406	5.76
Cochise	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	11	8.74
Maricopa	272	6.28	241	5.57	284	6.56	346	7.99	355	8.20	256	5.91
Mohave	¶	¶	¶	¶	¶	¶	¶	¶	¶	¶	10	4.81
Pima	44	4.28	52	5.06	57	5.55	78	7.59	104	10.12	74	7.20
Pinal	¶	¶	¶	¶	17	3.93	30	6.93	13	3.00	20	4.62
Yavapai	¶	¶	¶	¶	13	5.70	13	5.70	19	8.33	15	6.58
Yuma	¶	¶	¶	¶	11	5.25	11	5.25	¶	¶	¶	¶
Heroin Drug Overdose Deaths												
Arizona	78	1.11	69	0.98	40	0.57	54	0.77	74	1.05	43	0.61
Maricopa	51	1.18	39	0.90	24	0.55	27	0.62	33	0.76	16	0.37
Pima	17	1.65	18	1.75	11	1.07	18	1.75	28	2.73	19	1.85
Stimulant Drug Overdose Deaths												
Arizona	318	4.51	227	3.22	231	3.28	308	4.37	450	6.38	210	2.98
Maricopa	222	5.13	146	3.37	157	3.63	200	4.62	308	7.12	122	2.82
Pima	56	5.45	38	3.70	36	3.50	52	5.06	74	7.30	51	4.96
Pinal	10	2.31	¶	¶	¶	¶	13	3.00	12	2.77	¶	¶
Yavapai	¶	¶	11	4.82	10	4.38	¶	¶	12	5.26	¶	¶
Yuma	¶	¶	¶	¶	¶	¶	¶	¶	10	4.77	¶	¶

*Counties were excluded when all six quarters had cell counts below 10.

Unintentional Deaths: January-June 2019 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	749	100.00%	13	1.74%	736	98.26%	85	11.35%	0	0.00%	0	0.00%
Apache	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Cochise	<10	<1.3%	0	0.00%	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%
Coconino	<10	<1.3%	0	0.00%	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%
Gila	<10	<1.3%	0	0.00%	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%
Graham	<10	<1.3%	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%
Greenlee	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Maricopa	505	67.42%	0	0.00%	505	67.42%	37	4.94%	0	0.00%	0	0.00%
Mohave	14	1.87%	0	0.00%	14	1.87%	<10	<1.3%	0	0.00%	0	0.00%
Navajo	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pima	136	18.16%	<10	<1.3%	135	18.02%	36	4.81%	0	0.00%	0	0.00%
Pinal	17	2.27%	0	0.00%	17	2.27%	<10	<1.3%	0	0.00%	0	0.00%
Santa Cruz	<10	<1.3%	0	0.00%	<10	<1.3%	<10	<1.3%	0	0.00%	0	0.00%
Yavapai	24	3.20%	0	0.00%	24	3.20%	<10	<1.3%	0	0.00%	0	0.00%
Yuma	18	2.40%	0	0.00%	18	2.40%	0	0.00%	0	0.00%	0	0.00%

Undetermined Deaths: January-June 2019 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	37	100.00%	<10	<27.0%	36	97.30%	<10	<27.0%	0	0.00%	0	0.00%
Apache	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Cochise	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Coconino	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Gila	<10	<27.0%	0	0.00%	<10	<27.0%	<10	<27.0%	0	0.00%	0	0.00%
Graham	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Greenlee	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Maricopa	19	51.35%	0	0.00%	19	51.35%	<10	<27.0%	0	0.00%	0	0.00%
Mohave	<10	<27.0%	0	0.00%	<10	<27.0%	0	0.00%	0	0.00%	0	0.00%
Navajo	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pima	<10	<27.0%	<10	<27.0%	<10	<27.0%	0	0.00%	0	0.00%	0	0.00%
Pinal	<10	<27.0%	0	0.00%	<10	<27.0%	0	0.00%	0	0.00%	0	0.00%
Santa Cruz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Yavapai	<10	<27.0%	0	0.00%	<10	<27.0%	0	0.00%	0	0.00%	0	0.00%
Yuma	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

All Deaths: January-June 2019 Data Collection Status by Death County:																		
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests		
	n	%		n	%		n	%		n	%		n	%		n	%	
	786	100.00%		14	1.78%		772	98.22%		88	11.20%		0	0.00%		0	0.00%	
Apache	<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%		0	0.00%		0	0.00%	
Cochise	<10	<1.3%		0	0.00%		<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%	
Coconino	<10	<1.3%		0	0.00%		<10	<1.3%		0	0.00%		0	0.00%		0	0.00%	
Gila	<10	<1.3%		0	0.00%		<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%	
Graham	<10	<1.3%		<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%		0	0.00%	
Greenlee	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%	
La Paz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%	
Maricopa	524	66.67%		0	0.00%		524	66.67%		38	4.83%		0	0.00%		0	0.00%	
Mohave	19	2.42%		0	0.00%		19	2.42%		<10	<1.3%		0	0.00%		0	0.00%	
Navajo	<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%		0	0.00%		0	0.00%	
Pima	141	17.94%		<10	<1.3%		139	17.68%		36	4.58%		0	0.00%		0	0.00%	
Pinal	20	2.54%		0	0.00%		20	2.54%		<10	<1.3%		0	0.00%		0	0.00%	
Santa Cruz	<10	<1.3%		0	0.00%		<10	<1.3%		<10	<1.3%		0	0.00%		0	0.00%	
Yavapai	25	3.18%		0	0.00%		25	3.18%		<10	<1.3%		0	0.00%		0	0.00%	
Yuma	18	2.29%		0	0.00%		18	2.29%		0	0.00%		0	0.00%		0	0.00%	

Unintentional Deaths: July-December 2019 Data Collection Status by Death County:																
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	1002	100.00%		18	1.80%		967	96.51%		68	6.79%		0	0.00%		<20	<2.0%
Apache	<10	<1.0%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Cochise	12	1.20%		0	0.00%		12	1.20%		<10	<1.0%		0	0.00%		0	0.00%
Coconino	15	1.50%		<10	<1.0%		13	1.30%		0	0.00%		0	0.00%		0	0.00%
Gila	<10	<1.0%		0	0.00%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%
Graham	<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Greenlee	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
La Paz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Maricopa	701	69.96%		0	0.00%		701	69.96%		43	4.29%		0	0.00%		0	0.00%
Mohave	11	1.10%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		11	0.00%
Navajo	12	1.20%		10	1.00%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Pima	154	15.37%		<10	<1.0%		153	15.27%		16	1.60%		0	0.00%		0	0.00%
Pinal	35	3.49%		<10	<1.0%		27	2.69%		0	0.00%		0	0.00%		<10	<1.0%
Santa Cruz	<10	<1.0%		0	0.00%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%
Yavapai	29	2.89%		0	0.00%		29	2.89%		<10	<1.0%		0	0.00%		0	0.00%
Yuma	22	2.20%		0	0.00%		22	2.20%		<10	<1.0%		0	0.00%		0	0.00%
Undetermined Deaths: July-December 2019 Data Collection Status by Death County:																	
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	34	100.00%		<10	<29.4%		32	94.12%		<10	<29.4%		0	0.00%		0	0.00%
Apache	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Cochise	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Coconino	<10	<29.4%		0	0.00%		<10	<29.4%		<10	<29.4%		0	0.00%		0	0.00%
Gila	<10	<29.4%		0	0.00%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%
Graham	<10	<29.4%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Greenlee	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
La Paz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Maricopa	19	55.88%		0	0.00%		19	55.88%		0	0.00%		0	0.00%		0	0.00%
Mohave	<10	<29.4%		0	0.00%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%
Navajo	<10	<29.4%		0	0.00%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%
Pima	<10	<29.4%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Pinal	<10	<29.4%		0	0.00%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%
Santa Cruz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Yavapai	<10	<29.4%		0	0.00%		<10	<29.4%		0	0.00%		0	0.00%		0	0.00%
Yuma	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%

All Deaths: July-December 2019 Data Collection Status by Death County																	
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	1036	100.00%		20	1.93%		999	96.43%		69	6.66%		0	0.00%		<20	<2.0%
Apache	<10	<1.0%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Cochise	12	1.16%		0	0.00%		12	1.16%		<10	<1.0%		0	0.00%		0	0.00%
Coconino	16	1.54%		<10	<1.0%		14	1.35%		<10	<1.0%		0	0.00%		0	0.00%
Gila	<10	<1.0%		0	0.00%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%
Graham	<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Greenlee	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
La Paz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Maricopa	720	69.50%		0	0.00%		720	69.50%		43	4.15%		0	0.00%		0	0.00%
Mohave	14	1.35%		0	0.00%		<10	<1.0%		0	0.00%		0	0.00%		11	0.00%
Navajo	13	1.25%		10	0.97%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Pima	155	14.96%		<10	<1.0%		153	14.77%		16	1.54%		0	0.00%		0	0.00%
Pinal	37	3.57%		<10	<1.0%		29	2.80%		0	0.00%		0	0.00%		<10	<1.0%
Santa Cruz	<10	<1.0%		0	0.00%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%
Yavapai	33	3.19%		0	0.00%		33	3.19%		<10	<1.0%		0	0.00%		0	0.00%
Yuma	22	2.12%		0	0.00%		22	2.12%		<10	<1.0%		0	0.00%		0	0.00%

Unintentional Deaths: January-June 2020 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	1103	100.00%	<10	<1.0%	1094	99.18%	49	4.44%	0	0.00%	0	0.00%
Apache	<10	<1.0%	<10	<1.0%	<10	<1.0%	0	0.00%	0	0.00%	0	0.00%
Cochise	16	1.45%	0	0.00%	16	1.45%	<10	<1.0%	0	0.00%	0	0.00%
Coconino	13	1.18%	0	0.00%	13	1.18%	<10	<1.0%	0	0.00%	0	0.00%
Gila	<10	<1.0%	0	0.00%	<10	<1.0%	0	0.00%	0	0.00%	0	0.00%
Graham	<10	<1.0%	<10	<1.0%	<10	<1.0%	<10	<1.0%	0	0.00%	0	0.00%
Greenlee	<10	<1.0%	0	0.00%	<10	<1.0%	0	0.00%	0	0.00%	0	0.00%
La Paz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Maricopa	779	70.63%	0	0.00%	779	70.63%	27	2.45%	0	0.00%	0	0.00%
Mohave	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Navajo	<10	<1.0%	<10	<1.0%	<10	<1.0%	0	0.00%	0	0.00%	0	0.00%
Pima	172	15.59%	0	0.00%	172	15.59%	14	1.27%	0	0.00%	0	0.00%
Pinal	50	4.53%	0	0.00%	50	4.53%	0	0.00%	0	0.00%	0	0.00%
Santa Cruz	<10	<1.0%	0	0.00%	<10	<1.0%	0	0.00%	0	0.00%	0	0.00%
Yavapai	22	1.99%	0	0.00%	22	1.99%	<10	<1.0%	0	0.00%	0	0.00%
Yuma	26	2.36%	0	0.00%	26	2.36%	<10	<1.0%	0	0.00%	0	0.00%

Undetermined Deaths: January-June 2020 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	58	100.00%	0	0.00%	55	94.83%	<10	<17.2%	0	0.00%	<10	<17.2%
Apache	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Cochise	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Coconino	<10	<17.2%	0	0.00%	2	3.45%	0	0.00%	0	0.00%	0	0.00%
Gila	<10	<17.2%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	<10	<17.2%
Graham	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Greenlee	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Maricopa	18	31.03%	0	0.00%	18	31.03%	0	0.00%	0	0.00%	0	0.00%
Mohave	19	32.76%	0	0.00%	19	32.76%	<10	<17.2%	0	0.00%	0	0.00%
Navajo	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pima	<10	<17.2%	0	0.00%	<10	<17.2%	0	0.00%	0	0.00%	0	0.00%
Pinal	<10	<17.2%	0	0.00%	<10	<17.2%	0	0.00%	0	0.00%	0	0.00%
Santa Cruz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Yavapai	11	18.97%	0	0.00%	11	18.97%	<10	<17.2%	0	0.00%	0	0.00%
Yuma	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

All Deaths: January-June 2020 Data Collection Status by Death County:																	
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	1161	100.00%		<10	<1.0%		1149	98.97%		53	4.57%		0	0.00%		<10	<1.0%
Apache	<10	<1.0%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Cochise	16	1.38%		0	0.00%		16	1.38%		<10	<1.0%		0	0.00%		0	0.00%
Coconino	15	1.29%		0	0.00%		15	1.29%		<10	<1.0%		0	0.00%		0	0.00%
Gila	<10	<1.0%		0	0.00%		<10	<1.0%		0	0.00%		0	0.00%		<10	<1.0%
Graham	<10	<1.0%		<10	<1.0%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%
Greenlee	<10	<1.0%		0	0.00%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
La Paz	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
Maricopa	797	68.65%		0	0.00%		797	68.65%		27	2.33%		0	0.00%		0	0.00%
Mohave	19	1.64%		0	0.00%		19	1.64%		<10	<1.0%		0	0.00%		0	0.00%
Navajo	<10	<1.0%		<10	<1.0%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Pima	176	15.16%		0	0.00%		176	15.16%		14	1.21%		0	0.00%		0	0.00%
Pinal	51	4.39%		0	0.00%		51	4.39%		0	0.00%		0	0.00%		0	0.00%
Santa Cruz	<10	<1.0%		0	0.00%		<10	<1.0%		0	0.00%		0	0.00%		0	0.00%
Yavapai	33	2.84%		0	0.00%		33	2.84%		<10	<1.0%		0	0.00%		0	0.00%
Yuma	26	2.24%		0	0.00%		26	2.24%		<10	<1.0%		0	0.00%		0	0.00%

Unintentional Deaths: July-December 2020 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	1205	100.00%	19	1.58%	1186	98.42%	134	11.12%	0	0.00%	0	0.00%
Apache	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Cochise	22	1.83%	0	0.00%	22	1.83%	<10	<0.9%	0	0.00%	0	0.00%
Coconino	13	1.08%	0	0.00%	13	1.08%	<10	<0.9%	0	0.00%	0	0.00%
Gila	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Graham	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Greenlee	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	<10	<0.9%	<10	<0.9%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Maricopa	806	66.89%	0	0.00%	806	66.89%	82	6.80%	0	0.00%	0	0.00%
Mohave	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Navajo	20	1.66%	14	1.16%	<10	<0.9%	<10	<0.9%	0	0.00%	0	0.00%
Pima	221	18.34%	<10	<0.9%	219	18.17%	38	3.15%	0	0.00%	0	0.00%
Pinal	41	3.40%	<10	<0.9%	40	3.32%	<10	<0.9%	0	0.00%	0	0.00%
Santa Cruz	<10	<0.9%	0	0.00%	<10	<0.9%	<10	<0.9%	0	0.00%	0	0.00%
Yavapai	28	2.32%	<10	<0.9%	27	2.24%	<10	<0.9%	0	0.00%	0	0.00%
Yuma	24	1.99%	0	0.00%	24	1.99%	<10	<0.9%	0	0.00%	0	0.00%

Undetermined Deaths: July-December 2020 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	48	100.00%	0	0.00%	48	100.00%	<10	<21.0%	0	0.00%	0	0.00%
Apache	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Cochise	<10	<21.0%	0	0.00%	<10	<21.0%	0	0.00%	0	0.00%	0	0.00%
Coconino	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Gila	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Graham	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Greenlee	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	<10	<21.0%	0	0.00%	<10	<21.0%	<10	<21.0%	0	0.00%	0	0.00%
Maricopa	12	25.00%	0	0.00%	12	25.00%	0	0.00%	0	0.00%	0	0.00%
Mohave	16	33.33%	0	0.00%	16	33.33%	0	0.00%	0	0.00%	0	0.00%
Navajo	<10	<21.0%	0	0.00%	<10	<21.0%	<10	<21.0%	0	0.00%	0	0.00%
Pima	<10	<21.0%	0	0.00%	<10	<21.0%	0	0.00%	0	0.00%	0	0.00%
Pinal	<10	<21.0%	0	0.00%	<10	<21.0%	0	0.00%	0	0.00%	0	0.00%
Santa Cruz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Yavapai	12	25.00%	0	0.00%	12	25.00%	0	0.00%	0	0.00%	0	0.00%
Yuma	<10	<21.0%	0	0.00%	<10	<21.0%	0	0.00%	0	0.00%	0	0.00%

All Deaths: July-December 2020 Data Collection Status by Death County:																	
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	1253	100.00%		19	1.52%		1234	98.48%		136	10.85%		0	0.00%		0	0.00%
Apache	<10	<0.9%		0	0.00%		<10	<0.9%		0	0.00%		0	0.00%		0	0.00%
Cochise	23	1.84%		0	0.00%		23	1.84%		<10	<0.9%		0	0.00%		0	0.00%
Coconino	13	1.04%		0	0.00%		13	1.04%		<10	<0.9%		0	0.00%		0	0.00%
Gila	<10	<0.9%		0	0.00%		<10	<0.9%		0	0.00%		0	0.00%		0	0.00%
Graham	<10	<0.9%		0	0.00%		<10	<0.9%		0	0.00%		0	0.00%		0	0.00%
Greenlee	0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%		0	0.00%
La Paz	<10	<0.9%		<10	<0.9%		<10	<0.9%		<10	<0.9%		0	0.00%		0	0.00%
Maricopa	818	65.28%		0	0.00%		818	65.28%		82	6.54%		0	0.00%		0	0.00%
Mohave	18	1.44%		0	0.00%		18	1.44%		0	0.00%		0	0.00%		0	0.00%
Navajo	21	1.68%		14	1.12%		<10	<0.9%		<10	<0.9%		0	0.00%		0	0.00%
Pima	223	17.80%		<10	<0.9%		221	17.64%		38	3.03%		0	0.00%		0	0.00%
Pinal	43	3.43%		<10	<0.9%		42	3.35%		<10	<0.9%		0	0.00%		0	0.00%
Santa Cruz	<10	<0.9%		0	0.00%		<10	<0.9%		<10	<0.9%		0	0.00%		0	0.00%
Yavapai	40	3.19%		<10	<0.9%		39	3.11%		<10	<0.9%		0	0.00%		0	0.00%
Yuma	25	2.00%		0	0.00%		25	2.00%		<10	<0.9%		0	0.00%		0	0.00%

Unintentional Deaths: January-June 2021 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	1256	100.00%	15	1.22%	1146	91.43%	95	7.76%	20	0.90%	75	6.45%
Apache	<10	<0.9%	0	0.00%	<10	<0.9%	<10	<0.9%	0	0.00%	0	0.00%
Cochise	15	1.22%	0	0.00%	13	1.06%	<10	<0.9%	0	0.00%	2	0.16%
Coconino	15	1.22%	0	0.00%	14	1.14%	<10	<0.9%	0	0.00%	1	0.08%
Gila	11	0.90%	0	0.00%	10	0.82%	0	0.00%	0	0.00%	1	0.08%
Graham	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Greenlee	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
La Paz	<10	<0.9%	0	0.00%	<10	<0.9%	<10	<0.9%	0	0.00%	1	0.08%
Maricopa	844	66.45%	<10	<0.9%	823	65.06%	59	4.82%	20	0.90%	0	0.41%
Mohave	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Navajo	13	1.06%	11	0.90%	<10	<0.9%	0	0.00%	0	0.00%	0	0.00%
Pima	233	19.02%	<10	<0.9%	180	14.69%	18	1.47%	0	0.00%	51	4.16%
Pinal	51	4.08%	<10	<0.9%	32	2.61%	<10	<0.9%	0	0.00%	18	1.39%
Santa Cruz	<10	<0.9%	0	0.00%	<10	<0.9%	0	0.00%	0	0.00%	1	0.08%
Yavapai	30	2.45%	0	0.00%	30	2.45%	<10	<0.9%	0	0.00%	0	0.00%
Yuma	22	1.80%	0	0.00%	22	1.80%	<10	<0.9%	0	0.00%	0	0.00%

Undetermined Deaths: January-June 2021 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	46	100.00%	0	0.00%	27	58.70%	<10	<21.8%	<10	<21.8%	<20	<43.6%
Apache	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Cochise	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Coconino	<10	<21.8%	0	0.00%	<10	<21.8%	0	0.00%	<10	<21.8%	0	0.00%
Gila	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Graham	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Greenlee	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
La Paz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Maricopa	15	32.61%	0	0.00%	12	26.09%	<10	<21.8%	<10	<21.8%	0	0.00%
Mohave	21	45.65%	0	0.00%	<10	<21.8%	<10	<21.8%	0	0.00%	13	28.26%
Navajo	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Pima	<10	<21.8%	0	0.00%	<10	<21.8%	<10	<21.8%	0	0.00%	<10	<21.8%
Pinal	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Santa Cruz	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Yavapai	<10	<21.8%	0	0.00%	<10	<21.8%	<10	<21.8%	0	0.00%	0	0.00%
Yuma	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%

All Deaths: January-June 2021 Data Collection Status by Death County:																	
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests	
	n	%		n	%		n	%		n	%		n	%		n	%
	1302	100.56%		15	1.15%		1173	90.57%		100	7.71%		<30	<23.0%		90	6.91%
Apache	<10	<0.8%		0	0.00%		<10	<0.8%		<10	<0.8%		0	0.00%		0	0.00%
Cochise	15	1.22%		0	0.00%		13	1.06%		<10	<0.8%		0	0.00%		<10	<0.8%
Coconino	17	1.31%		0	0.00%		15	1.15%		<10	<0.8%		<10	<0.8%		<10	<0.8%
Gila	11	0.90%		0	0.00%		10	0.82%		0	0.00%		0	0.00%		<10	<0.8%
Graham	<10	<0.8%		0	0.00%		<10	<0.8%		0	0.00%		0	0.00%		0	0.00%
Greenlee	<10	<0.8%		0	0.00%		<10	<0.8%		0	0.00%		0	0.00%		0	0.00%
La Paz	<10	<0.8%		0	0.00%		<10	<0.8%		<10	<0.8%		0	0.00%		<10	<0.8%
Maricopa	859	65.98%		<10	<0.8%		835	64.13%		60	4.61%		23	0.00%		0	0.00%
Mohave	21	1.61%		0	0.00%		<10	<0.8%		<10	<0.8%		0	0.00%		13	1.00%
Navajo	13	1.06%		11	0.90%		<10	<0.8%		0	0.00%		0	0.00%		0	0.00%
Pima	240	18.43%		<10	<0.8%		185	14.21%		19	1.46%		0	4.07%		53	4.07%
Pinal	51	4.08%		<10	<0.8%		32	2.61%		<10	<0.8%		0	0.00%		18	1.39%
Santa Cruz	<10	<0.8%		0	0.00%		<10	<0.8%		0	0.00%		0	0.00%		<10	<0.8%
Yavapai	31	2.38%		0	0.00%		31	2.38%		<10	<0.8%		0	0.00%		0	0.00%
Yuma	22	1.80%		0	0.00%		22	1.80%		<10	<0.8%		0	0.00%		0	0.00%

Unintentional Deaths: July-September 2021 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	250	100.0%	<10	<4.0%	68	27.2%	<10	<4.0%	>65	>26.0%	104	41.6%
Apache	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Cochise	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Coconino	<10	<4.0%	0	0.0%	<10	<4.0%	<10	<4.0%	0	0.0%	<10	<4.0%
Gila	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Graham	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Greenlee	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
La Paz	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Maricopa	133	53.2%	0	0.0%	56	22.4%	<10	<4.0%	65	26.0%	<10	<4.0%
Mohave	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Navajo	<10	<4.0%	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pima	58	23.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	58	23.2%
Pinal	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Santa Cruz	<10	<4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	<4.0%
Yavapai	17	6.8%	0	0.0%	<10	<4.0%	<10	<4.0%	<10	<4.0%	<10	<4.0%
Yuma	<10	<4.0%	0	0.0%	<10	<4.0%	0	0.0%	0	0.0%	<10	<4.0%

Undetermined Deaths: July-September 2021 Data Collection Status by Death County:

	Total Deaths by Death County		Non-Participating		Abstraction Completed		No Circumstance		In-Progress		Open Requests	
	n	%	n	%	n	%	n	%	n	%	n	%
	<10	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	100.0%
Apache	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cochise	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Coconino	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Gila	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Graham	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Greenlee	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
La Paz	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Maricopa	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Mohave	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Navajo	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pima	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pinal	<10	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	<10	100.0%
Santa Cruz	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Yavapai	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Yuma	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

All Deaths: July-September 2021 Data Collection Status by Death County:																		
	Total Deaths by Death County			Non-Participating			Abstraction Completed			No Circumstance			In-Progress			Open Requests		
	n	%		n	%		n	%		n	%		n	%		n	%	
	251	100.0%		<10	<4.0%		68	27.1%		<10	<4.0%		>65	>26.0%		105	41.83%	
Apache	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Cochise	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Coconino	<10	<4.0%		0	0.0%		<10	<4.0%		<10	<4.0%		0	0.0%		<10	<4.0%	
Gila	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Graham	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Greenlee	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
La Paz	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Maricopa	133	52.99%		0	0.0%		56	22.3%		<10	<4.0%		65	25.90%		<10	<4.0%	
Mohave	0	0.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%	
Navajo	<10	<4.0%		<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%	
Pima	58	23.1%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		58	23.11%	
Pinal	10	3.98%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		10	3.98%	
Santa Cruz	<10	<4.0%		0	0.0%		0	0.0%		0	0.0%		0	0.0%		<10	<4.0%	
Yavapai	17	6.8%		0	0.0%		<10	<4.0%		<10	<4.0%		<10	<4.0%		<10	<4.0%	
Yuma	<10	<4.0%		0	0.0%		<10	<4.0%		0	0.0%		0	0.0%		<10	<4.0%	

APPENDIX B: Special Topic and Technical Reports

Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona

Arizona State Unintentional Drug Overdose Reporting System

(AZ-SUDORS)

July 2019 – June 2020

AZ SUDORS
State Unintentional Drug Overdose Reporting System

April 2021

Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona

July 1, 2019 – June 30, 2020

Melissa Kovacs, Ph.D., PStat
Charles M. Katz, Ph.D.
Taylor Cox, Ph.D.

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Suggested Citation: Kovacs, Melissa Charles M. Katz, & Taylor Cox. An Overview of Unintentional Overdose Deaths in Arizona: July 1, 2019 – June 30, 2020 (April 2021), Arizona State University, Center for Violence Prevention and Community Safety. Arizona State Unintentional Drug Overdose Reporting System (AZ-SUDORS).

Key Findings

During the 12-month reporting period ending June 30, 2020, Arizona experienced 2,204 unintentional / undetermined drug overdose deaths at a rate of 30.28 per 100,000 population. Over 75% of those deaths had an opioid present as one of the causes of death, with fentanyl being the most common.

Men were more likely than women to experience an unintentional overdose death, and for all sexes, overdose deaths were most likely to occur within the 25-to-44-year-old age group.

Black people had a significantly higher rate of overdose death than white people. American Indian people also had a significantly higher rate of overdose death than white people.

Among men, Black men had the highest unintentional / undetermined overdose death rate. Among women, American Indian women had the highest unintentional / undetermined overdose death rate.

Among deaths where opioids were present, victims aged 25 to 44 had the highest death rate. Among deaths where fentanyl was present, victims aged 18 to 24 had the highest death rate.

Maricopa County had both the highest number and the highest rate of unintentional / undetermined overdose deaths among all Arizona counties, and Maricopa and Pima counties had overdose death rates higher than the overall state average.

Regarding education level, most victims had a high school diploma / graduate equivalency degree (GED) or below, and most were single or divorced / separated.

People experiencing homelessness were over-represented among unintentional / undetermined overdose deaths in Arizona.

Over 27% of unintentional / undetermined overdose victims had a known currently diagnosed mental health problem, and over 17% of victims were known to have currently been receiving mental illness treatment at the time of their death.

Over 11% of victims had a history of a previous overdose.

Approximately 26% of victims were administered one or more doses of naloxone, and it was most commonly administered by emergency medical services staff or firefighters.

Annualized unintentional / undetermined drug overdose death rates were statistically significantly higher following the implementation of Arizona's COVID-19 stay-at-home order than before implementation of the stay-at-home order.

Introduction

The United States experienced 67,367 drug overdose deaths in 2018.[1] Seventy percent of these deaths involved an opioid.[2] In an effort to better track opioid-involved and other drug-related deaths and to inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS), of which Arizona is a participant.

As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

This report presents findings from AZ-SUDORS on drug overdose deaths in the state of Arizona for the reporting period of July 1, 2019, through June 30, 2020. The data were accessed and downloaded from the secure CDC web-based portal system used for SUDORS data management. The data were downloaded on February 19, 2021, and represent the most complete abstracted data to that date.

Data and Methods

Data used for this report are all unintentional / undetermined drug overdose deaths from AZ-SUDORS from July 1, 2019, through June 30, 2020. SUDORS data rely on two principal sources to populate an aggregated, anonymous database: death certificates and medical examiner reports, which include death investigation, toxicology, and autopsy reports. SUDORS data contain information on victim demographics and circumstances, which are then de-identified, abstracted, and aggregated into a CDC-managed database.

AZ-SUDORS received death certificate data for all overdose deaths in Arizona over the reporting period (n=2,204). Among these cases, 94.8% of medical examiner records were obtained by the project from medical examiners' offices. Records not obtained were primarily the result of the Pinal (n=34) and Yavapai (n=29) County Medical Examiner's Offices not participating until January 1, 2020, and the Mohave (n=11) and Navajo (n=14) County Medical Examiner's Offices joining as participating agencies after the completion of the data periods analyzed in this paper.[3] The remainder of the missing reports are due to the nonparticipation of

[1] See Hedegaard et al., 2020. "Drug Overdose Deaths in the United States, 1999-2018." NCHS Data Brief No. 365. National Center for Health Statistics. https://www.cdc.gov/drugoverdose/data/statedeaths.html
[2] See Wilson et al., 2020. "Drug and Opioid Involved Overdose Deaths – United States, 2017-2018." MMWR Mobility and Mortality Weekly Report, 69. https://www.cdc.gov/mmwr/volumes/69/wr/mm6911a4.htm
[3] The Mohave County Medical Examiner's Office joined the project in Spring 2021; AZ-SUDORS is in the process of finalizing a data use agreement for participation with the Navajo County Office of the

medical examiner service providers partially servicing Apache and Graham Counties as of the writing of this report, as well as deaths that were not admitted to a medical examiner's office and deaths that were certified by Navajo Nation criminal investigators, each representing fewer than 10 deaths. The absence of these records represents an important limitation to the findings presented in this report.

Classification of drug involvement in these data relies on toxicology results. If a decedent tested positive for more than one type of drug, each drug type was recorded. In the AZ-SUDORS data, we define a drug as "any chemical compound that is chiefly used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes." Thus, substances such as alcohol are expressly excluded, and deaths attributed exclusively to toxicity from an alcohol-related substance are not included as SUDORS cases and are not present among these data. However, deaths for which the cause is toxicity from both a drug and alcohol concomitantly are included by virtue of the inclusion of a SUDORS-relevant substance as the primary cause of death. Because of this, some deaths with alcohol included as part of the primary cause are captured by SUDORS; however, toxicity deaths with alcohol as the *only* cause are not included in the SUDORS data.

Some analyses in this report are presented using rates. Rates for this report are calculated using incidence counts per 100,000 population, as estimated by the US Census Bureau, most commonly from the American Community Survey 2019 1-year estimate. Census sources are cited throughout the report. IBM SPSS Statistics v27 and Stata v15 were used for the analyses.

Findings

Overview of Deaths and Substances

During the reporting period of July 1, 2019, through June 30, 2020, Arizona experienced 2,204 unintentional / undetermined drug overdose deaths. As shown in Table 1, the overall rate of overdose deaths for this period is 30.28 per 100,000 population. After separating out deaths with an opioid substance present, the rate of unintentional / undetermined overdose deaths for this period is 21.64 per 100,000 population.[4]

Table 1. Number and Rate of Deaths

Number of unintentional / undetermined overdose deaths	2,204
Rate per 100,000	30.28
Number of deaths with opioid present	1,575
Rate per 100,000	21.64

Medical Examiner as of May 2021; *n* denotes missing cases from the respective jurisdictions during this report's project period.

[4] Rates based on Arizona population of 7,278,717 as of July 1, 2019 https://www.census.gov/quickfacts/AZ

Table 2 shows the percentage of unintentional / undetermined overdose death victims for whom specific classes of substances were listed as among their causes of death. Victims can have multiple substances listed as causing death, such that the percentages in the following table will not total 100%. Moreover, victims may have other substances present at the time of death that did not cause death. These combinations of substances are explored further in Figure 1.

Table 2. Percentage of Victims With Listed Substance as a Cause of Death

Substance	Percentage of Victims with Substance as One of Their Causes of Death
Opioids	75.5%
Methamphetamines	41.2%
Benzodiazepines	11.7%
Cocaine	9.3%
Antidepressant	6.0%
Gabapentin	3.2%

In the AZ-SUDORS data, we define a drug as "any chemical compound that is chiefly used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes." Thus, substances such as alcohol are expressly excluded, and deaths attributed exclusively to toxicity from an alcohol-related substance are not included as SUDORS cases and are not present among these data. However, deaths for which the cause is toxicity from a drug and alcohol concomitantly are included by virtue of the inclusion of a SUDORS-relevant substance as the primary cause of death. Because of this, some deaths with alcohol included as part of the primary cause are captured by SUDORS. However, toxicity deaths with alcohol as the *only* cause are not included in the SUDORS data and, therefore, are not included in Table 2.

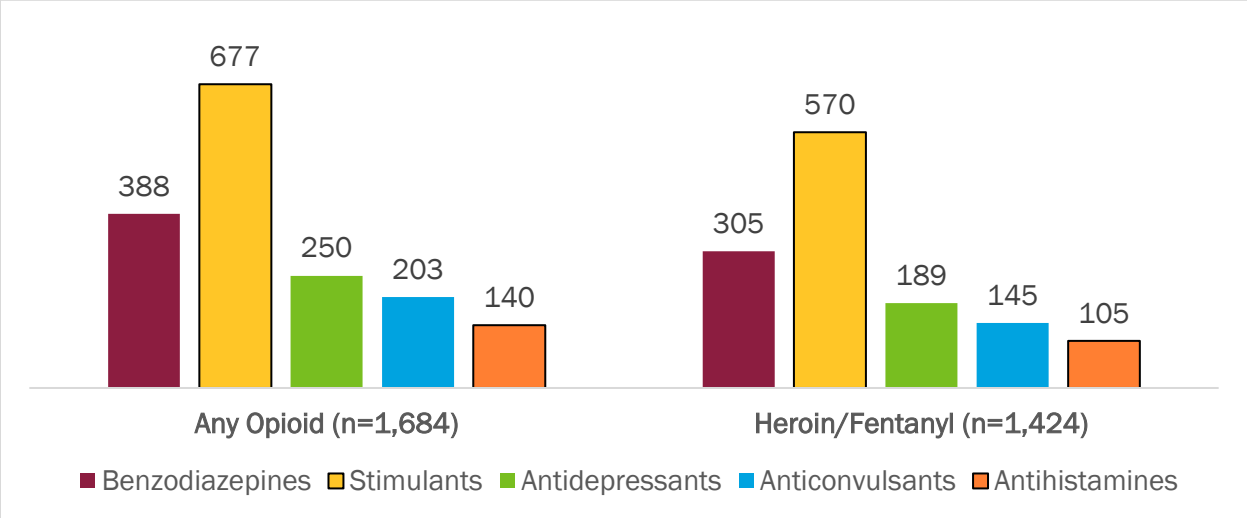
Table 3 shows the proportional breakdown of specific opioids within the category of "Opioids" described in Table 2. Table 3 percentages total 100% as this table shows the total proportions of types of opioids within the "Opioids" category. Multiple types of opioids may appear within a single victim's toxicology report. For example, a victim's toxicology results may show both fentanyl and morphine present at time of death. Polysubstance deaths are further discussed below.

Table 3. Percentage of Substances Listed in the "Opioid" Category

Substance	Percentage Within "Opioid" Category
Fentanyl	75.2%
Heroin	6.8%
Morphine	6.8%
Oxycodone	3.9%
Methadone	3.3%
Codeine	1.2%
Buprenorphine	1.1%
Tramadol	1.0%
Hydrocodone	0.8%

Approximately 93% of unintentional / undetermined deaths included multiple substances. Figure 1 shows the number of polysubstance deaths by drug type as well as common drug pairings among deaths where any opioid was present (first cluster of bars) and among deaths where heroin or fentanyl was present (second cluster of bars).[5] Of note, not all substances represented in Figure 1 caused the death; rather, Figure 1 represents substances *present* at time of death.

Figure 1. Number of Polysubstance Deaths by Drug Type and Common Drug Pairings



[5] In analyzing polysubstance deaths, we followed the lead of Georgia's SUDORS reporting—"State Unintentional Drug Overdose Reporting System (SUDORS) Opioid-Involved Overdose Deaths, Georgia, July 2017 – June 2018," https://bit.ly/3uIHwqx—by reporting on common drug pairings within the two categories of (1) any opioid present and (2) heroin / fentanyl / fentanyl analogs present. For AZ-SUDORS, this second category includes heroin, fentanyl, and norfentanyl. Other novel synthetic opioids such as U47700, U48800, U49900, AH7921, and MT45 are not present in AZ-SUDORS data, although they were present in Georgia's SUDORS data and included in this category in their report.

Note: Substances were present at death but were not necessarily noted as being among the causes of death.

When victims experienced a single-substance death (7% of victims), based on toxicology results, the most common single substances were, in order of prevalence, fentanyl, methamphetamine, cocaine, heroin, amphetamine, and morphine. Table 4 details these proportions.

Table 4. Percentage of Substances Among Single-Substance Deaths

Substance in Single-Substance Death	Percentage Within Single-Substance Deaths
Fentanyl	50.0%
Methamphetamine	32.7%
Cocaine	10.5%
Heroin	3.0%
Amphetamine	1.9%
Morphine	1.9%

Demographics

Unintentional / undetermined overdose deaths statistically significantly differed by sex, with men representing over 73% of deaths.[6] Table 5 shows the number of deaths as well as rates for men and women.[7] In SUDORS death data, sex is classified as a binary category, with a separate data field to indicate whether the victim was transgender. Data on the transgender status of decedents are not always available or provided. Fewer than ten deaths of transgender individuals, as classified via medical examiner documents, were among the data for this report; these are not reported separately due to the small subsample size.

Table 5. Number and Rate of Deaths by Sex

	Number of Deaths	Percentage of Deaths	Rate per 100,000
Men	1,614	73.2%	44.57
Women	590	26.8%	16.13

Rates of unintentional / undetermined overdose deaths peaked in the 25–44-year-old age range.[8] Table 6 shows the number of deaths and the rates for five age categories. All age category death rates statistically significantly differed from each other, excepting that the 18–24-year-old age category's death rate did not statistically differ from the 45–64-year-old age category's death

[6] Based on a *z*-score test of proportional differences conducted at the α=.05 level
[7] Rates were populated from the American Community Survey ("ACS") 1-year estimate, 2019, for Arizona; US Census.
[8] Ibid.

rate.[9] A forthcoming separate SUDORS report will explore the unintentional / undetermined overdose deaths among Arizona's youth.

Table 6. Number and Rate of Deaths by Age Category

	Number of Deaths	Percentage of Deaths	Rate per 100,000
< 18	47	2.1%	2.87
18 – 24	302	13.7%	43.48
25 – 44	996	45.2%	52.42
45 – 64	768	34.9%	44.21
65 +	90	4.1%	6.88

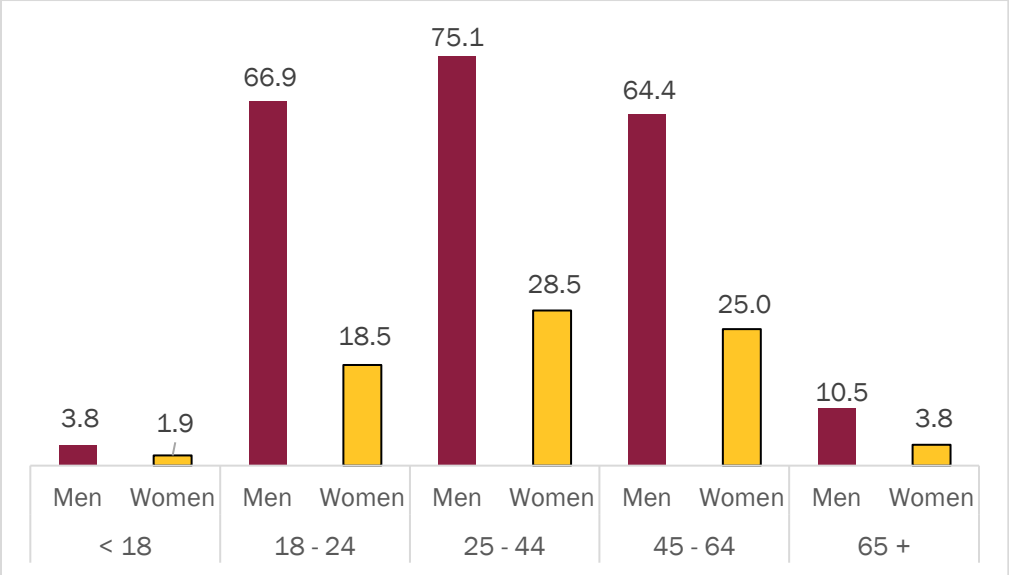
Examining sex and age together shows that in all age categories, men had statistically significantly higher rates of unintentional / undetermined overdose deaths than women.[10] Table 7 shows the number and rate of deaths for men and women by age category, and Figure 2 visualizes these death rates.

Table 7: Number and Rate of Deaths by Sex and Age Category

		Number of Deaths	Percentage of Deaths within Age Cat.	Rate per 100,000
< 18	Men	32	68%	3.81
	Women	15	32%	1.87
18 – 24	Men	240	79.5%	66.92
	Women	62	20.5%	18.46
25 – 44	Men	733	73.6%	75.13
	Women	263	26.4%	28.45
45 – 64	Men	545	71%	64.39
	Women	223	29%	25.03
65 +	Men	63	70%	10.47
	Women	27	30%	3.83

[9] Based on a *z*-score test of proportional differences conducted at the α=.05 level
[10] Based on a *z*-score test of proportional differences conducted at the α=.05 level

Figure 2. Death Rates by Sex and Age Category



In Arizona, unintentional / undetermined overdose deaths differed by race and ethnicity. Data on race and ethnicity are collected from death certificates for AZ-SUDORS. Race is not mutually exclusive at the individual level. Fewer than ten deaths in the data were of victims of multiple races. Ethnicity, however, is mutually exclusive in these data.

As shown in Table 8, for the current reporting period, Black people and American Indian people both had statistically significantly higher rates of overdose death than white people. Asian / Pacific Islander people had a statistically significantly lower rate of death than all other races. Hispanic people had a statistically significantly lower rate of death than non-Hispanic people.[11] When calculating rates, Census data reflecting more than one race were used within each of the racial categories when appropriate.[12]

[11] All tests of differences were based on a *z*-score test of proportional differences conducted at the α=.05 level.

[12] Rates were populated from the American Community Survey ("ACS") 1-year estimate, 2019, for Arizona; US Census. The Census categories of "Asian" and "Native Hawaiian and Other Pacific Islander" were combined to compare to the SUDORS combined category of "Asian and Pacific Islander." Additionally, the Census categories of "American Indian" and "Alaskan Native" were combined to compare to the SUDORS category "American Indian"—in the SUDORS data, Alaskan natives are included in the "American Indian" category.

Table 8. Number and Rate of Deaths by Race and Ethnicity

	Number of Deaths	Percentage of Deaths	Rate per 100,000
Race			
Black	171	7.8%	39.35
American Indian	145	6.6%	35.17
White	1,772	80.4%	29.79
Asian/Pacific Islander	20	0.9%	5.50
Unspecified	94	4.3%	22.25
Multiple Races	N/A	N/A	N/A
Ethnicity			
Hispanic	639	29%	27.66
Non-Hispanic	1,564	71%	31.48

Note: N/A denotes fewer than ten deaths.

Examining sex and race / ethnicity together shows that in all racial and ethnic categories, men had statistically significantly higher rates of unintentional / undetermined overdose deaths than women.[13] Table 9 shows the number and rate of deaths for men and women by race / ethnic category, and Figure 3 visually displays these death rates.

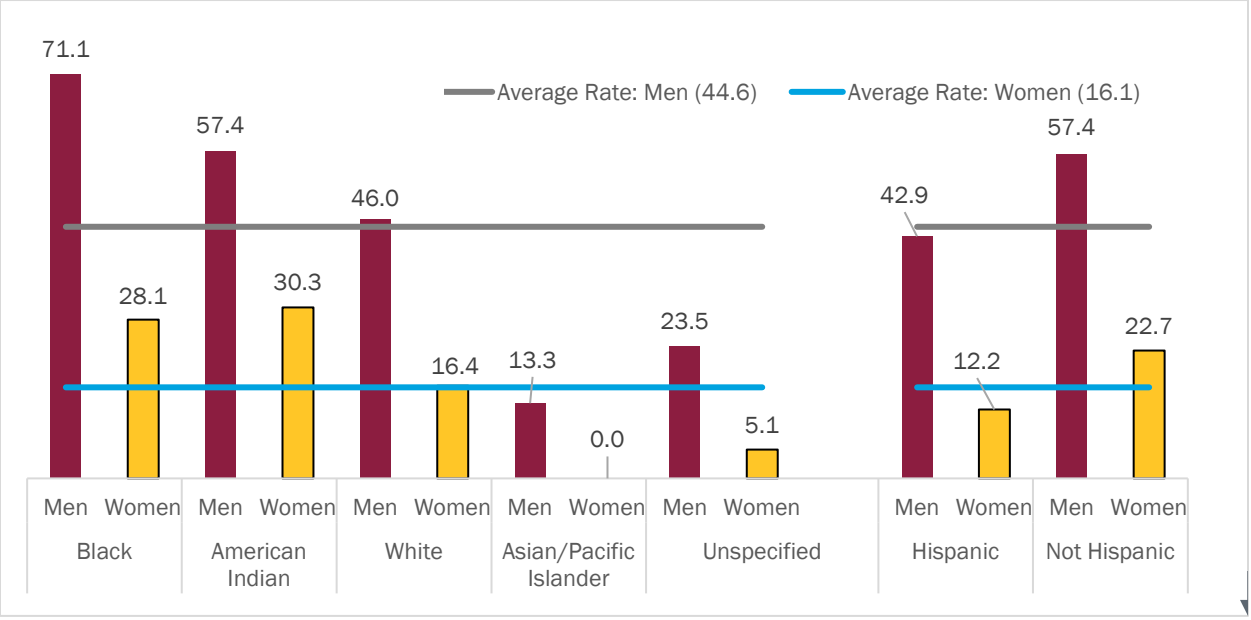
Table 9. Number and Rate of Deaths by Sex and Race / Ethnicity

		Number of Deaths	Percentage of Deaths Within Race/Ethnicity	Rate per 100,000
Black	Men	123	71.93%	71.08
	Women	48	28.07%	28.12
American Indian	Men	94	64.83%	57.36
	Women	51	35.17%	30.28
White	Men	1,301	73.42%	45.93
	Women	471	26.58%	16.41
Asian/Pacific Islander	Men	16	80.00%	13.32
	Women	N/A	N/A	N/A
Unspecified	Men	78	82.98%	23.52
	Women	16	17.02%	5.10
Multiple Races	Men	N/A	N/A	N/A
	Women	N/A	N/A	N/A
Hispanic	Men	499	78.1%	42.88
	Women	140	21.9%	12.21
Non-Hispanic	Men	1,114	71.2%	57.36
	Women	450	28.8%	22.65

Note: N/A denotes fewer than ten deaths.

[13] Based on a *z*-score test of proportional differences conducted at the α=.05 level

Figure 3. Death Rates by Sex and Race / Ethnicity



Among men, Black men had the highest unintentional / undetermined overdose death rate. Among women, American Indian women had the highest unintentional / undetermined overdose death rate.

Table 10 shows demographic characteristics (i.e., sex, race/ethnicity, age) by substance type. The data compare the numbers and rates of overdose deaths among victims who had opioids as a cause of death and victims who did not have opioids as a cause of death. The table also reports these demographics separately for victims who had fentanyl as a cause of death.

Table 10. Demographic Characteristics by Substance

		Opioids Present as a Cause of Death (*n*=1,684)		Opioids NOT Present as a Cause of Death (*n*=520)			Fentanyl Present as a Cause of Death (*n*=1,228)	
		Number	Rate	Number	Rate		Number	Rate
Sex								
	Men	1,234	34.08	380	10.50		922	25.46
	Women	450	12.31	140	3.83		306	8.37
Race/Ethnicity								
	Black	119	27.38	53	12.19		97	22.32
	American Indian	114	27.65	32	7.76		98	23.77
	White	1,373	23.08	401	6.74		973	16.36
	Asian/Pacific Islander	26	7.16	N/A	N/A		21	5.78
	Hispanic	517	22.38	122	5.28		420	18.18
	Not Hispanic	1,167	23.49	397	7.99		808	16.26
Age Category								
	< 18	45	2.74	N/A	N/A		42	2.56
	18 – 24	285	41.04	17	2.45		257	37.00
	25 – 44	831	43.73	165	8.68		629	33.10
	45 – 64	468	26.94	300	17.27		278	16.00
	65 +	55	4.21	35	2.68		22	1.68

As shown in Table 10, for all types of substances examined, women experienced lower death rates than men. The data also show that when opioids and/or fentanyl were present as a cause of death, American Indian people had the highest overdose death rates, compared to other racial groups, though only slightly higher than the rates for Black people. Asian/Pacific Islander people consistently had the lowest overdose death rates.

Compared to non-Hispanic people, Hispanic people had lower overdose death rates for both opioid-caused deaths and deaths not caused by opioids, as shown in Table 10. However, their rate among deaths for which fentanyl was a cause were higher than that of non-Hispanic people.

Among deaths in which opioids were present as a cause of death, victims aged 25 to 44 had the highest death rate, while among deaths in which fentanyl was present as a cause, victims aged 18 to 24 had the highest death rate.

Across all demographics, the overdose death rate was higher when opioids were among the causes of death.

Table 11 shows the number, rate, and proportion of deaths by county of injury and county of residence. All deaths in the AZ-SUDORS data occurred in Arizona; however, 52 deaths have an unknown county of injury within Arizona and are not represented here. No AZ-SUDORS deaths occurred in La Paz County during the reporting period.

Conversely, not all deaths that occur in Arizona are of Arizona residents. Table 11 also details the county of residence for victims. Sixty-seven deaths represent victims who resided outside Arizona.

For the reporting period, the rates of overdose deaths occurring within Maricopa, Pima, and Yuma Counties were significantly higher than rates of overdose deaths for their respective residents.[14] Alternatively stated, for example, the rate of overdose deaths that occurred in Maricopa County was significantly higher than the overdose death rate for Maricopa County residents.

In contrast, the rates of overdose deaths occurring within Yavapai, Navajo, Cochise, Pinal, Coconino, and Mohave Counties were significantly lower than the rates of overdose deaths for their residents. Alternatively stated, for example, the rate of overdose deaths that occurred in Yavapai County was significantly lower than the overdose death rate for Yavapai County residents.

The most substantial examples of discrepancies between county of residence and county of injury were in Maricopa and Pinal Counties. One-hundred eighteen nonresident victims were injured in Maricopa County. Conversely, in Pinal County, 10 resident victims were injured in other Arizona counties.

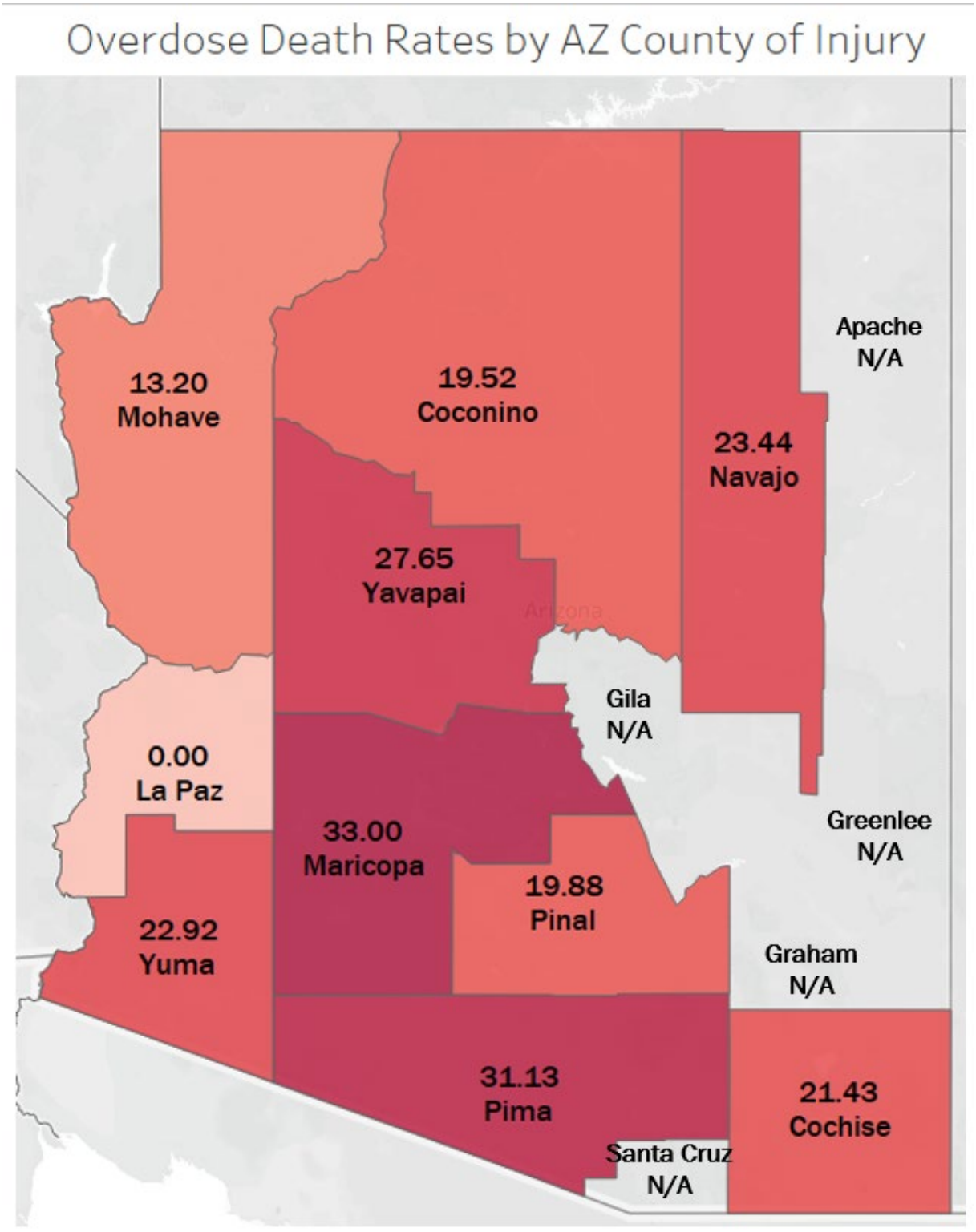
[14] Based on a *z*-score test of proportional differences conducted at the α=.05 level

Table 11. Number and Rate of Deaths by County of Injury and County of Residence

	County of Injury			County of Residence		
AZ County	Number of Deaths	Percentage of AZ Deaths	Rate per 100,000	Number of Deaths	Percentage of AZ Deaths	Rate per 100,000
Maricopa	1,480	68.8%	33.00	1,362	65.9%	30.37
Pima	326	15.1%	31.13	321	15.5%	30.65
Statewide	2,152	100.0%	30.28	2,067	N/A	N/A
Yavapai	65	3.0%	27.65	73	3.5%	31.05
Navajo	26	1.2%	23.44	28	1.4%	25.24
Yuma	49	2.3%	22.92	46	2.2%	21.52
Cochise	27	1.3%	21.43	30	1.5%	23.81
Greenlee	N/A	N/A	N/A	N/A	N/A	N/A
Pinal	92	4.3%	19.88	102	4.9%	22.04
Coconino	28	1.3%	19.52	32	1.5%	22.30
Graham	N/A	N/A	N/A	N/A	N/A	N/A
Gila	N/A	N/A	N/A	12	0.6%	22.41
Mohave	28	1.3%	13.20	33	1.6%	15.55
Santa Cruz	N/A	N/A	N/A	N/A	N/A	N/A
Apache	N/A	N/A	N/A	11	0.5%	15.30
La Paz	0	0.0%	0.00	0	0.0%	0.00
Non-AZ	0	0.0%	0.00	67	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths.

Figure 4 maps overdose death rates by county of injury. During the reporting period, Maricopa County had both the highest number and the highest rate of unintentional / undetermined overdose deaths in the state, and Maricopa and Pima counties had overdose death rates that were higher than the overall state average rate of 30.28. A forthcoming report will focus on geographic differences in overdose deaths in Arizona by cities and major metropolitan areas, rural and urban areas, and other geographic differentiators.

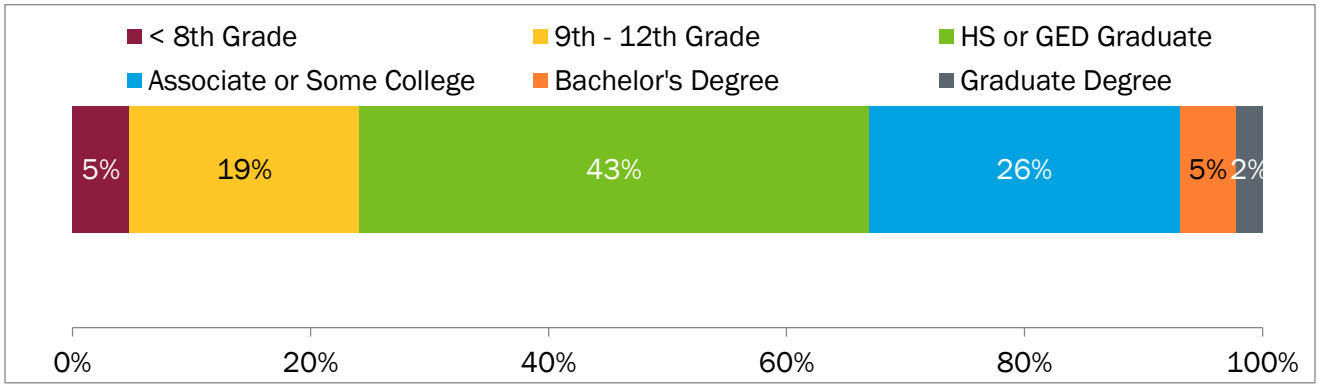


Note: N/A denotes fewer than ten but more than zero deaths; darker shading reflects a higher overdose death rate.

Figures 5 and 6 show the number and proportion of overdose deaths by specific socio-demographic characteristics, including education level, marital status, homelessness status, and veteran status. Rates are not reported.

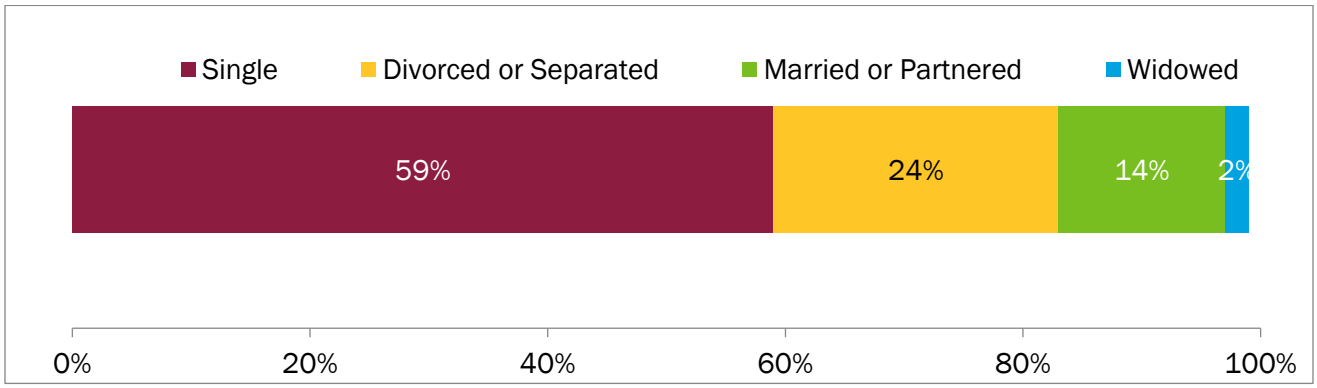
The most common education level achieved among unintentional / undetermined overdose death victims during this reporting period was high school graduate / graduate equivalent degree (GED). Figure 5 below shows the proportional make-up of educational attainment among overdose death victims.

Figure 5. Highest Level of Educational Attainment



The vast majority of unintentional / undetermined overdose victims analyzed for this report were single or divorced / separated. Figure 6 shows the proportional make-up of marital status among overdose death victims.

Figure 6. Marital Status



At or near the time of death, over 10% of unintentional / undetermined overdose death victims were people experiencing homelessness (*n*=207). This is statistically significantly greater than the proportion of Arizona's overall population who are people experiencing homelessness

(0.14%), indicating that people experiencing homelessness were over-represented among overdose death victims during this period.[15]

Just over 6% of unintentional / undetermined overdose death victims were active or former military personnel (*n*=136).

Circumstances

For over 86% of unintentional / undetermined overdose death victims, no evidence was reported indicating a recent release from an institutional setting such as a hospital, prison, or residential treatment center. As shown in Table 12, however, approximately 6% of victims had recently been released from a hospital; over 4% had recently been released from a jail, prison, or detention facility; and approximately 2% had been released from a residential facility related to alcohol or substance abuse treatment.

Table 12. Proportion Recently Released From an Institutional Setting

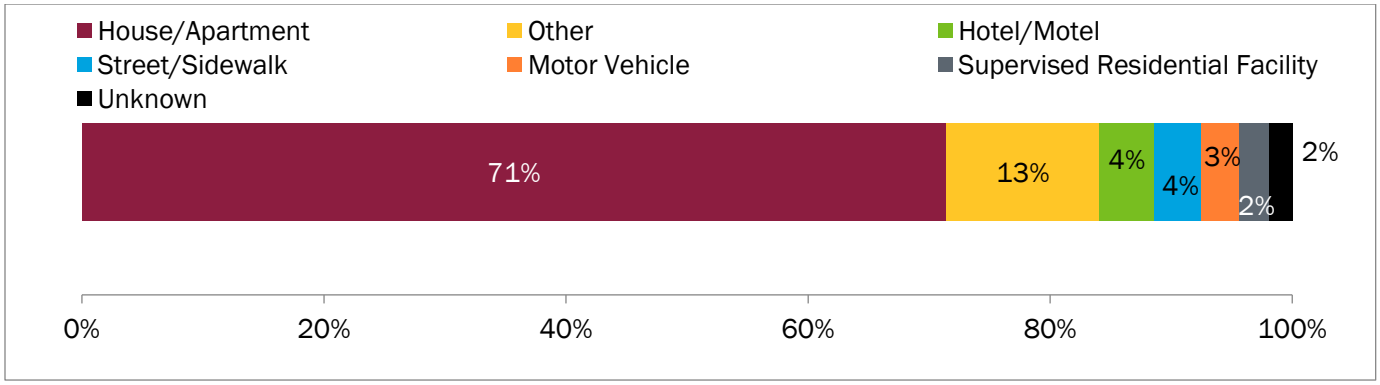
Institutional Setting	Number of Deaths	Percentage of Deaths
No evidence of recent release	1,905	86.5%
Hospital	135	6.1%
Jail or prison	98	4.4%
Residential facility related to alcohol or substance abuse treatment	48	2.2%
Psychiatric hospital or treatment	12	0.5%
Other / unknown institution	N/A	N/A
Residential facility not related to alcohol or substance abuse treatment	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths.

With respect to location, over 70% of victims overdosed in a home or apartment; almost 60% (*n*=1,317) are known to have been injured at their own home. Other common locations of overdose included hotels; motor vehicles; streets, roads, or sidewalks; and supervised residential facilities. Figure 7 shows these proportions.

[15] As of January 2019, 10,007 people were experiencing homelessness in Arizona, or 0.14% of the state's population; https://www.usich.gov/homelessness-statistics/az/. Statistical significance was determined based on a *z*-score test of proportional differences conducted at the α=.05 level.

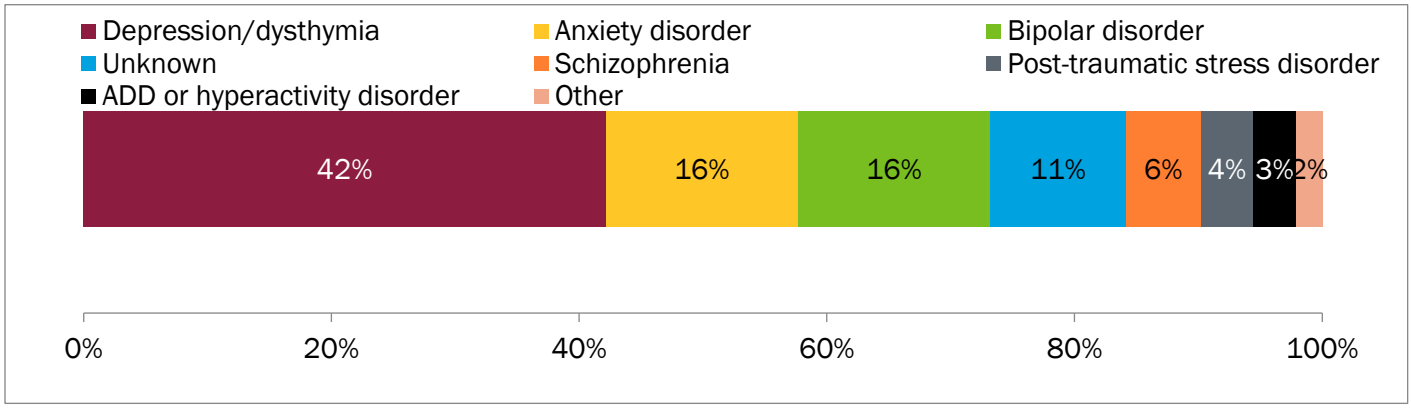
Figure 7. Injury Location



Fewer than ten unintentional / undetermined overdose death victims were pregnant at the time of death.

Over 27% of unintentional / undetermined overdose victims were known to have a currently diagnosed mental health problem (*n*=612). Over 17% of victims were known to have actively been receiving mental illness treatment at the time of death (*n*=388). Among those with a known mental health diagnosis, the most common diagnosis was depression / dysthymia, followed by anxiety disorder, bipolar disorder, schizophrenia, and post-traumatic stress disorder. Figure 8 below shows these proportions.

Figure 8. Proportions of Diagnoses Among Those With a Mental Health Diagnosis



Over 11% of victims (*n*=253) had a history of a previous overdose. The timing of previous overdoses was largely unknown. However, of those for which timing was known, the previous overdose most commonly occurred more than a year prior to death.

For the vast majority of overdose death victims (*n*=1,912), no evidence of treatment for substance abuse currently or in the past was reported. Evidence of current substance abuse

treatment was found for 5.5% of victims, while evidence of non-current treatment in the past was found for 7% of victims.

Among Arizona's unintentional / undetermined overdose deaths, 567 (25.9%) of victims were administered naloxone, a drug that can reverse the effect of an opioid overdose. Some were administered more than one dose prior to death. When Naloxone was administered, it was most commonly administered by emergency medical services staff or firefighters, followed by hospital staff and then bystanders.

Regarding bystander scenario, overdose death incidents most commonly occurred with at least one bystander present. In the AZ-SUDORS data, we define a bystander as "an individual who was physically nearby either during or shortly preceding a drug overdose who potentially had an opportunity to intervene and respond to the overdose. First responders or medical professionals called to the scene are not considered bystanders." Only 23% of deaths are known to have occurred with no bystander present. Table 13 describes the proportion of overdose deaths with and without bystanders present.

Table 13. Percentage of Overdose Deaths With Bystanders Present

Bystander Scenario	Percentage of Deaths
No bystanders present	23.1%
One bystander present	29.3%
Multiple bystanders present	23.1%
Bystanders present, unknown number	7.9%
Unknown if bystander present	16.5%

COVID-19 Stay-at-Home Order Timing

In response to health risks posed by COVID-19 during the current reporting period, Arizona's governor issued a stay-at-home order that entered into effect at 5:00 pm on March 31, 2020.[16] Therefore, we used April 1, 2020, to designate the state-wide implementation of these COVID-19 precautionary measures. As Table 14 shows, for the current reporting period, Arizona's annualized unintentional / undetermined overdose death rate statistically differed before and after COVID-19 precautionary measures were implemented.[17] Specifically, the annualized rate was higher for the period following implementation. Similarly, examination of deaths that involved the presence of an opioid substance indicates a significant difference between annualized overdose death rates before and after state-wide precautionary measures were implemented, with higher rates occurring after their implementation (Table 14).

[16] See https://azgovernor.gov/governor/news/2020/03/stay-home-stay-healthy-stay-connected; see also "Racial / Ethnic Disparities in Unintentional Fatal and Non-Fatal Emergency Medical Services-Attended Opioid Overdoses During the COVID-19 Pandemic in Philadelphia." Khatri et al., 2021, JAMA Network Open. This study also uses April 1, 2020, as a defining date for COVID-19. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2775360

[17] Based on a *z*-score test of proportional differences conducted at the α=.05 level

Table 14. Number and Rate of Deaths Before and After April 1, 2020

	Number of Deaths	Annualized Rate per 100,000
All deaths, July 1, 2019 – March 30, 2020	1,539	28.19
All deaths, April 1, 2020 – June 30, 2020	657	36.11
Deaths with opioid present, July 1, 2019 – March 30, 2020	1,067	19.55
Deaths with opioid present, April 1, 2020 – June 30, 2020	508	27.92

Geographic Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona

Arizona State Unintentional Drug Overdose Reporting System

(AZ-SUDORS)

July 2019 – June 2020

AZ SUDORS
State Unintentional Drug Overdose Reporting System

May 2021

Geographic Prevalence and Characteristics of Unintentional Overdose Deaths in Arizona

July 1, 2019 – June 30, 2020

Melissa Kovacs, Ph.D., PStat
Charles M. Katz, Ph.D.
Taylor Cox, Ph.D.

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Key Findings

During the 12 months ending June 30, 2020, Arizona experienced 2,204 unintentional / undetermined drug overdose deaths at a rate of 30.28 per 100,000 population.

Maricopa County had both the highest number of deaths and the highest rate of unintentional / undetermined overdose deaths among all counties in Arizona, and Maricopa and Pima counties had overdose death rates higher than the overall state average.

At times, decedents died in a geographic place other than where they lived. The data were explored for differences between a victim's county of residence and county of injury. The largest examples of discrepancies between county of residence and county of injury were in Maricopa and Pinal Counties. Among the decedents whose fatal injury occurred in Maricopa County, 118 were nonresidents. Conversely, in the case of Pinal County, 10 residents were injured in other Arizona counties.

Two Maricopa County zip codes, 85034 and 85007, had the highest overdose death rates in the state among zip codes with at least ten deaths – 396.4 and 242.6 deaths per 100,000 population, respectively. Additionally, zip code 85308 in Maricopa County had the lowest overdose death rate in the state among zip codes with at least ten deaths, with 16.5 deaths per 100,000 population.

The data were examined for the relationship between urbanicity and unintentional overdose deaths using RUCA codes that quantify a location's urban and rural characteristics. In Arizona, counties with lower RUCA codes (more urban) had higher rates of unintended / undetermined overdose deaths than counties with higher RUCA codes (more rural). However, this correlation is based on only nine counties, three of which are Maricopa and Pima Counties, which have high urbanicity and high overdose death rates, and Navajo County, which has low urbanicity and a high overdose death rate.

Introduction

The United States experienced 67,367 drug overdose deaths in 2018.[1] Seventy percent of these deaths involved an opioid.[2] To better track opioid-involved and other drug-related deaths and to inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS), of which Arizona is a participant.

As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

This report presents findings from AZ-SUDORS on drug overdose deaths in the state of Arizona for the period of July 1, 2019 through June 30, 2020. The data were accessed and downloaded from the secure CDC web portal system used for SUDORS data management. The data were downloaded on February 19, 2021 and represent the most complete abstracted data to that date.

This is the second report in a series and focuses on geographic differences in unintentional and undetermined overdose death rates in Arizona. The first report in this series provided an overview of overdose deaths in Arizona.

Data and Methods

The data used for this report comprise all unintentional / undetermined drug overdose deaths from AZ-SUDORS from July 1, 2019 through June 30, 2020. SUDORS data rely on two principal sources to populate an aggregated, anonymous database: death certificates and medical examiner reports, which include death investigation reports, toxicology reports, and autopsy reports. SUDORS data contain information on victim demographics and circumstances that are then de-identified, abstracted, and aggregated into a CDC-managed database.

AZ-SUDORS received death certificate data for all overdose deaths in Arizona over the reporting period (n=2,204). Among these cases, 94.8% of medical examiner records were obtained by the project from medical examiners' offices. Records not obtained were primarily the result of the Pinal (n=34) and Yavapai (n=29) County Medical Examiner's Offices not participating until January 1, 2020, and the Mohave (n=11) and Navajo (n=14) County Medical Examiner's Offices joining as participating agencies after the completion of the data periods

[1] See Hedegaard et al., 2020. "Drug Overdose Deaths in the United States, 1999-2018." NCHS Data Brief No. 365. National Center for Health Statistics. https://www.cdc.gov/drugoverdose/data/statedeaths.html
[2] See Wilson et al., 2020. "Drug and Opioid Involved Overdose Deaths – United States, 2017-2018." MMWR Mobility and Mortality Weekly Report, 69. https://www.cdc.gov/mmwr/volumes/69/wr/mm6911a4.htm

analyzed in this paper.[3] The remainder of the missing reports are due to the nonparticipation of medical examiner service providers partially servicing Apache and Graham Counties as of the writing of this report, as well as deaths that were not admitted to a medical examiner's office and deaths that were certified by Navajo Nation criminal investigators, each representing fewer than 10 deaths. The absence of these records represents an important limitation to the findings presented in this report.

Classification of drug involvement in these data relies on toxicology results. If a decedent tested positive for more than one type of drug, each drug type was recorded. In the AZ-SUDORS data, we define a drug as "any chemical compound that is chiefly used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes." Thus, substances such as alcohol are expressly excluded, and deaths attributed exclusively to toxicity from an alcohol-related substance are not included as SUDORS cases and are not present among these data. However, deaths for which the cause is toxicity from both a drug and alcohol concomitantly are included by virtue of the inclusion of a SUDORS-relevant substance as the primary cause of death. Because of this, some deaths with alcohol included as part of the primary cause are captured by SUDORS; however, toxicity deaths with alcohol as the *only* cause are not included in the SUDORS data.

Some analyses in this report are presented using rates. Rates for this report are calculated using incidence counts per 100,000 population, as estimated by the US Census Bureau, most commonly from the American Community Survey 2019 1-year estimate. Census sources are cited throughout the report. IBM SPSS Statistics v27 and Stata v15 were used for the analyses.

Findings

Findings by County

As reported in the first report in this series, during the time period of July 1, 2019, through June 30, 2020, Arizona experienced 2,204 unintentional / undetermined drug overdose deaths. The overall rate of overdose deaths during this time was 30.28 per 100,000 population.

Table 1 shows the number, proportion, and rate of deaths by Arizona county of injury and county of residence. All deaths in the AZ-SUDORS data occurred in Arizona; however, 52 deaths have an unknown county of injury within Arizona and are not represented in Table 1. La Paz County had no AZ-SUDORS deaths during this report's timeframe.

[3] The Mohave County Medical Examiner's Office joined the project in the spring of 2021; AZ-SUDORS is in the process of finalizing a data use agreement for participation with the Navajo County Office of the Medical Examiner as of May 2021; *n* denotes missing cases from the respective jurisdictions during this report's project period.

Conversely, not all deaths that occur in Arizona are of Arizona residents. Table 1 details the county of residence for victims. Sixty-seven deaths represent victims who resided outside Arizona.

The rates of overdose deaths occurring within Maricopa, Pima, and Yuma Counties were significantly higher than the rates of overdose deaths for their respective residents.[4] Alternatively stated, the rate of overdose deaths that occurred in Maricopa County was significantly higher than the overdose death rate for Maricopa County residents.

In contrast, the rates of overdose deaths within Yavapai, Navajo, Cochise, Pinal, Coconino, and Mohave Counties were significantly lower than the rates of overdose deaths for their respective residents. Alternatively stated, for example, the rate of overdose deaths that occurred in Yavapai County was significantly lower than the overdose death rate for Yavapai County residents.

Maricopa and Pinal counties reported the largest discrepancies between county of residence and county of injury. Among decedents whose fatal injury occurred in Maricopa County, 118 were nonresidents. Conversely, in the case of Pinal County, 10 residents were injured in other Arizona counties.

Table 1. Number and Rate of Overdose Deaths by County of Injury and County of Residence

	County of Injury			County of Residence		
AZ County	Number of Deaths	Percentage of AZ Deaths	Rate per 100,000	Number of Deaths	Percentage of AZ Deaths	Rate per 100,000
Maricopa	1,480	68.8%	33.00	1,362	65.9%	30.37
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Graham	N/A	N/A	N/A	N/A	N/A	N/A
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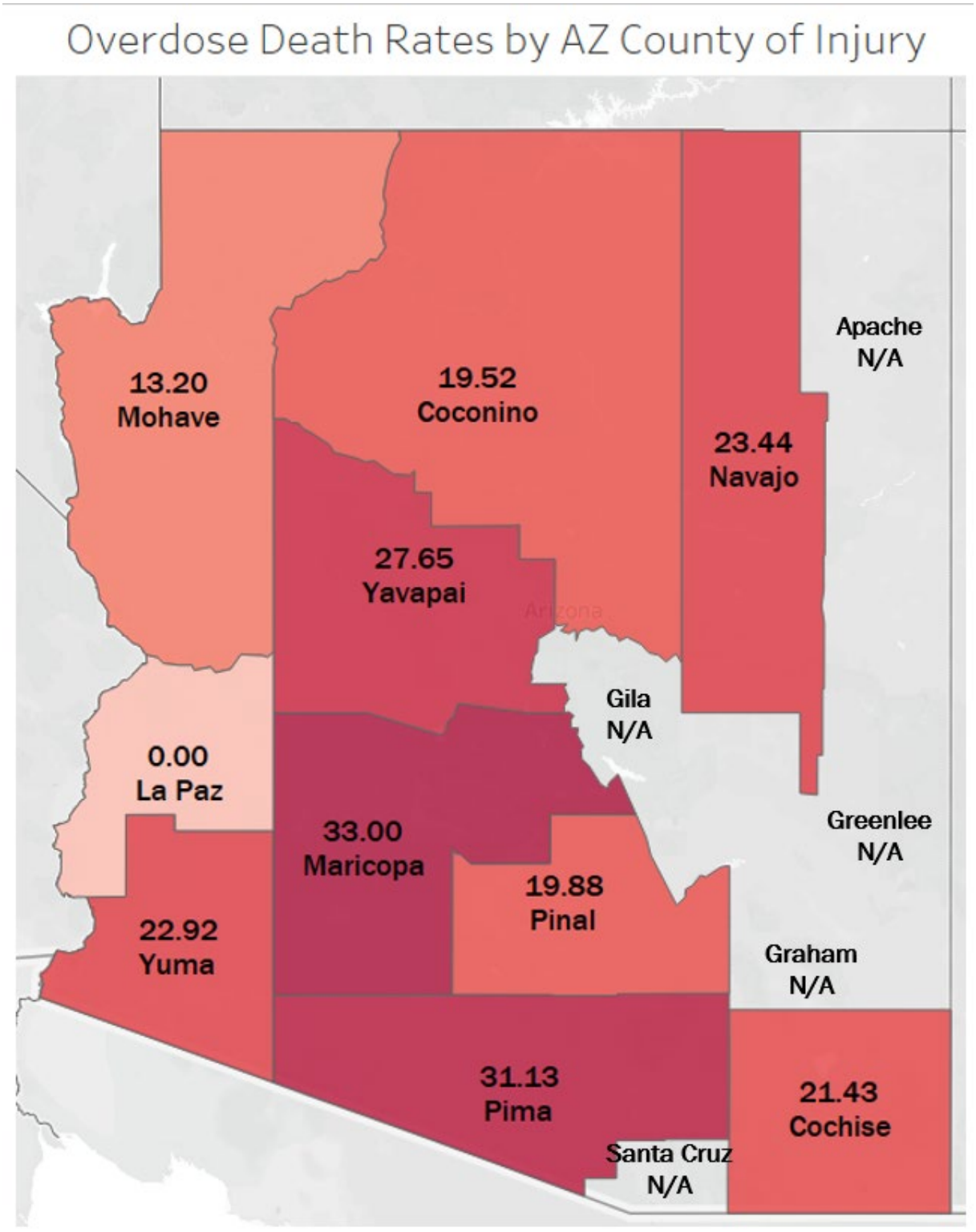
Mohave	28	1.3%	13.20	33	1.6%	15.55
Santa Cruz	N/A	N/A	N/A	N/A	N/A	N/A
Apache	N/A	N/A	N/A	11	0.5%	15.30
La Paz	0	0.0%	0.00	0	0.0%	0.00
Non-AZ	0	0.0%	0.00	67	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths.

[4] Based on a *z*-score test of proportional differences conducted at the $\alpha = .05$ level

Figure 1 below maps overdose death rates by county of injury. Maricopa County had both the highest number of deaths and the highest rate of unintentional / undetermined overdose deaths in the state, and Maricopa and Pima Counties had overdose death rates that were higher than the overall state average rate of 30.28.



Note: N/A denotes fewer than ten but more than zero deaths; darker shading reflects a higher overdose death rate.

Findings by Zip Code

SUDORS data allow for an examination of overdose death rates at the zip code level.[5] Arizona has 405 zip codes, 266 of which reported overdose deaths. Among those with overdose deaths, 74 zip codes had at least ten deaths and are reported here.

Table 2 shows the number and rate of overdose deaths by county and zip code in Arizona for the 74 zip codes that had at least ten deaths. Within counties, data are displayed sorted by rates.

Table 2: Number and Rate of Overdose Deaths by Zip Code

Zip Code	Number of Deaths	Rate per 100,000
Cochise:		
85635	11	32.4
Maricopa:		
85034	20	396.4
85007	35	242.6
85004	11	153.5
85003	12	141.2
85015	43	102.6
85009	53	102.5
85017	40	93.8
85019	26	93.5
85021	38	87.6
85006	23	84.5
85051	34	75.0
85301	50	72.9
85201	39	72.1
85008	42	67.4
85210	27	65.7
85014	18	65.2
85040	22	62.5
85020	22	62.2
85202	25	61.9
85027	23	60.7
85281	37	55.4
85043	21	54.3
85031	18	53.1
85023	18	52.5
85018	19	49.4
85203	19	47.7
85013	10	47.6
85029	22	46.7
85033	29	44.7
85016	16	44.5
85053	13	42.5
85024	10	40.3
85306	10	39.2
85041	24	38.6

[5] Population numbers at the zip code level used to calculate overdose death rates are from 2019 US Census data, American Community Survey, Demographic and Housing Estimates, 5-year estimates.

Zip Code	Number of Deaths	Rate per 100,000
85282	21	37.7
85022	19	36.6
85204	23	33.9
85032	24	32.8
85251	13	31.6
85042	15	31.3
85353	13	30.4
85257	10	29.9
85323	13	29.6
85345	16	27.9
85224	12	27.4
85037	15	27.4
85392	10	25.6
85283	13	25.2
85035	15	25.1
85207	12	24.1
85326	14	22.1
85254	10	21.2
85338	10	19.9
85225	13	18.5
85308	11	16.5
Navajo:		
86047	10	65.2
Pima:		
85716	21	69.6
85711	28	69.3
85705	36	63.9
85713	29	61.3
85712	16	48.9
85706	26	46.6
85730	16	41.7
85745	16	41.3
85719	18	36.8
85746	16	35.1
85756	14	32.7
85710	14	25.7
Pinal:		
85120	11	34.5
85122	16	27.2
Yavapai:		
86314	14	35.3
Yuma:		
85367	10	43.7
85364	17	22.9

Two Maricopa County zip codes, 85034 and 85007, have the highest overdose death rates in the state among zip codes with at least ten deaths – 396.4 and 242.6 deaths per 100,000 population, respectively. Additionally, zip code 85308 in Maricopa County had the lowest overdose death rate in the state among zip codes with at least ten deaths, with 16.5 deaths per 100,000 population.

Figure 2 maps reportable zip codes for Maricopa and Pinal Counties with some zip codes labeled.

Figure 2. Zip Code-Level Heat Map of Overdose Death Rates, Maricopa and Pinal Counties

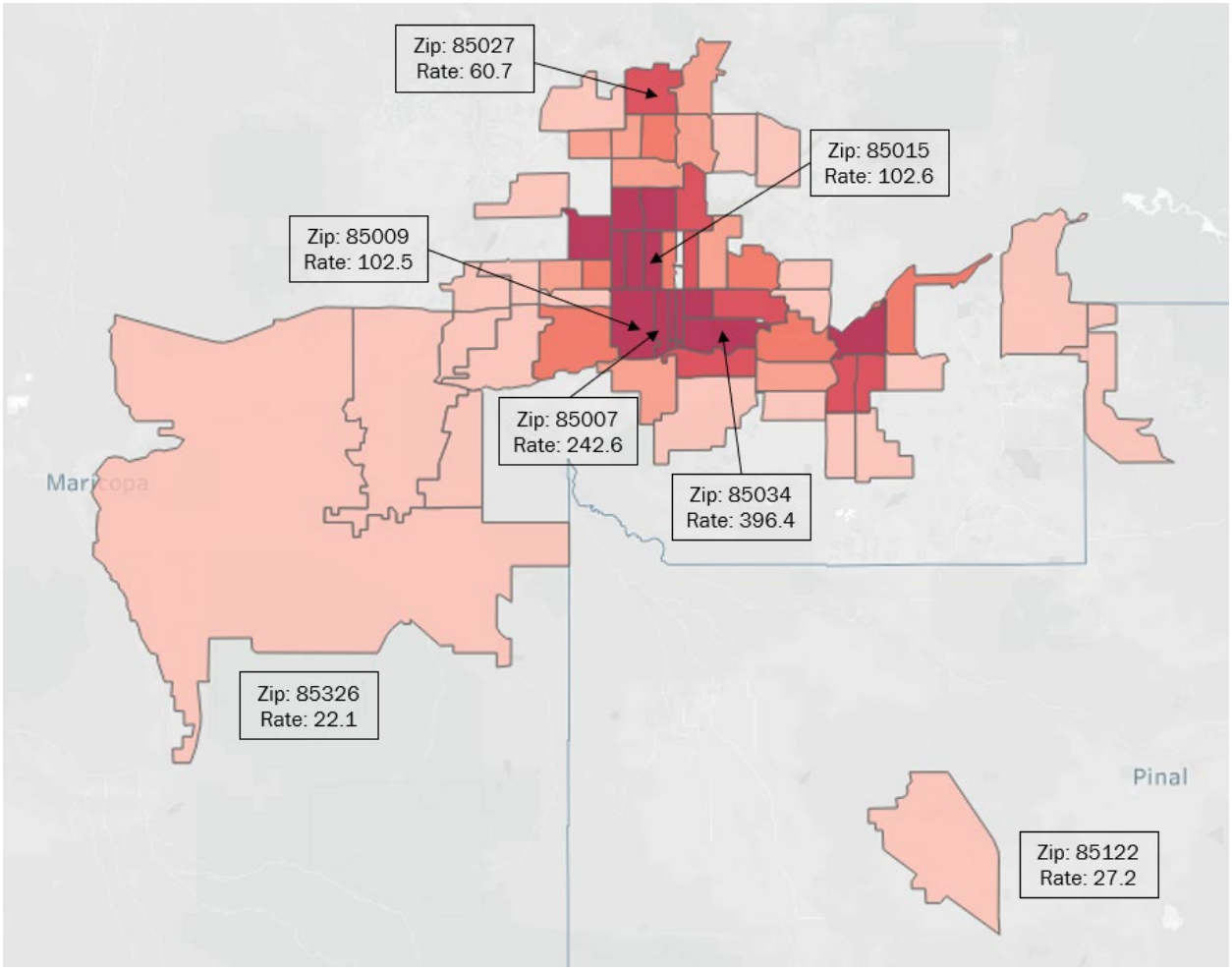


Figure 3 maps reportable zip codes for Cochise and Pima Counties with some zip codes labeled.

Figure 3. Zip Code-Level Heat Map of Overdose Death Rates, Cochise and Pima Counties

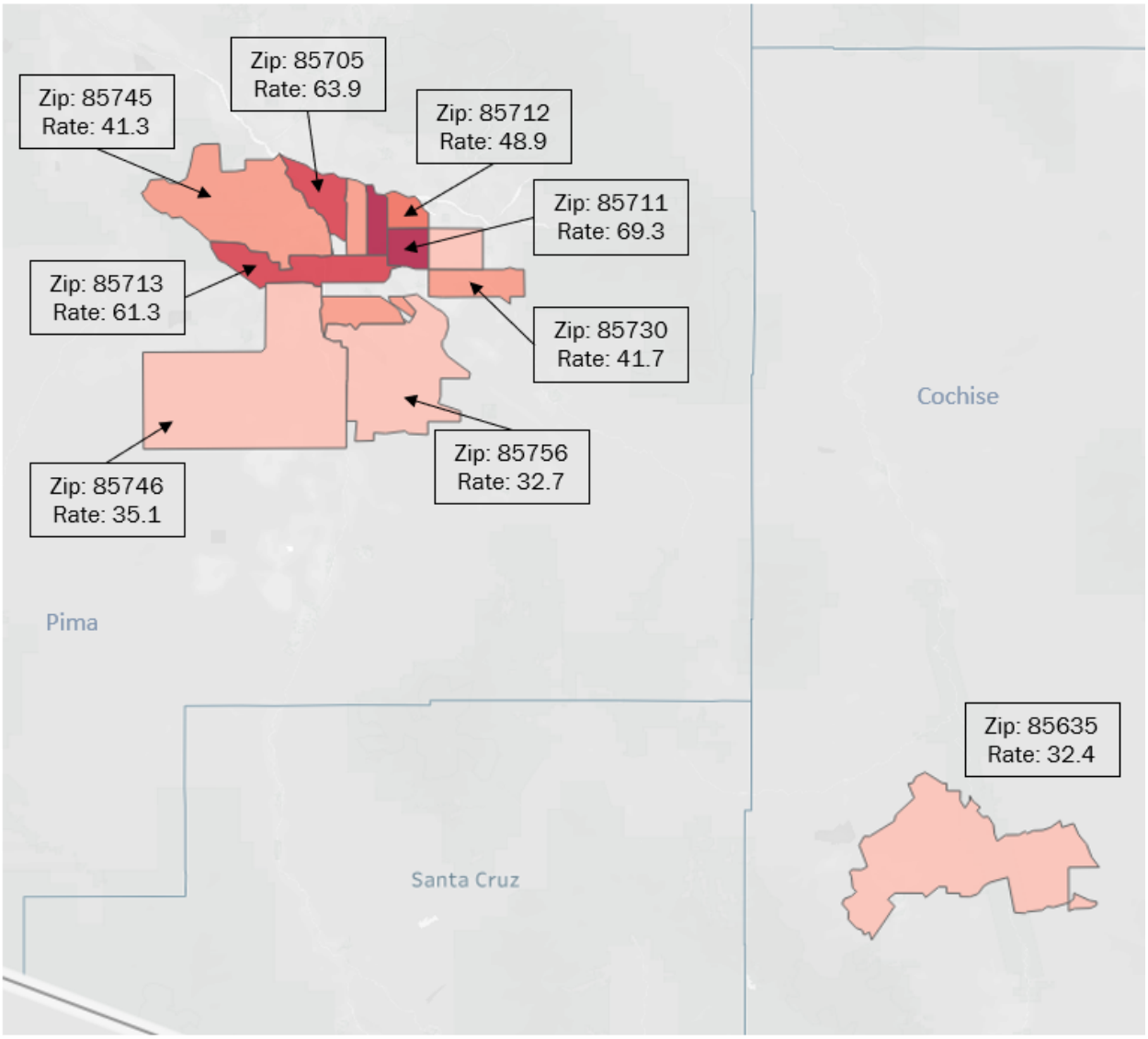


Figure 4 maps the reportable zip code for Navajo County. Zip code 86047 lies within Navajo and Coconino counties but is reported in Navajo County in Table 2.

Figure 4. Zip Code-Level Heat Map of Overdose Death Rates, Navajo County

Figure 5 maps the reportable zip code for Yavapai County.

Figure 5. Zip Code-Level Heat Map of Overdose Death Rates, Yavapai County

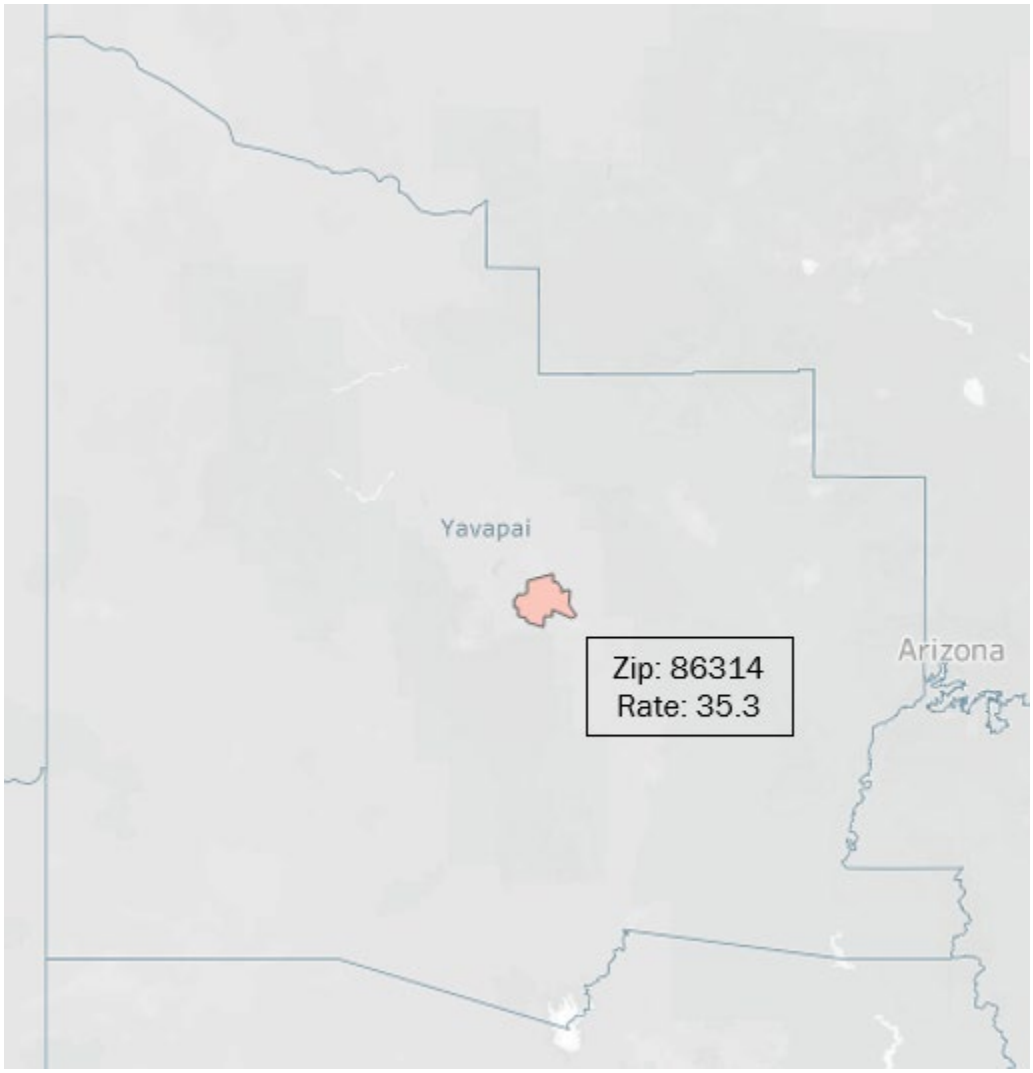
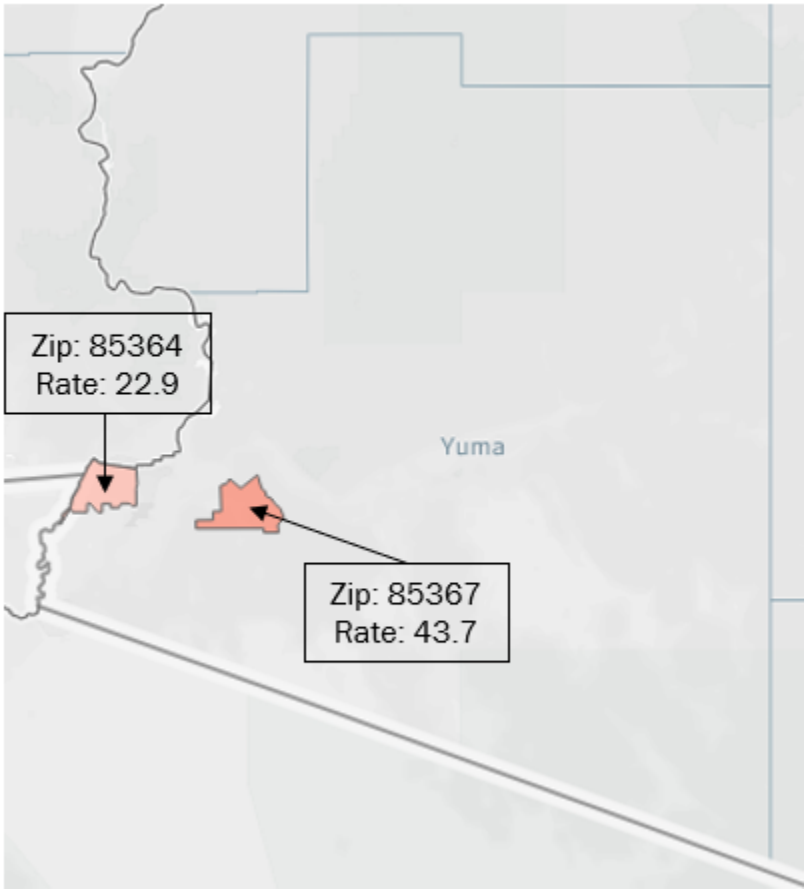


Figure 6 maps the reportable zip codes for Yuma County.

Figure 6. Zip Code-Level Heat Map of Overdose Death Rates, Yuma County



Urbanicity

Table 3 categorizes Arizona counties by their RUCA codes. The US Department of Agriculture's rural-urban commuting area ("RUCA") codes "classify US census tracts using measures of population density, urbanization, and daily commuting" as a way of quantifying the urbanicity of a geographic area.[6] The codes range from 1 to 10, with 1 being the most urban and 10 being the most rural. In Arizona, Maricopa and Pinal Counties have the most urban classification and are scored as a "1," and Graham and Greenlee Counties are the most rural counties in the state, with scores of "7."

[6] USDA Economic Research Service 2010 RUCA classifications. See https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/

In Arizona, counties with lower RUCA scores (more urban) had higher rates of unintended / undetermined overdose deaths than counties with higher RUCA scores (more rural).[7] However, this correlation is based on only nine counties, including Maricopa and Pima Counties, which had high urbanicity and high overdose death rates, and Navajo County, which had low urbanicity and a high overdose death rate.

Table 3 below shows the overdose death rates by RUCA classification for Arizona counties.

Table 3. Overdose Death Rate by Arizona County Urbanicity—County of Injury Reported

RUCA Score and Description	AZ County	Overdose Death Rate
1 (Metro – Counties in metro areas of 1 million population or more)	Maricopa	33.00
	Pinal	19.88
2 (Metro – Counties in metro areas of 250,000 to 1 million population)	Pima	31.13
3 (Metro – Counties in metro areas of fewer than 250,000 population)	Cochise	21.43
	Coconino	19.52
	Mohave	13.20
	Yavapai	27.65
	Yuma	22.92
4 (Nonmetro – Urban population of 20,000 or more, adjacent to a metro area)	Gila	N/A
	Navajo	23.44
	Santa Cruz	N/A
6 (Nonmetro – Urban population of 2,500 to 19,999, adjacent to a metro area)	Apache	N/A
	La Paz	0.00
7 (Nonmetro – Urban population of 2,500 to 19,999, not adjacent to a metro area)	Graham	N/A
	Greenlee	N/A

Note: N/A denotes fewer than ten but more than zero deaths.

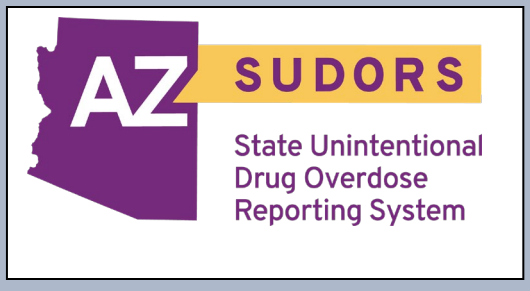
[7] A simple Pearson correlation between the RUCA score and the overdose death rate = -.38 among reportable counties, indicating a moderate negative relationship between urbanicity and overdose death rate.

Prevalence and Characteristics of Unintentional Overdose Deaths Among Arizonans by Age Group

Arizona State Unintentional Drug Overdose Reporting System

(AZ-SUDORS)

July 2019 – December 2020



August 2021

Prevalence and Characteristics of Unintentional Overdose Deaths Among Arizonans by Age Group

July 1, 2019 – December 31, 2020

Melissa Kovacs, Ph.D., PStat
Charles M. Katz, Ph.D.

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Key Findings

During the time period of July 1, 2019, through December 31, 2020, Arizona experienced 3,457 unintentional / undetermined drug overdose deaths, for an annualized overdose death rate of 31.68 per 100,000 population. This time period included 531 deaths among those aged 24 and younger.

Overall, the proportion of victims with any opioid as one of their causes of death decreased with age. This is specifically true for the opioid fentanyl. The proportional presence of fentanyl as a cause of death decreased with age, while the proportional presence of all other types of opioids as a cause of death increased with age.

Approximately 93% of unintentional / undetermined deaths involved multiple substances. When victims experienced a single-substance death, the most common single substance based on toxicology results was fentanyl.

Examining sex and age together shows that in all age categories, males had significantly higher rates of overdose death than females, and younger males had significantly higher rates of overdose death than older males.

When comparing age groups within ethnic categories, Hispanic people in the 25–44 age group had significantly higher overdose death rates than their Hispanic counterparts in any other age group. The same pattern holds for non-Hispanic people – those in the 25–44 age group had significantly higher overdose death rates than their non-Hispanic counterparts in any other age group.

Among overdose victims aged 24 and younger, Black people had a significantly higher rate of overdose death than their American Indian, white, or Asian / Pacific Islander counterparts.

Among overdose victims aged 25–44, Black people had a significantly higher rate of overdose death than white people or Asians / Pacific Islanders, as did American Indians.

Among overdose victims aged 45 and older, Black people had a significantly higher rate of overdose death than their American Indian, white, or Asian / Pacific Islander counterparts.

For all races except Asian / Pacific Islander, death rates peaked in the 25–44 age group. Black and American Indian men aged 25–44 had the highest overdose death rates when examining overdose rates by race / ethnicity.

Among victims under the age of 25, overdose death rates were higher among females than males for overdose deaths that were caused by any opioid as well as those that were caused specifically by fentanyl. The data also show that when opioids, including fentanyl specifically, were present as a cause of death among victims under the age of 25, Black people had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people under the age of 25 consistently had higher overdose death rates when any opioid was present and when fentanyl, specifically, was present.

Among victims in the 25–44 age group, overdose death rates were lower among females than males for overdose deaths that were caused by any opioid as well as for those that were caused specifically by fentanyl. The data also show that when opioids, including fentanyl, were present as a cause of death among victims aged 25–44, American Indians had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people aged 25–44 consistently had lower overdose death rates when any opioid was present and when fentanyl, specifically, was present.

Among victims over the age of 44, overdose death rates were lower among females than males for overdose deaths that were caused by any opioid as well as for those that were caused specifically by fentanyl. The data also show that when opioids and/or fentanyl were present as a cause of death among victims over the age of 44, Black people had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people over the age of 44 consistently had lower overdose death rates when any opioid was present and when fentanyl, specifically, was present.

High school or GED equivalent is the most common level of education attained among victims of all age categories.

For most overdose death victims in all age categories, no evidence was reported indicating a recent release from an institutional setting such as a hospital, prison, or residential treatment center. When there was evidence, younger victims were more likely to have been released from jail or a residential treatment facility, while older victims were more likely to have been released from a hospital.

Among youth under the age of 25, 24% of overdose victims had a known currently diagnosed mental health problem. Among overdose death victims aged 25–44, 28% had a known currently diagnosed mental health problem. Among overdose death victims aged 45 and older, 26% had a known currently diagnosed mental health problem.

Almost 18% of victims (n=95) aged 24 and under had a history of a previous overdose. For older age categories, the percentage of deaths with a previous overdose was lower.

For most overdose death victims of any age, no evidence of treatment for substance abuse currently or in the past was reported. Victims younger than age 45 were approximately twice as likely to have evidence of either current or past treatment for substance abuse, compared to victims aged 45 and older.

When opioid use history is known, the data show that, as a group, younger victims had higher rates of past opioid use than older victims.

Almost 11% of overdose victims under the age of 25 were administered naloxone. Fewer victims in the older age categories had naloxone administered, with only 5.4% of victims over the age of 44 receiving naloxone during the fatal overdose.

As the victim’s age group increased, they were less likely to have a bystander present.

Introduction

The United States experienced 70,630 drug overdose deaths in 2019. Over 70% of these deaths involved an opioid.[1] In an effort to better track opioid-involved and other drug-related deaths and to inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS), of which Arizona is a participant.

As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

This report presents findings from AZ-SUDORS on drug overdose deaths in the state of Arizona for the period of July 1, 2019, through December 31, 2020, with a specific focus on age categories. The data were accessed and downloaded from the secure CDC web-portal system used for SUDORS data management. The data were downloaded on June 30, 2021, and represent the most complete abstracted data to that date.

This is the third report in a series and focuses on unintentional and undetermined overdose deaths among Arizonans of different ages. The first report in this series provided an overview of overdose deaths in Arizona, and the second examined geographic differences in unintentional and undetermined overdose death rates in Arizona.

Data and Methods

The data used for this report comprise all unintentional and undetermined drug overdose deaths from AZ-SUDORS from July 1, 2019, through December 31, 2020. SUDORS data rely on two principal sources to populate an aggregated, anonymous database: death certificates and medical examiner reports, which include death investigation reports, toxicology reports, and autopsy reports. SUDORS data contain information on victim demographics and circumstances that are then de-identified, abstracted, and aggregated into a CDC-managed database.

AZ-SUDORS received death certificate data for all overdose deaths occurring in Arizona over the reporting period (*n*=3,457). Among these cases, 3,317 were unintentional, and 140 were undetermined. Of the overdose deaths, 96.4% of medical examiner records were obtained by the project from medical examiners' offices. Records not obtained were primarily the result of the nonparticipation of the Pinal (*n*=34) and Yavapai (*n*=29) County Medical Examiner's Offices until January 1, 2020, the nonparticipation of the Mohave County Medical Examiner's Office

[1] See "Drug Overdose Deaths," Centers for Disease Control and Prevention, page updated March 3, 2021. https://www.cdc.gov/drugoverdose/deaths/index.html

(*n*=11) until July 1, 2020, and the Navajo (*n*=27) County Medical Examiner's Office joining as a participating agency only after the completion of the data period analyzed in this report.[2] The remainder of the missing reports are due to the nonparticipation of medical examiner service providers partially servicing Apache and Graham Counties as of the writing of this report, as well as deaths that were not admitted to a medical examiner's office and deaths that were certified by Navajo Nation criminal investigators, each representing fewer than 10 deaths. The absence of these records represents an important limitation to the findings presented in this report.

Classification of drug involvement in these data relies on toxicology results. If a decedent tested positive for more than one type of drug, each drug type was recorded. In the AZ-SUDORS data, we define a drug as "any chemical compound that is chiefly used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury, for the relief of pain or suffering, to control or improve any physiologic or pathologic condition, or for the feeling it causes." Thus, substances such as alcohol are expressly excluded, and deaths attributed exclusively to toxicity from an alcohol-related substance are not included as SUDORS cases and are not present among these data. However, deaths for which the cause is toxicity from both a drug and alcohol concomitantly are included by virtue of the inclusion of a SUDORS-relevant substance as the primary cause of death. Because of this, some deaths with alcohol included as part of the primary cause are captured by SUDORS; however, toxicity deaths with alcohol as the *only* cause are not included in the SUDORS data.

Some analyses in this report are presented using rates. Rates for this report are calculated using incidence counts per 100,000 population and then annualized. Rates are estimated with data from the US Census Bureau, most commonly from the American Community Survey (ACS) 2019 1-year estimate. Census sources are cited throughout the report. IBM SPSS Statistics v27 and Stata v15 were used for the analyses.

[2] AZ-SUDORS is in the process of finalizing a data use agreement for participation with the Navajo County Office of the Medical Examiner as of July 2021; *n* denotes missing cases for this report's project period from each of the jurisdictions.

Findings

Overview of Drug Overdose Deaths by Age

During the time period of July 1, 2019, through December 31, 2020, Arizona experienced 3,457 drug overdose deaths, for an annualized death rate of 31.68 per 100,000 population.

Table 1 shows the number and rate of overdose deaths during the 18-month period that ended December 31, 2020, for various age groups.[3]

Table 1. Number and Rate of Overdose Deaths by Age Category

Age	Number of Deaths	Percentage of Deaths	Rate per 100,000 (annualized)
< 25	531	15%	15.17
25 – 44	1,585	46%	55.64
45 +	1,339	39%	29.34

Note: The number of deaths in Table 1 totals 3,455 due to two cases with missing age data.

Table 2 shows the percentage of overdose death victims by age group, with specific classes of substances, including opioids, listed as one of their causes of death. Victims can have multiple substances listed as causing death, such that the percentages in the following table will not total 100%. Moreover, victims may have had other substances present at the time of death that did not cause death; such combinations of substances are explored further below in Figure 1 for youth deaths.

Table 2. Percentage of Victims With the Listed Substance as a Cause of Death by Age Category

Substance	Percentage of Victims With the Listed Substance as One of Their Causes of Death		
	Age <25	Age 25 – 44	Age 45 +
All Opioids	94.16%	82.71%	57.95%
Methamphetamine	14.69%	38.11%	58.18%
Benzodiazepines	13.94%	10.47%	8.59%
Cocaine	8.85%	9.27%	7.32%
Antidepressants	3.58%	4.23%	6.12%
Gabapentin	1.13%	3.03%	3.29%

Proportionally, the percentage of victims with opioids as one of their causes of death decreased with age.

Table 3 shows the proportional breakdown of specific opioids within the category of "Opioids" from Table 2 by victim age group. Table 3 does total to 100% as it shows the total proportion of

[3] Annualized rates based on Arizona population of 7,278,717 as of July 1, 2019 https://www.census.gov/quickfacts/AZ

types of opioids within the category of "Opioids." Multiple types of opioids may appear within a single victim's toxicology report. For example, a victim's toxicology results may show both fentanyl and morphine present at the time of death. Polysubstance deaths are explored further below.

The proportional presence of fentanyl as a cause of death decreased for older age groups, while the proportional presence of all other types of opioids as a cause of death increased for older age groups.

Table 3. Opioid Overdose Deaths by Type of Opioid and Victim Age Group

Substance	Percentage by Type of Opioid		
	Age <25	Age 25 – 44	Age 45 +
Fentanyl	92.0%	79.8%	61.7%
Heroin	2.5%	6.5%	9.0%
Morphine	2.3%	5.4%	9.5%
Oxycodone	1.1%	2.3%	7.6%
Methadone	1.1%	3.2%	5.7%
Codeine	0.4%	0.9%	1.6%
Buprenorphine	0.3%	0.9%	1.3%
Tramadol	0.0%	0.5%	2.1%
Hydrocodone	0.4%	0.5%	1.4%

Approximately 93% of unintentional / undetermined deaths included multiple substances. Figure 1 shows the number of polysubstance deaths by drug type and common drug pairings among deaths for which any opioid was present (first cluster of bars) and among deaths for which fentanyl was present (second cluster of bars).[4] Of note, not all substances represented in Figure 1 caused the death. Rather, Figure 1 represents substances present at the time of death.

[4] In analyzing polysubstance deaths, we followed the lead of Georgia's SUDORS reporting, "State Unintentional Drug Overdose Reporting System (SUDORS) Opioid-Involved Overdose Deaths, Georgia, July 2017 – June 2018," https://bit.ly/3uIHwqx, by reporting on common drug pairings within the two categories of (1) any opioid present and (2) fentanyl / fentanyl analogs. For AZ-SUDORS, this second category includes fentanyl and norfentanyl. Other novel synthetic opioids such as U47700, U48800, U49900, AH7921, and MT45 are not present in AZ-SUDORS data, although they were present in Georgia's SUDORS data and included in this category in their report. Georgia also included heroin in this category in their report.

Figure 1. Number of Polysubstance Deaths by Drug Type and Common Drug Pairings, Ages < 25

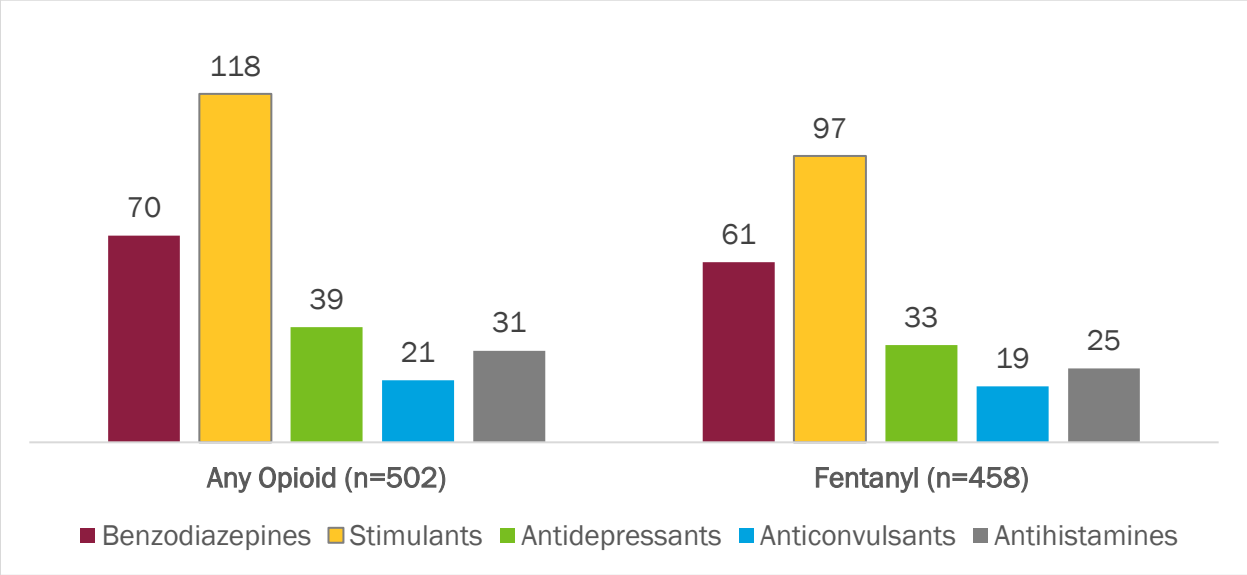


Figure 2. Number of Polysubstance Deaths by Drug Type and Common Drug Pairings, Ages 25–44

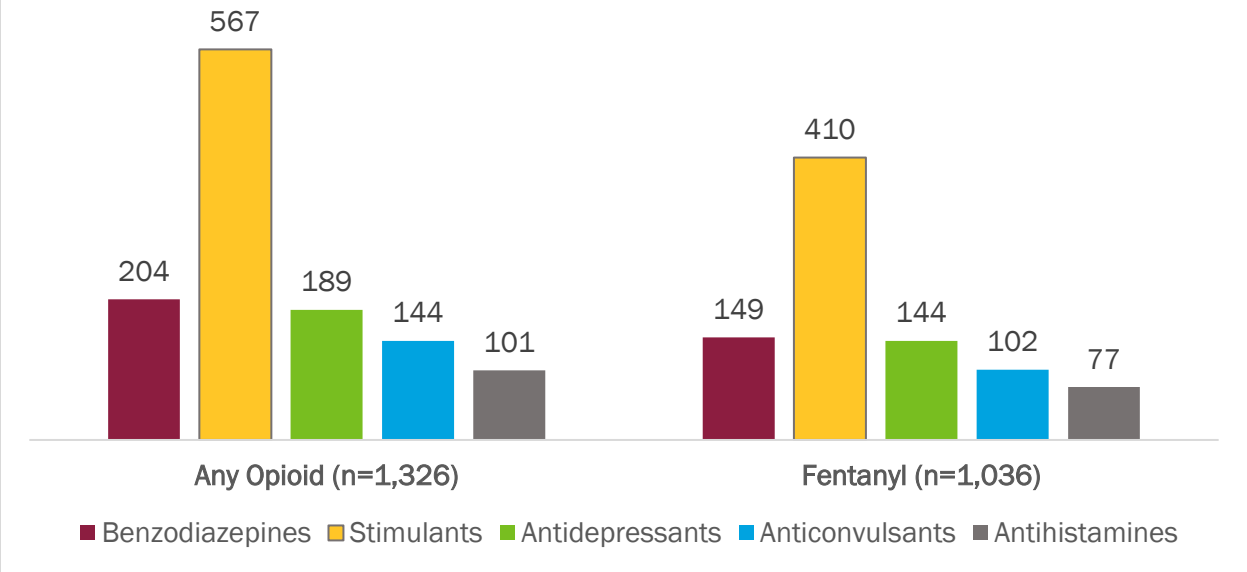
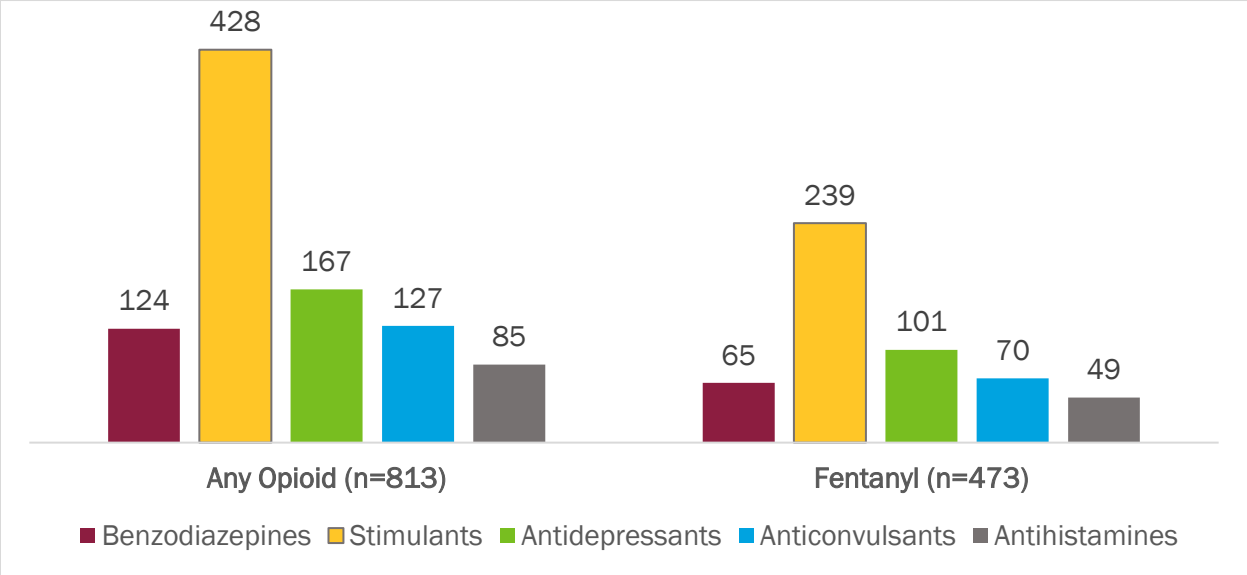


Figure 3. Number of Polysubstance Deaths by Drug Type and Common Drug Pairings, Ages 45+



When victims experienced a single-substance death, the most common single substance present based on toxicology results was fentanyl.

Demographics – Sex, Age, Ethnicity, and Race

Table 4 shows the number and rate of deaths for males and females by age category, and Figure 4 visualizes these death rates.[5] Overdose deaths significantly differ by sex, with males more likely than females to be the victims of overdose deaths in all age categories.[6] Males aged 25–44 are significantly more likely to be victims of overdose deaths than their male counterparts in any other age category. Similarly, females aged 25–44 are significantly more likely to be victims of overdose deaths than their female counterparts in any other age group.[7]

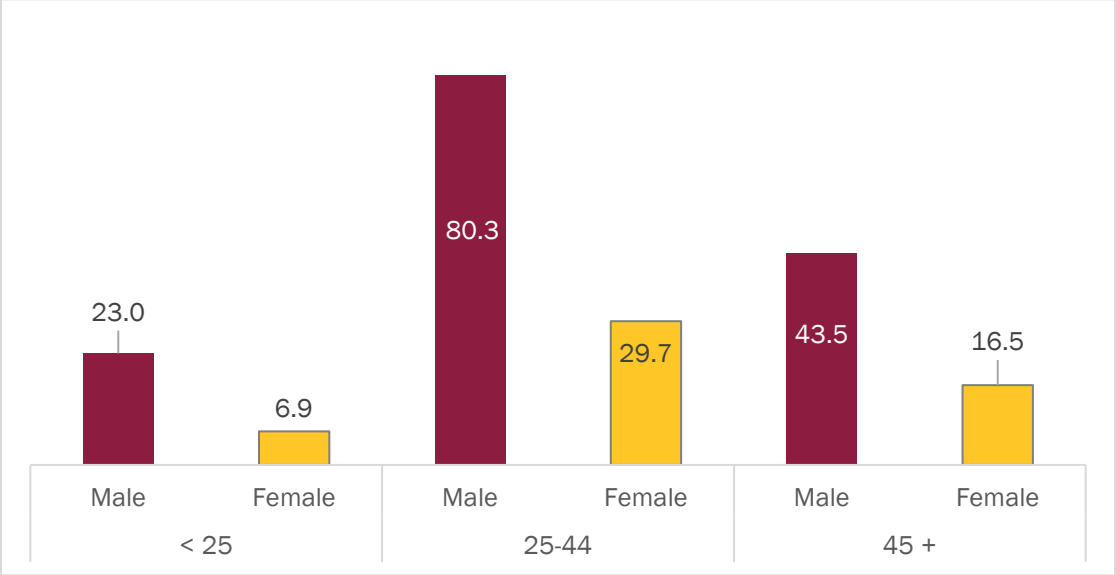
SUDORS classifies sex as a binary category, with a separate data field to indicate whether the victim was transgender. Data on the transgender status of decedents are not always available or provided. Fewer than ten deaths of transgender individuals, as classified via medical examiner documents, were among the data for this report; these are not reported separately due to the small subsample size.

[5] Annualized rates were populated from the American Community Survey (ACS) 1-year estimate, 2019, for Arizona. US Census.
[6] Based on a *z*-score test of proportional differences conducted at $\alpha = .05$ level
[7] *Ibid.*

Table 4: Number and Rate of Overdose Deaths by Sex and Age Category

Age	Sex	Number of Deaths	Percentage of Deaths Within Age Cat.	Rate per 100,000 (annualized)
< 25	Male	413	77.8%	23.00
	Female	118	22.2%	6.92
25 – 44	Male	1,174	74.1%	80.26
	Female	411	25.9%	29.65
45 +	Male	945	70.6%	43.54
	Female	394	29.4%	16.46

Figure 4. Overdose Death Rates by Sex and Age Category



Overdose deaths in Arizona differ by race and ethnicity. For AZ-SUDORS, racial and ethnic data are collected from death certificates. Ethnicity data are mutually exclusive. Race is not mutually exclusive at the individual level. In the dataset, 23 deaths are of victims who were identified as

multiracial. Multiracial deaths were represented in many age categories, such that fewer than ten deaths in each age category were of multiracial victims.

Table 5 details overdose deaths by ethnicity and age category. When comparing age groups within ethnic categories, Hispanic people in the 25–44 age group had significantly higher overdose death rates than their Hispanic counterparts in any other age group. The same pattern holds for non-Hispanic people – non-Hispanic people in the 25–44 age group had significantly higher overdose death rates than their non-Hispanic counterparts in any other age group.[8]

Alternatively stated, for both Hispanic people and non-Hispanic people, the overdose death rate peaked in the 25–44 age group.

Table 5. Number and Rate of Overdose Deaths by Ethnicity and Age Category

Age	Ethnicity	Number of Deaths	Percentage of Deaths Within Age Cat.	Rate per 100,000 (annualized)
< 25	Hispanic	249	47.1%	16.31
	Not Hispanic	280	52.9%	14.19
25 – 44	Hispanic	491	31.0%	48.11
	Not Hispanic	1,091	68.9%	59.68
45 +	Hispanic	234	17.6%	25.52
	Not Hispanic	1,096	82.4%	30.05

Note: Two victims were of unknown ethnicity in the under-25 age group, three victims were of unknown ethnicity in the 25–44 age group, and nine victims are of unknown ethnicity in the 45+ age group.

[8] All tests of differences based on a *z*-score test of proportional differences conducted at the $\alpha = .05$ level

Table 6 details overdose deaths by race and age category. When calculating rates, census data reflecting more than one race were used within each of the racial categories when appropriate.[9]

Among overdose victims aged 24 and younger, Black people had a significantly higher rate of overdose death than their American Indian, white, and Asian / Pacific Islander counterparts.

Among overdose victims aged 25–44, Black people had a significantly higher rate of overdose death than white people and Asians and Pacific Islanders, as did American Indians.

Among overdose victims aged 45 and older, Black people had a significantly higher rate of overdose death than their American Indian, white, and Asian / Pacific Islander counterparts.

Table 6. Number and Rate of Overdose Deaths by Race and Age Category

Age	Race	Number of Deaths	Percentage of Deaths Within Age Cat.	Rate per 100,000 (annualized)
< 25	Black	50	9.8%	25.91
	American Indian	33	6.5%	16.48
	Asian and Pacific Islander	18	3.5%	16.31
	White	408	80.2%	16.01
25 – 44	Black	131	8.5%	81.17
	American Indian	139	9.0%	94.95
	Asian and Pacific Islander	19	3.5%	14.42
	White	1,255	81.3%	58.98
45 +	Black	110	8.5%	68.35
	American Indian	50	3.9%	33.00
	Asian and Pacific Islander	12	0.9%	8.48
	White	1,122	86.7%	28.97

[9] Rates were populated from the American Community Survey (ACS) 1-year estimate, 2019, for Arizona. US Census. The Census categories for "Asian" and "Native Hawaiian and Other Pacific Islander" were combined to compare with the SUDORS combined category of "Asian and Pacific Islander." In addition, the Census categories for "American Indian" and "Alaskan Native" were combined to compare with the SUDORS category "American Indian." In the SUDORS data, Alaskan natives are included in the "American Indian" category.

Table 7 below shows the number and rate of deaths for males and females by race / ethnic category as well as age, and Figures 5–7 visually display the overdose death rates. Black and American Indian men aged 25–44 had the highest overdose death rates. Within race / ethnicity categories, death rates peaked in the 25–44 age group.

Table 7. Number and Rate of Overdose Deaths by Sex and Race / Ethnicity

Race / Ethnicity, Age Category	Sex	Number of Deaths	Rate per 100,000 (annualized)
Black, < 25	Male	40	41.78
	Female	10	10.28
Black, 25 – 44	Male	89	106.70
	Female	42	53.86
Black, 45+	Male	84	104.63
	Female	26	32.24
American Indian, < 25	Male	22	21.11
	Female	11	11.45
American Indian, 25 – 44	Male	91	122.07
	Female	48	68.09
American Indian, 45+	Male	29	43.34
	Female	21	24.82
Asian and Pacific Islander, < 25	Male	10	17.91
	Female	N/A	N/A
Asian and Pacific Islander, 25 – 44	Male	16	24.88
	Female	N/A	N/A
Asian and Pacific Islander, 45+	Male	N/A	N/A
	Female	N/A	N/A
White, < 25	Male	318	24.30
	Female	90	7.26
White, 25 – 44	Male	945	86.73
	Female	310	29.86
White, 45+	Male	789	42.69
	Female	333	16.45
Hispanic, <25	Male	204	26.11
	Female	45	6.04
Hispanic, 25 – 44	Male	388	73.55
	Female	103	20.89
Hispanic, 45+	Male	179	41.07
	Female	55	11.44
Non-Hispanic, <25	Male	207	20.41
	Female	73	7.61
Non-Hispanic, 25 – 44	Male	785	83.94
	Female	306	34.27
Non-Hispanic, 45+	Male	758	43.69
	Female	338	17.67

Note: N/A denotes fewer than ten but more than zero deaths.

Figure 5. Overdose Death Rates by Sex and Race / Ethnicity Ages < 25

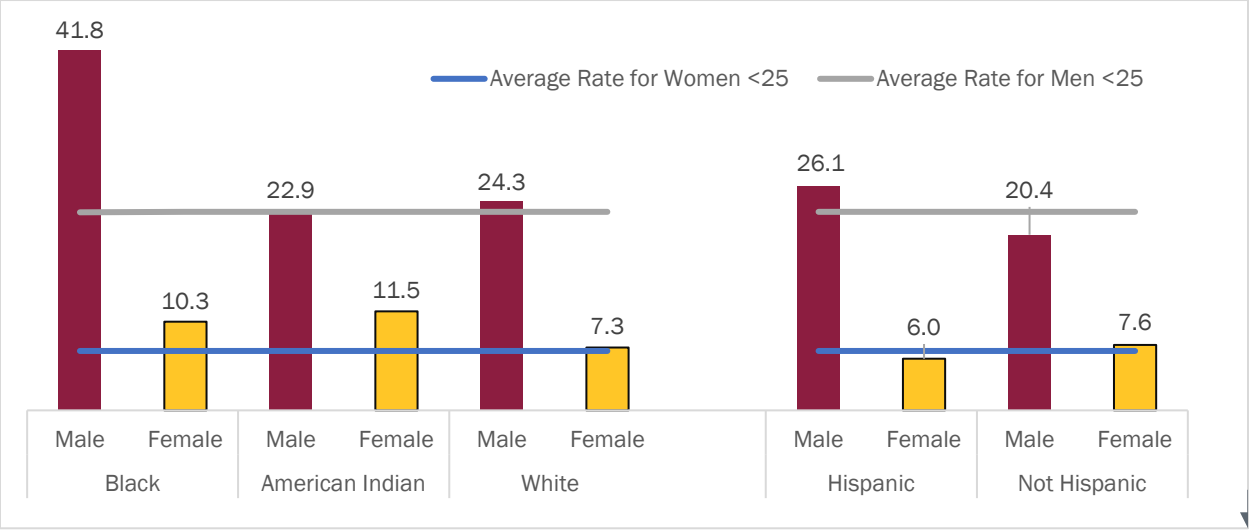


Figure 6. Overdose Death Rates by Sex and Race / Ethnicity, Ages 25 – 44

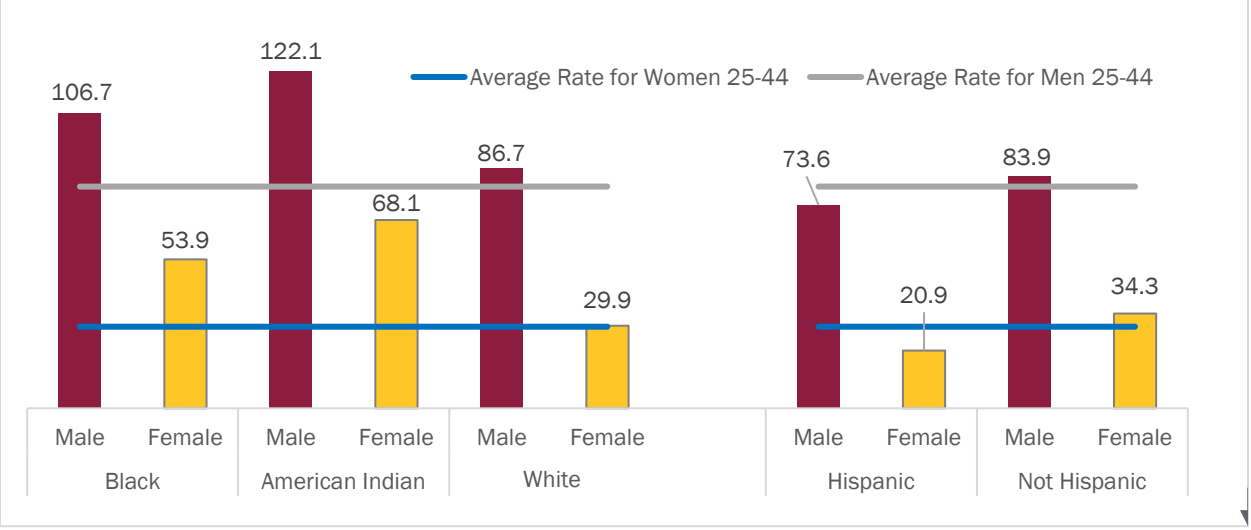
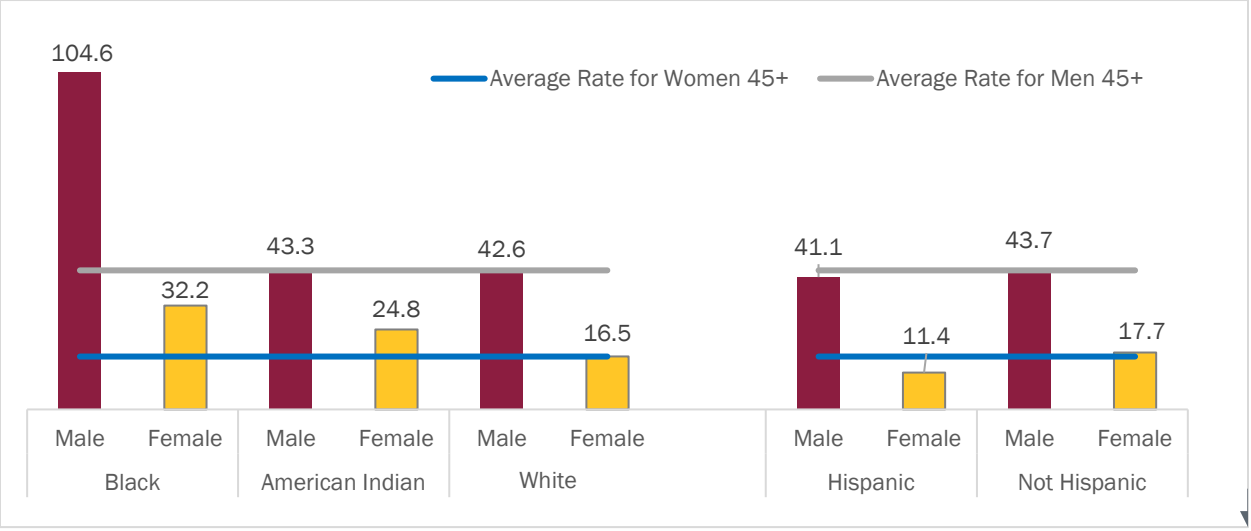


Figure 7. Overdose Death Rates by Sex and Race / Ethnicity, Ages 45 +



Demographics – Presence of Opioids

Table 8 below shows demographics by substance type for youth under the age of 25 who died from an opioid overdose. The data show the numbers and rates of overdose deaths among victims with any opioid as a cause of death and among victims for whom fentanyl, specifically, was a cause of death.

Table 8. Demographic Characteristics by Substance Type for Victims Under 25 Who Died From an Opioid Overdose

		Any Opioid Present as a Cause of Death (*n*=502)		Fentanyl Present as a Cause of Death (*n*=458)	
		Number	Rate	Number	Rate
Sex					
	Male	392	21.8	365	20.3
	Female	110	6.5	93	5.5
Race/Ethnicity					
	Black	46	23.8	43	22.3
	American Indian	32	16.0	31	15.5
	White	386	15.1	350	13.7
	Asian/Pacific Islander	18	16.3	16	14.5
	Hispanic	237	15.5	217	14.2
	Not Hispanic	263	13.3	239	12.1

As shown in Table 8, among victims under the age of 25, females experienced lower overdose death rates than males for overdose deaths that were caused by any opioid as well as for those that were caused specifically by fentanyl. The data also show that when opioids and/or fentanyl were present as a cause of death among victims under the age of 25, Black people had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people under the age of 25 consistently had higher overdose death rates when any opioid was present and when fentanyl, specifically, was present.

Table 9. Demographic Characteristics by Substance Type for Victims Aged 25–44 Who Died From an Opioid Overdose

		Any Opioid Present as a Cause of Death (*n*=1,326)		Fentanyl Present as a Cause of Death (*n*=1,036)	
		Number	Rate	Number	Rate
Sex					
	Male	976	66.7	780	53.3
	Female	350	25.3	256	18.5
Race/Ethnicity					
	Black	106	65.7	89	55.1
	American Indian	113	77.2	100	68.3
	White	1059	49.8	806	37.9
	Asian/Pacific Islander	13	9.9	12	9.1
	Hispanic	425	41.6	355	34.8
	Not Hispanic	899	49.2	681	37.3

As shown in Table 9, among victims aged 25–44, overdose death rates were lower for females than for males for overdose deaths that were caused by any opioid as well as for those that were caused specifically by fentanyl. The data also show that when opioids, including fentanyl, were present as a cause of death among victims aged 25–44, American Indians had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people aged 25–44 consistently had lower overdose death rates when any opioid was present and when fentanyl, specifically, was present.

Table 10. Demographic Characteristics by Substance Type for Victims Aged 45+ Who Died From an Opioid Overdose

		Any Opioid Present as a Cause of Death (*n*=813)		Fentanyl Present as a Cause of Death (*n*=473)	
		Number	Rate	Number	Rate
Sex					
	Male	554	25.5	331	15.2
	Female	259	10.8	142	5.9
Race/Ethnicity					
	Black	46	28.6	36	22.4
	American Indian	29	19.1	21	13.9
	White	711	18.4	401	10.4
	Asian/Pacific Islander	N/A	N/A	N/A	N/A
	Hispanic	141	15.4	86	9.4
	Not Hispanic	666	18.3	383	10.5

As shown in Table 10, among victims over the age of 44, overdose death rates were lower among females than males for overdose deaths that were caused by any opioid as well as for those that were caused specifically by fentanyl. The data also show that when opioids and/or fentanyl were present as a cause of death among victims over the age of 44, Black people had the highest overdose death rates, compared to other racial groups.

Compared to non-Hispanic people, Hispanic people over the age of 44 consistently had lower overdose death rates when any opioid was present and when fentanyl, specifically, was present.

Demographics – Counties

Tables 11–13 show the number, proportion, and rate of overdose deaths by Arizona **county of injury** and **county of residence** by age category. All deaths in the AZ-SUDORS data occurred in Arizona; however, some deaths within each age category have an unknown county of injury and are not represented in the following tables.

Conversely, not all deaths that occur in Arizona are of Arizona residents. The following tables detail the county of residence for victims by age group.

Table 11. Number and Rate of Overdose Deaths by County of Injury and County of Residence, Age Group < 25

	County of Injury				County of Residence		
AZ County	Number of Deaths <25	Percentage of AZ Deaths <25	Rate per 100,000		Number of Deaths <25	Percentage of AZ Deaths <25	Rate per 100,000
Statewide	531	100.0%	15.2		507	N/A	N/A
Maricopa	370	70.1%	17.0		348	68.6%	16.0
Pima	84	15.9%	16.5		84	16.6%	16.5
Pinal	23	4.4%	11.5		24	4.7%	12.0
Yavapai	19	3.6%	23.9		17	3.4%	21.5
Yuma	14	2.7%	12.1		14	2.8%	12.1
Cochise	N/A	N/A	N/A		N/A	N/A	N/A
Greenlee	N/A	N/A	N/A		N/A	N/A	N/A
Navajo	N/A	N/A	N/A		N/A	N/A	N/A
Coconino	N/A	N/A	N/A		N/A	N/A	N/A
Mohave	N/A	N/A	N/A		N/A	N/A	N/A
Santa Cruz	N/A	N/A	N/A		N/A	N/A	N/A
Apache	N/A	N/A	N/A		N/A	N/A	N/A
Graham	0	0%	0.0		0	0%	0.0
Gila	0	0%	0.0		N/A	N/A	N/A
La Paz	0	0.0%	0.0		0	0.0%	0.00
Non-AZ	0	0.0%	0.0		21	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths. Three deaths did not have county of injury information.

Table 12. Number and Rate of Overdose Deaths by County of Injury and County of Residence, Age Group 25-44

	County of Injury				County of Residence		
AZ County	Number of Deaths 25-44	Percentage of AZ Deaths 25-44	Rate per 100,000		Number of Deaths 25-44	Percentage of AZ Deaths 25-44	Rate per 100,000
Statewide	1,585	100.0%	55.6		1,485	N/A	N/A
Maricopa	1,078	69.0%	60.2		957	64.4%	53.4
Pima	245	15.7%	66.1		243	16.4%	65.6
Pinal	63	4.0%	36.9		76	5.1%	44.5
Yavapai	39	2.5%	63.6		45	3.0%	73.4
Yuma	26	1.7%	33.5		23	1.5%	29.6
Cochise	16	1.0%	35.9		20	1.3%	45.0
Greenlee	N/A	N/A	N/A		N/A	N/A	N/A
Navajo	25	1.6%	66.8		31	2.1%	82.8
Coconino	20	1.3%	37.8		28	1.9%	52.9
Mohave	20	1.3%	33.3		22	1.5%	36.7
Santa Cruz	N/A	N/A	N/A		N/A	N/A	N/A
Apache	N/A	N/A	N/A		10	0.7%	40.5
Graham	N/A	N/A	N/A		N/A	N/A	N/A
Gila	N/A	N/A	N/A		N/A	N/A	N/A
La Paz	N/A	N/A	N/A		N/A	N/A	N/A
Non-AZ	0	0.0%	0.0		100	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths. Twenty-two deaths did not have county of injury information.

Table 13. Number and Rate of Overdose Deaths by County of Injury and County of Residence, Age Group 45+

	County of Injury				County of Residence		
AZ County	Number of Deaths 45+	Percentage of AZ Deaths 45+	Rate per 100,000		Number of Deaths 45+	Percentage of AZ Deaths 45+	Rate per 100,000
Statewide	1,339	100.0%	29.3		1,232	N/A	N/A
Maricopa	835	64.0%	33.1		760	61.7%	30.1
Pima	215	16.5%	32.5		203	16.5%	30.7
Pinal	52	4.0%	18.7		59	4.8%	21.2
Yavapai	49	3.8%	24.3		53	4.3%	26.3
Yuma	36	2.8%	29.7		33	2.7%	27.3
Cochise	45	2.6%	38.6		31	N/A	N/A
Greenlee	N/A	N/A	N/A		N/A	N/A	N/A
Navajo	15	1.2%	22.0		13	1.1%	19.0
Coconino	17	1.3%	23.0		16	1.3%	21.6
Mohave	25	1.9%	14.1		29	2.4%	16.3
Santa Cruz	N/A	N/A	N/A		N/A	N/A	N/A
Apache	N/A	N/A	N/A		N/A	N/A	N/A
Graham	N/A	N/A	N/A		N/A	N/A	N/A
Gila	N/A	N/A	N/A		11	0.9%	24.9
La Paz	N/A	N/A	N/A		N/A	N/A	N/A
Non-AZ	0	0.0%	0.0		107	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths. Thirty-five deaths did not have county of injury information.

Demographics - Other

The remainder of this section reports on the number and proportion of overdose deaths by specific socio-demographic characteristics (education level, marital status, and homelessness status) among youth under the age of 25 without reporting rates.

The most common education level achieved among unintentional / undetermined overdose deaths in Arizona for those under 25 years old was high school graduate / GED equivalent. While this was also the most common education level attained among all age categories, education levels do increase with age, given that those under the age of 25 may not have had an opportunity to complete their highest level of education. Figures 8–10 show the proportional make-up of educational attainment among overdose death victims by age category.

Figure 8. Highest Level of Educational Attainment, Age Group < 25

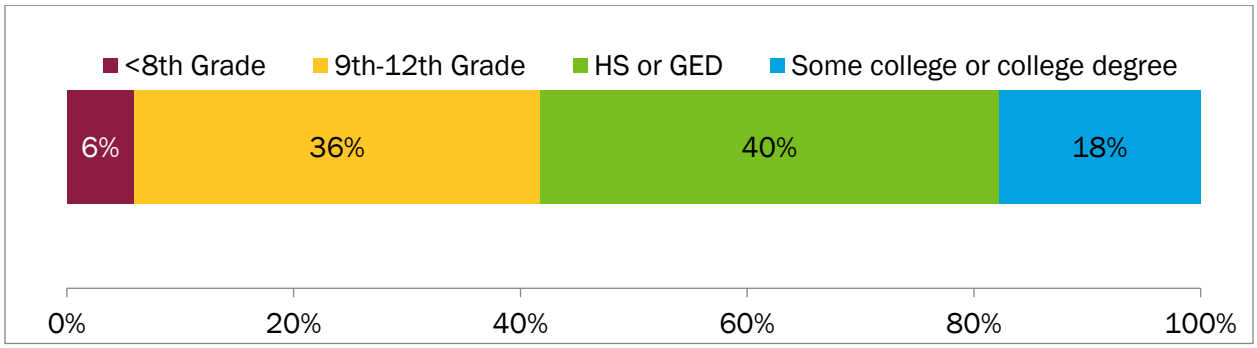


Figure 9. Highest Level of Educational Attainment, Age Group 25–44

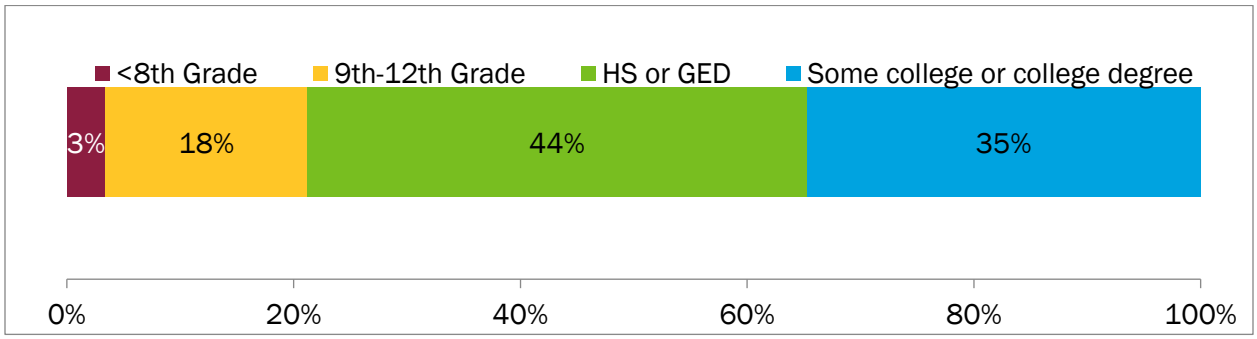
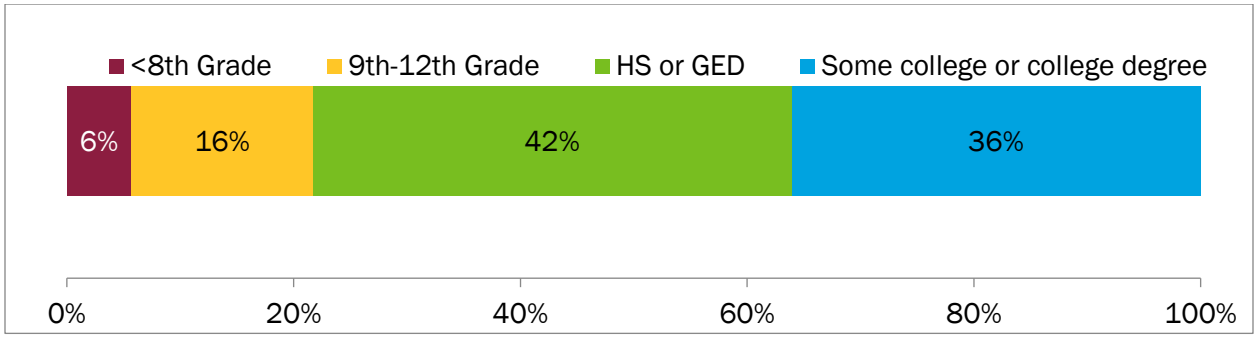


Figure 10. Highest Level of Educational Attainment, Age Group 45+



Circumstances

For most overdose death victims in all age categories, no evidence was reported indicating a recent release from an institutional setting such as a hospital, prison, or residential treatment center. Table 14 shows the proportion of victims who were recently released from institutional settings. Younger victims were more likely to have recently been released from jail or a residential treatment facility, while victims in older age groups were more likely to have recently been released from a hospital.

Table 14. Proportion Recently Released From Institutional Setting by Age Category

	Age <25		Age 25 – 44		Age 45+	
Institutional Setting	Number of Deaths	Percentage of Deaths	Number of Deaths	Percentage of Deaths	Number of Deaths	Percentage of Deaths
No evidence of recent release	452	85.1%	1,379	87.0%	1,202	89.8%
Jail or prison	36	6.8%	84	5.3%	35	2.6%
Residential facility related to alcohol or substance abuse treatment	20	3.8%	44	2.8%	12	0.9%
Hospital	19	3.6%	68	4.3%	80	6.0%
Psychiatric hospital or treatment	N/A	N/A	N/A	N/A	N/A	N/A
Other / unknown institution	N/A	N/A	N/A	N/A	N/A	N/A
Residential facility not related to alcohol or substance abuse treatment	N/A	N/A	N/A	N/A	N/A	N/A

Note: N/A denotes fewer than ten but more than zero deaths.

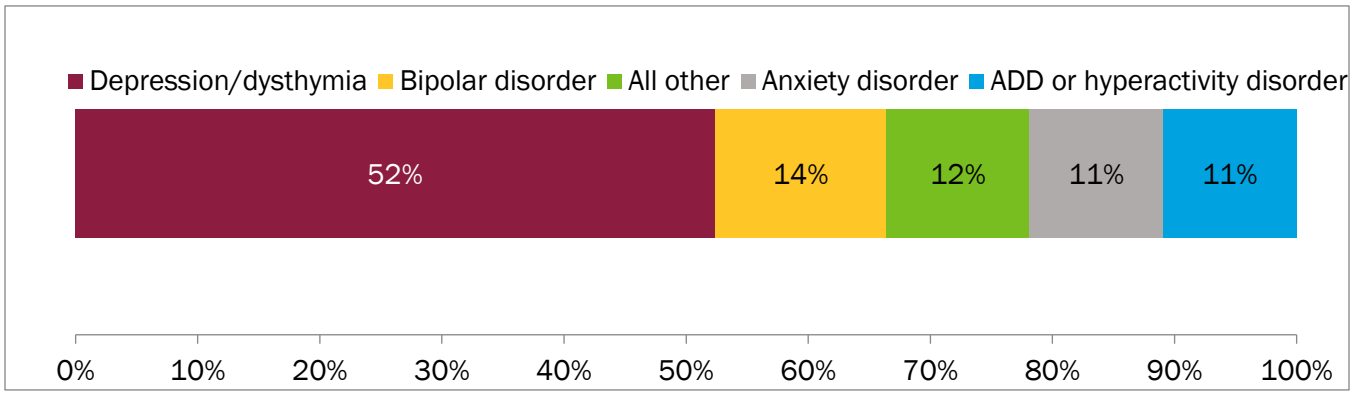
The majority of overdose death victims in all age categories are known to have been **injured at their own home.** The most common location of overdose death for victims in all age categories was at a house or apartment, with other common locations of injury including hotels or motels and motor vehicles. Table 15 shows injury location proportions by age category.

Table 15. Injury Location Proportion by Age Category

	Age <25		Age 25 – 44		Age 45+	
Injury Location	Number of Deaths	Percentage of Deaths	Number of Deaths	Percentage of Deaths	Number of Deaths	Percentage of Deaths
House/apartment	420	79.1%	1,078	68.0%	879	65.6%
Hotel/motel	25	4.7%	100	6.3%	52	3.9%
Motor vehicle	17	3.2%	45	2.8%	46	3.4%
Street/road	12	2.3%	60	3.8%	96	7.2%
Supervised residential facility	11	2.1%	46	2.9%	18	1.3%
All other / unknown	46	8.7%	256	16.2%	248	18.5%

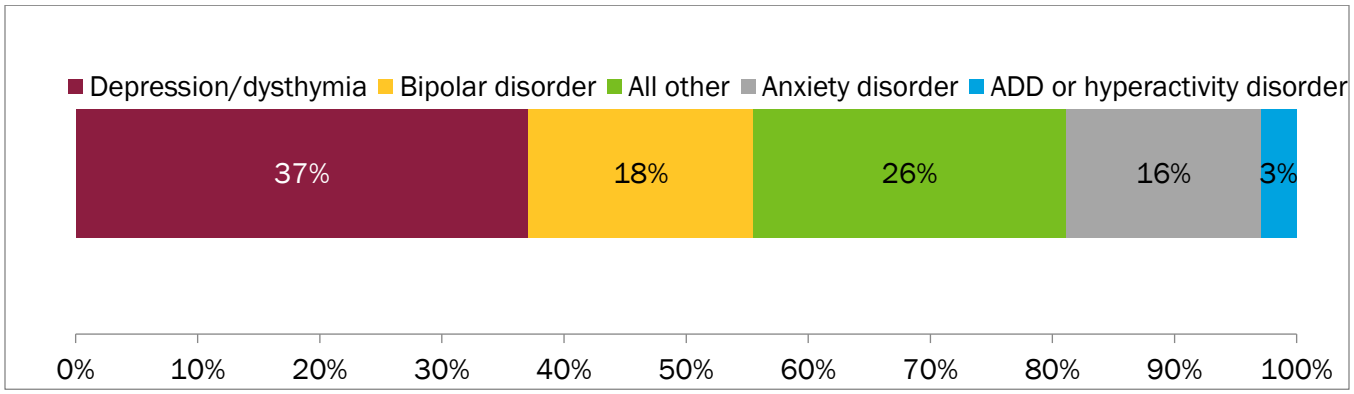
Among youth under the age of 25, 24% of unintentional / undetermined overdose victims had a known currently diagnosed **mental health problem**. Over 14% of victims were known to currently be receiving mental illness treatment (*n*=77). Among those with a known mental health diagnosis (*n*=128), the most common diagnosis was depression / dysthymia. Figure 11 visualizes these diagnoses.

Figure 11. Diagnoses Among Those With a Mental Health Diagnosis, Age Group < 25



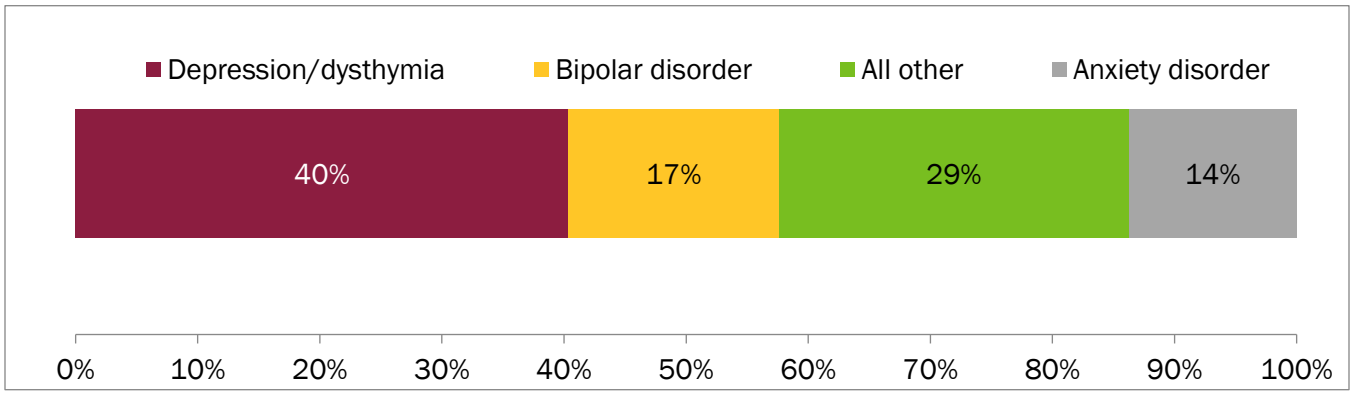
Among overdose death victims aged 25–44, 28% had a known currently diagnosed **mental health problem**. Almost 16% of victims were known to currently be receiving mental illness treatment (*n*=252). Among those with a known mental health diagnosis (*n*=445), the most common diagnosis was depression / dysthymia. Figure 12 visualizes these diagnoses.

Figure 12. Diagnoses Among Those with a Mental Health Diagnosis, Ages Group 25-44



Among overdose death victims aged 45 and older, 26% had a known currently diagnosed **mental health problem**. Almost 14% of victims were known to currently be receiving mental illness treatment (*n*=181). Among those with a known mental health diagnosis (*n*=342), the most common diagnosis was depression / dysthymia. Figure 13 visualizes these diagnoses.

Figure 13. Diagnoses Among Those With a Mental Health Diagnosis, Age Group 45+



Almost 18% of victims aged 24 and under (*n*=95) had experienced a **previous overdose**. For older age categories, the percentage of deaths with a previous overdose was lower. Table 16 shows the proportions of deaths with a previous overdose by age group.

Table 16. Proportion of Overdose Deaths with a Previous Overdose by Age Category

Age	Number of Deaths With a Previous Overdose	Percentage of Deaths With a Previous Overdose
Under 25	95	17.9%
25 – 44	198	12.5%
45 +	84	6.3%

Most overdose death victims of any age had no evidence of **treatment for substance abuse** currently or in the past. Victims younger than age 45 were approximately twice as likely to have evidence of either current or past treatment for substance abuse, compared to victims in the 45-and-older age group. Table 17 below shows these proportions.

Table 17. Proportion of Overdose Deaths with Current or Past Treatment for Substance Abuse, by Age Group

Age	Number of Deaths With Current or Past Treatment for Substance Abuse	Percentage of Deaths With Current or Past Treatment for Substance Abuse
Under 25	77	14.5%
25 – 44	231	14.6%
45 +	98	7.4%

For approximately half of overdose death victims, their **history of past opioid use** was unknown. When opioid use history was known, the data show that younger victims had higher rates of past opioid use than older victims. Table 18 below shows these differences by age group.

Table 18. Proportion of Overdose Deaths with a History of Opioid Use, by Age Group

Age	Number of Deaths With a History of Opioid Use	Percentage of Deaths With a History of Opioid Use
Under 25	128	47.2%
25 – 44	354	46.2%
45 +	226	32.6%

Note: For all age groups, approximately 50% of history of opioid use data were missing. Percentages reported are restricted to cases for which data on history of opioid use were provided.

Almost 11% of overdose victims under the age of 25 were administered **naloxone**, a drug that can reverse the effects of an opioid overdose. Fewer victims in the older age categories had naloxone administered, with only 5.2% of victims over the age of 44 having received naloxone.

For victims in all age categories, when naloxone was administered, it was most commonly administered by emergency medical service staff or firefighters.

Table 19. Proportion of Overdose Deaths With Naloxone Administered

Age	Number of Deaths Administered Naloxone	Percentage of Deaths Administered Naloxone
Under 25	56	10.5%
25 – 44	155	9.8%
45 +	69	5.2%

The most common scenario among overdose death incidents involved the presence of a **bystander**. In the AZ-SUDORS data, we define a bystander as "an individual who was physically nearby either during or shortly preceding a drug overdose who potentially had an opportunity to intervene and respond to the overdose. First responders or medical professionals called to the scene are not considered bystanders."[10]

As victims' age groups increased, bystanders were less likely to have been present.

Table 20 shows the proportions of overdose deaths with and without bystanders present, by victim age category.

Table 20. Percentage of Overdose Deaths With Bystanders Present, by Victim Age Group

Bystander Scenario	Percentage of Deaths		
	Ages < 25	Ages 25 – 44	Ages 45+
No bystanders present	11.5%	22.6%	31.8%
One bystander present	28.8%	30.2%	29.3%
Multiple bystanders present	36.3%	24.7%	13.6%
Bystanders present, unknown number	11.5%	7.8%	6.6%
Unknown if bystander present	11.9%	14.8%	18.8%

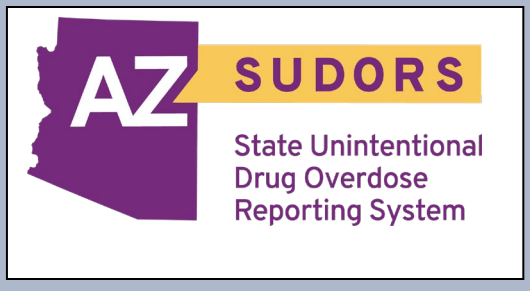
[10] Additionally, this definition excludes anyone under the age of 11 and anyone with limited mental capacity that would interfere with the ability to respond to an overdose.

Pilot Study of Prior Hospital Discharge Data and Overdose Death Data in Arizona

Arizona State Unintentional Drug Overdose Reporting System

(AZ-SUDORS)

January 2019 – December 2020



August 2021

Pilot Study of Prior Hospital Discharge Data and Overdose Death Data in Arizona

January 1, 2019 – December 31, 2020

Melissa Kovacs, Ph.D., PStat
Charles M. Katz, Ph.D.

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Suggested Citation: Kovacs, Melissa and Charles M. Katz. Pilot Study of Prior Hospital Discharge Data and Overdose Death Data in Arizona: January 1, 2019 – December 31, 2020 (September 2021), Arizona State University, Center for Violence Prevention and Community Safety. Arizona State Unintentional Drug Overdose Reporting System (AZ-SUDORS).

Introduction

The United States experienced 70,630 drug overdose deaths in 2019. Over 70% of these deaths involved an opioid.[1] In an effort to better track opioid-involved and other drug-related deaths and to inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS), of which Arizona is a participant.

As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

Additionally, all Arizona licensed hospitals are required to report patient discharge records, known as hospital discharge data (HDD), to the AZDHS twice yearly. This report describes a pilot test to compile and merge AZ-SUDORS data with HDD data. By merging these two data sources, rich information regarding unintentional and undetermined overdose death victims' prior hospital usage, if any, can be obtained.

AZ-SUDORS data for the period January 1, 2019 – December 31, 2020 were matched with HDD data to create the dataset used for this report. AZ-SUDORS data were accessed and downloaded from the secure CDC web-portal system used for SUDORS data management. The data were downloaded on June 30, 2021, and represent the most complete abstracted data to that date. HDD data were provided to CVPCS by the AZDHS through its agreement with ASU and its honest broker for protected health information. HDD data were matched with an anonymous linking variable within the authorized protected computing environment and were then merged with the SUDORS data and de-identified for analyses. The HDD data provided to AZ-SUDORS cover the period of January 1, 2016, through December 31, 2020.

This is the fourth report in a series focusing on unintentional and undetermined overdose deaths among Arizonans. The first report in this series provided an overview of overdose deaths in Arizona, the second report examined geographic differences in unintentional and undetermined overdose death rates in Arizona, and the third report analyzed overdose death characteristics by age group.

Data and Methods

[1] See "Drug Overdose Deaths," Centers for Disease Control and Prevention, page updated March 3, 2021. https://www.cdc.gov/drugoverdose/deaths/index.html

The data used for this report comprise all unintentional and undetermined drug overdose deaths from AZ-SUDORS from January 1, 2019, through December 31, 2020, merged with HDD data from the AZDHS.

SUDORS data rely on two principal sources to populate an aggregated, anonymous database: death certificates and medical examiner reports, which include death investigation reports, toxicology reports, and autopsy reports. SUDORS data contain information on victim demographics and circumstances that are then de-identified, abstracted, and aggregated into a CDC-managed database.

AZ-SUDORS received death certificate data for all overdose deaths in Arizona over the reporting period. For these deaths, approximately 97% of medical examiner records were obtained by the project from medical examiners' offices. Records not obtained were primarily the result of the Pinal (*n*=34) and Yavapai (*n*=29) County Medical Examiner's Offices not participating until January 1, 2020, the Mohave County Medical Examiner's Office (*n*=11) not participating until July 1, 2020, the Navajo (*n*=31) County Medical Examiner's Office joining as a participating agency after the completion of the data periods analyzed in this report, and the lack of participation of the Navajo Nation Criminal investigations unit, which certifies many of the deaths that occur in Navajo Nation jurisdiction (*n*=10).[2] The remainder of the missing reports are due to medical examiner services providers partially servicing Apache and Graham counties not participating as of the writing of this report as well as deaths that were not admitted to a medical examiner's office, each representing fewer than 10 deaths. The absence of these records represents an important limitation to the findings presented in this report.

The term HDD data refers to a database of patient information from in-patient and emergency department hospitalizations across Arizona. The data include basic demographic information for the patient and the facility as well as very detailed information regarding the various diagnoses, treatments, and procedures and their related costs. All hospitals licensed by Arizona must submit these records twice per calendar year.

All results in this report are preliminary. This report represents the results of a pilot test of accessing and merging these two robust datasets and proceeds with descriptive statistics of the merged data followed by future answerable research questions in relation to these data.

IBM SPSS Statistics v27 was used for the analyses.

[2] AZ-SUDORS is in the process of finalizing a data use agreement for participation with the Navajo County Office of the Medical Examiner as of September 2021; *n* denotes missing cases from the respective jurisdiction during this report's project period.

Dataset Description

Subsample Sizes

The SUDORS component of the dataset represents all unintentional / undetermined overdose deaths during the two-year time period of the dataset, encompassing 2019 – 2020. The HDD component of the dataset represents any hospital discharge data that matched to a SUDORS death.

From January 1, 2019 – December 31, 2020, there were 4,406 unintentional / undetermined overdose deaths comprising the SUDORS data. Among these SUDORS deaths, 72.3% (*n*=3,185) had matching hospital discharge data.

Table 1 describes these proportions.

Table 1. Dataset Component Subsample Sizes

Dataset Component	*N*
SUDORS	4,406
HDD	3,185

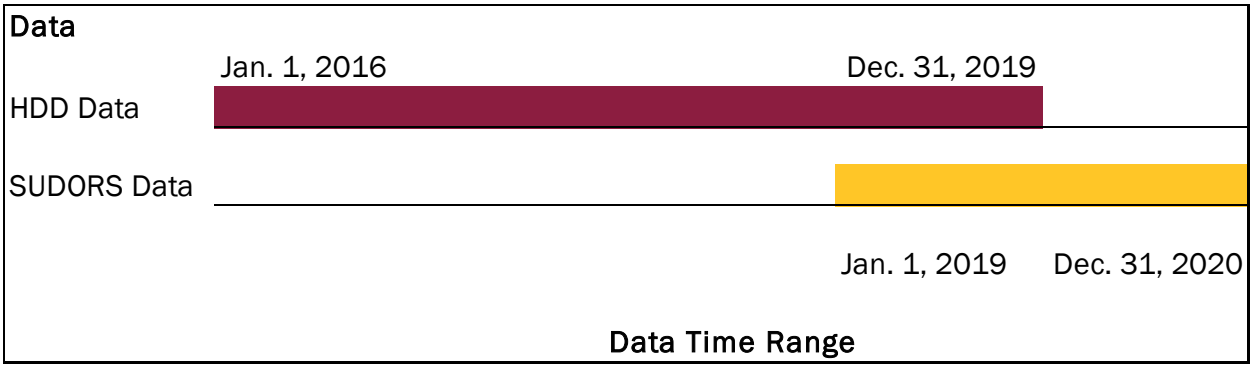
The SUDORS deaths that had matching hospital discharge data (*n*=3,185) represent 3,225 hospital visits. These 3,225 hospital visits include 95 visits for which the hospital discharge status was "expired," indicating that 95 of these hospitalizations were connected to the fatal overdose incident itself. Only 26 overdose death victims had a history of more than one hospital visit. On average, SUDORS overdose death victims had .74 hospital visits prior to their death.

Timeline

In the dataset, two years' worth of SUDORS deaths are represented (January 1, 2019 – December 31, 2020). These deaths are matched against four years' worth of hospital discharge records (January 1, 2016 – December 31, 2019).[3] In this sense, every SUDORS death has at least three years' worth of prior hospital discharge data for a potential match, and for some deaths, this period is longer than three years. Figure 1 displays the timelines of the two data components in this dataset.

[3] Hospital discharge dates in the dataset begin on January 1, 2016, but the individual could have been admitted to the hospital prior to January 1, 2016, and then been discharged on or after that date.

Figure 1. Dataset Components' Timelines



Preliminary Findings

Preliminary analyses were performed on the merged dataset to inform future answerable research questions with this new merged data. Results of the preliminary analyses are described below.

As stated in Table 1, **72.3%** of unintentional / undetermined overdose deaths from 2019 – 2020 had matching hospital discharge records.

For **59.7%** (*n*=1,839) of overdose victims' visits with a hospital discharge record, the length of stay was less than one day.

For those who were admitted to the hospital (length of stay of at least one day), their average length of stay was **3.9** days, with a median length of stay of **2** days.

Table 2 shows the most common ICD-10 codes provided as the reason for the visit to the hospital. These top 15 most common reasons for the hospital visit represent 31% of all hospital visit reasons. These common reasons for visiting the hospital often involve pain – an area that should be further researched.

Table 2. Common Reasons for Hospital Visit

ICD-10 Code Reason for Visit	Number	Percent of Total
Unspecified abdominal pain	89	3.7%
Headache	70	2.9%
Cough	69	2.9%
Altered mental status, unspecified	63	2.6%
Chest pain, unspecified	63	2.6%
Low back pain	61	2.5%
Cardiac arrest	56	2.3%
Dorsalgia, unspecified (severe back pain)	45	1.9%
Nausea with vomiting	43	1.8%
Rash	36	1.5%
Cervicalgia (neck pain)	34	1.4%
Dizziness	31	1.3%
Shortness of breath	30	1.2%
Epigastric pain	30	1.2%
Unspecified convulsions	30	1.2%

Table 3 shows the most common admitting diagnoses for hospital visits. These top 15 most common reasons represent 27% of all admitting diagnoses. Both alcohol dependence and opioid dependence are present in the table, along with mental health diagnoses, and these factors should be further researched.

Table 3. Common Admitting Diagnoses

ICD-10 Code Admitting Diagnosis	Number	Percent of total
Sepsis, unspecified	34	4.2%
Altered mental status, unspecified	25	3.1%
Cardiac arrest	19	2.4%
Alcohol dependence with withdrawal	16	2.0%
Major depressive disorder, single episode	16	2.0%
Major depressive disorder, recurrent severe	16	2.0%
Pneumonia	13	1.6%
Major depressive disorder, single episode without psychotic	11	1.4%
Acute respiratory failure	11	1.4%
Cellulitis of left lower limb	11	1.4%
Opioid dependence with withdrawal	10	1.2%
Shortness of breath	9	1.1%
Unspecified abdominal pain	9	1.1%
Schizoaffective disorder, bipolar type	9	1.1%
Gastrointestinal hemorrhage	9	1.1%

Table 4 shows the proportion of payer types represented among hospital visits in the data.

Table 4. Proportion of Payer Type

Payer Type	Number	Percent of Total
AHCCCS Medicaid	1,746	54.1%
Self-Pay	479	14.9%
HMO	275	8.5%
Medicare	218	6.8%
PPO	168	5.2%
Commercial (Indemnity)	141	4.4%
Medicare Risk	86	2.7%
Other	43	1.3%
TRICARE	27	0.8%
Workers' Compensation	15	0.5%
Charity	13	0.4%
Indian Health Services	11	0.3%
Children's Rehab Services	3	0.1%

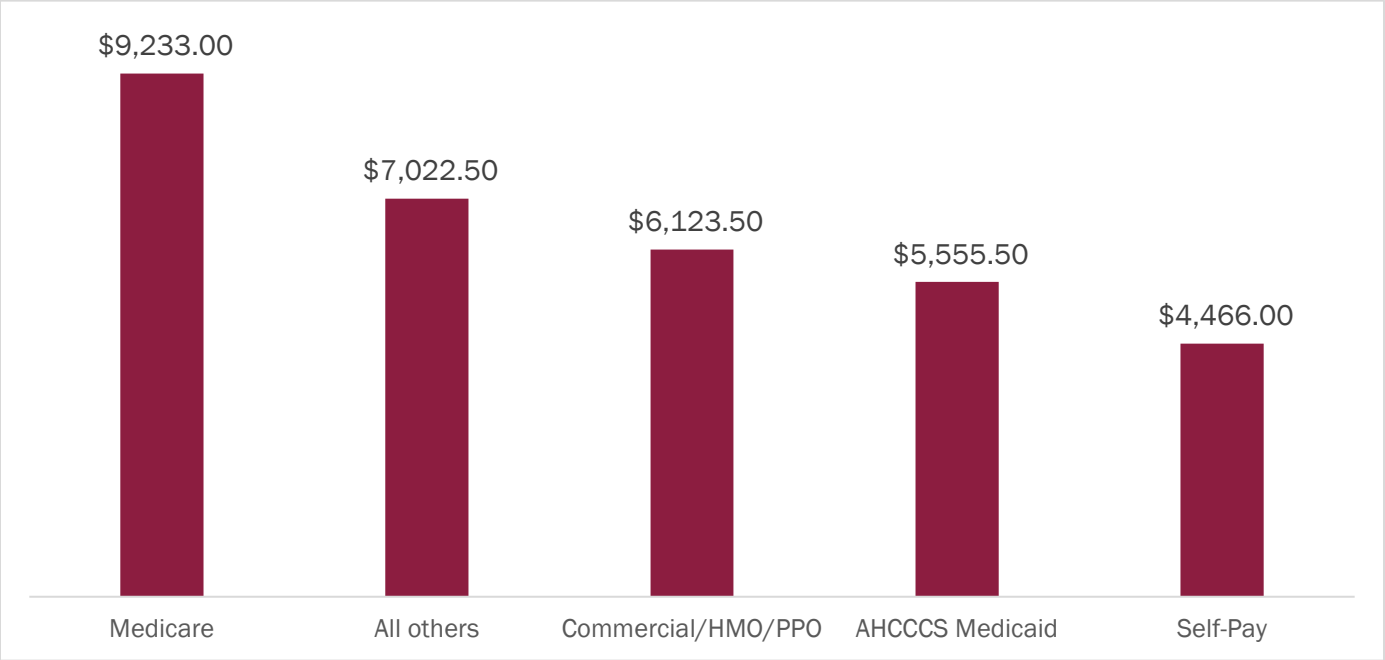
On average, the total charges for hospital visits were $19,058 per visit, with a median charge of $5,759 per visit. These values are slightly higher when measured per victim and are summarized in Table 5.

Table 5. Average and Median Charges per Visit and per Victim

	Average Charge	Median Charge
Per Visit	$19,058	$5,759
Per Victim	$19,408	$5,886

Total charges differ by payer type, with Medicare-paying individuals having the highest total charges and self-pay individuals experiencing the lowest total charges. Figure 2 shows median[4] total charges by payer type. Payer type categories were collapsed for ease of understanding.

Figure 2. Median Total Charge by Payer Type



[4] Because the "total charge" variable exhibits skew and kurtosis, medians are reported instead of means.

Future Answerable Questions

The preliminary results in this report showcase future answerable questions with these data that could inform prevention and policymaking, such as:

- How many visits and/or admissions were for a drug-related issue? This question will require coding all visit and admission ICD-10 codes, not merely the top 15 as reported in Table 3, which will require a substantial time commitment.
- What were common procedures performed and/or what were the ultimate costs when the visit or admission was drug-related?
- What other diagnoses commonly accompany a drug-related diagnosis?
- Among unintentional / undetermined overdose victims who had a recent hospitalization, do their payer types differ from those of the general population?
- Are there demographic differences among overdose death victims who were recently hospitalized, compared with those who were not recently hospitalized?
- How many hospital visits were related to pain? What common procedures were performed when the primary presenting complaint was pain-related?
- How do the proportions of hospital visits that resulted in discharge to a psychiatric hospital, discharge to court or law enforcement, expiration, or a routine discharge compare to the same proportions among hospital visits of those who were not overdose death victims?

Drug Overdose Deaths in Arizona During the Early Stages of the COVID-19 Pandemic

Arizona State Unintentional Drug Overdose Reporting System (AZ-SUDORS)
January 2019 – December 2020

August 2021

Center for Violence Prevention and Community Safety
Arizona State University

College of Health Solutions
Arizona State University

Drug Overdose Deaths in Arizona During the Early Stages of the COVID-19 Pandemic

By
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Drug Overdose Deaths in Arizona During the Early Stages of the COVID-19 Pandemic

Raminta Daniulaityte; Lance Ruhter; Charles Katz

Introduction

The key aims of this report are to assess changes in drug-related characteristics of overdose deaths in Arizona in 2019 and 2020 and to characterize patterns during the first nine months of the COVID-19 pandemic (April through December 2020). The report focuses on changes across different drug categories, including non-pharmaceutical fentanyl, heroin, pharmaceutical opioids, methamphetamine, cocaine, benzodiazepines, and alcohol.

To improve epidemiological surveillance of opioid-involved and other drug-related deaths and inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS). As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

Methods

The data used for this report include all drug overdose deaths from January 1, 2019, through December 31, 2020, recorded by AZ-SUDORS. We relied on post-mortem toxicology results in classifying drug involvement. If a decedent tested positive for more than one type of drug, each drug type was recorded. For the purposes of this report, *drug involvement* does not necessarily imply that the substance in question was determined to be a cause of death; rather, we classify a substance as involved if the decedent's toxicology results reported the presence of that substance. AZ-SUDORS data included overdose cases from all 15 Arizona counties. Out of a total of 4,152 cases, no toxicology data were available for 196 cases (4.7%), and they were excluded from further analysis of drug-related characteristics of overdose mortality cases.

Key sociodemographic and drug-related indicators

Sociodemographic information (age, sex, ethnic/racial background, education, and homelessness) was obtained from death certificates and medical examiner reports (Table 1). Non-pharmaceutical fentanyl (NPF)-positive cases were identified if they tested positive for fentanyl (*n*=2,248) and/or norfentanyl (*n*=1,832), 4-ANPP (precursor chemical; its presence is indicative of illicitly manufactured fentanyl use; *n*=1,245), acetyl fentanyl (*n*=32), para-fluorofentanyl (*n*=14), acetyl norfentanyl (*n*=9), cyclopropylfentanyl (*n*=2), valerylfentanyl (*n*=2), and other fentanyl analogs (one positive case was identified for each of the following fentanyl analogs: butyrfentanyl, carfentanil, fluoroisobutyrylfentanyl, and n-methyl norfentanyl). Following the classification approach used in prior studies of opioid-related overdose mortality (O'Donnell et al., 2020), we classified detection of fentanyl as a potential pharmaceutical fentanyl case (*n*=19) if it was negative for 4-ANPP or fentanyl analogs and, according to the medical examiner's report, contained evidence of use of prescription

fentanyl at the scene or by witness account. These cases were excluded from the NPF category and were added to the pharmaceutical opioid category.

An overdose case was defined as heroin-related a) if the decedent tested positive for the heroin-specific metabolite 6-monoacetylmorphine (6-MAM; *n*=370), b) if the case was classified as heroin-related by the medical examiner (*n*=14; 7 out 14 cases also tested positive for 6-MAM), or c) following the approach used in the prior research (Gladden et al., 2019; O'Donnell et al., 2020), if morphine was detected in the absence of 6-MAM (*n*=121) if the case also tested positive for one or more common impurities in heroin, such as codeine (Ellis et al., 2016; Somerville et al., 2017).

Pharmaceutical opioid-positive cases included those that tested positive for oxycodone, oxymorphone, hydrocodone, hydromorphone, dihydrocodeine, tramadol, methadone, buprenorphine, meperidine, morphine (if the case was not classified as heroin-positive to exclude morphine as a heroin metabolite), and codeine (if the case was not classified as heroin-positive to exclude codeine as a potential heroin impurity). We acknowledge limitations related to the identification of heroin, pharmaceutical morphine, and pharmaceutical codeine cases. Similar strategies in the interpretation of toxicology reports have been adopted in prior analyses of overdose mortality data (O'Donnell et al., 2020). Cases that tested positive for fentanyl (but negative for 4-ANPP or other analogs) and were noted as containing evidence of use of prescription fentanyl at the scene or by witness account were added to the pharmaceutical opioid category.

Cocaine cases included those that tested positive for cocaine and its metabolites cocaethylene and benzoylecgonine. Methamphetamine cases included all those that tested positive for methamphetamine. About 90% of methamphetamine-positive cases also tested positive for amphetamine, which is a primary metabolite of methamphetamine. Benzodiazepine cases included all cases that tested positive for pharmaceutical benzodiazepines, including alprazolam, diazepam, clonazepam, temazepam, lorazepam, and oxazepam. Alcohol cases included all that tested positive for alcohol.

Data analyses

First, sociodemographic data are presented for all cases (*N*=4,152; Table 1). Drug-related information is presented for all cases that had toxicology reports (*N*=3,956; Table 2). To compare changes over time by different types of opioid-involvement categories, decedents were categorized into four mutually exclusive analysis groups based on the types of opioids involved in the overdose deaths. The analysis categories are 1) NPF-positive cases (all cases that tested positive for fentanyl and/or other NPFs; they may or may not have tested positive for other types of opioids), 2) heroin-positive cases that are negative for NPFs (may or may not also have tested positive for pharmaceutical opioids), 3) pharmaceutical opioid-positive cases that are negative for NPFs and heroin, and 4) cases that tested negative for any type of opioid.

Next, monthly counts of overdose death cases were plotted over time for all cases and by the different types of drugs involved. To account for seasonal variation, percent change between 2019 and 2020 overdose death cases were calculated and graphed for each month. For this report, the April 1^{t} cutoff point was selected because it was the start of a statewide shutdown (which was first announced on March 30 but entered into effect after 5 pm on March 31, 2020) that marked more restrictive and drastic measures to control the spread of COVID-19. All analyses were completed using SPSS and Excel.

Results

Overall sociodemographic and drug-related characteristics

The majority of the overdose mortality cases were male (73.4%). The mean age was 39.9 years. About 58% were identified as non-Hispanic Whites (Table 1). NPFs constituted the most commonly identified drug type, with 2,207 (55.8%) decedents testing positive for NPFs (Table 2). About 12.5% of cases tested positive for heroin, 23.0% were identified as positive for pharmaceutical opioids, and 42.6% tested positive for methamphetamine. To assess differences among different types of opioid-related overdose mortality cases, we grouped overdose mortality cases into four mutually exclusive categories: 1) NPF-positive, 2) heroin-positive, negative for NPFs, 3) pharmaceutical opioid-positive, negative for other types of opioids, and 4) negative for any type of opioid. The largest was the NPF-positive group (55.8%). The non-opioid-related group included 22.7% of all cases (Table 2).

Table 1. Sociodemographic characteristics of drug-related overdose mortality cases in Arizona, January 1, 2019 – December 31, 2020.

Characteristics	All cases (*N*=4,152)	Cases with toxicology reports (*N*=3,956)
Sex[1]		
Male	3059 (73.7%)	2931 (74.1%)
Female	1092 (26.3%)	1025 (25.9%)
Ethnicity[2]		
Non-Hispanic	2956 (71.5%)	2808 (71.2%)
Hispanic	1179 (28.5%)	1134 (28.8%)
Race[3]		
White	3338 (80.4%)	3192 (80.7%)
Black	340 (8.2%)	332 (8.4%)
American Indian	251 (6.0%)	232 (5.9%)
Asian and/or Pacific Islander	37 (0.9%)	36 (0.9%)
Race/Ethnicity (combined)		
White, non-Hispanic	2397 (57.7%)	2276 (57.5%)
Other	1755 (42.3%)	1680 (42.5%)
Age[4] (mean, std. dev)	39.9 (Std. Dev. 14.4)	39.8 (Std. Dev.14.4)
Unsheltered (homeless)[5]	479 (11.5%)	468 (11.8%)
County of Injury[6]		
Large Metro (Maricopa)	2784 (67.1%)	2722 (68.8%)
Mid-Size Metro (Pinal, Pima)	834 (20.1%)	783 (19.8%)
Small Metro AND Rural combined	476 (11.5%)	409 (10.3%)

[1] Information on sex was missing for one case.

[2] Information on ethnicity was missing for 17 cases.

[3] Out of all 3,349 cases that were identified as being of the White race, four were also identified as Black, six were also identified as American Indian, and one was identified as Asian. To keep racial groups mutually exclusive to facilitate comparisons, we removed these eleven cases from the White group and kept their original classification as Black, American Indian, or Asian. Out of 24 cases that were identified as Pacific Islander, 20 were also identified as Asian (and out of a total of 33 cases that were identified as Asian, 20 were also identified as Pacific Islander). To facilitate comparison, we combined these two racial categories into one category of "Asian and/or Pacific Islander." Information on race was missing for 186 cases out of a total of 4,152 and for 164 cases out of 3,956 cases with toxicology reports.

[4] Three cases had missing information on age.

[5] Information on unsheltered status was available for *n*=3,882 of all cases (*n*=3,768 cases with toxicology reports).

[6] Information on the county of injury was available for *n*=4,094 of all cases (*n*=3,956 for cases with toxicology reports).

Table 2. Drug-related characteristics of overdose mortality cases (with available toxicology information, *N*=3,956) in Arizona, January 1, 2019 – December 31, 2020.	
Types of Drugs Identified by the Drug Toxicology Analysis	***N* (%)**
Any type of opioid	3,057 (73.3%)
Non-pharmaceutical fentanyl	2,207 (55.8%)
Heroin	495 (12.5%)
Pharmaceutical opioids	911 (23.0%)
Any type of stimulant[1]	2105 (53.2%)
Cocaine	443 (11.2%)
Methamphetamine	1684 (42.6%)
Pharmaceutical stimulants	85 (2.1%)
Other drugs	
Benzodiazepines	761 (19.2%)
Cannabis	1010 (25.5%)
Alcohol	1058 (26.7%)
Four groups by opioid involvement	
1) Non-pharmaceutical fentanyl (NPF)-positive	2207 (55.8%)
2) Heroin-positive, NPF-negative	400 (10.1%)
3) Pharmaceutical opioid-positive, heroin/NPF-negative	450 (11.4%)
4) Negative for any type of opioid	899 (22.7%)
[1] Any type of stimulant included cases that tested positive for methamphetamine, cocaine, or pharmaceutical stimulants.	

All drug overdose deaths over time

Figure 1A displays all overdose death cases in Arizona by month. Monthly counts of drug-related overdose deaths in Arizona increased notably from May through August 2020, reaching 305 overdose deaths in July 2020. These increases occurred more than a month after the announcement of the first state-wide shutdown order to control the spread of COVID-19 in Arizona. To account for seasonal variation that is linked to increased risks due to heat-related vulnerabilities and injuries, monthly counts of overdose deaths were compared for each month individually between 2019 and 2020. As seen from Figure 1B, monthly counts of overdose deaths were notably greater in the summer of 2020, compared to the summer of 2019. In terms of percent change between 2019 and 2020, overdose death counts were over 20% greater in the months of January and February in 2020 (before the start of the COVID-19 pandemic). They remained elevated at about 20% during the initial phases of the COVID-19 pandemic in March and April 2020, in comparison to the corresponding months in 2019. The percent change between the two years increased from May to August, peaking at 92.6% in June 2020, compared to June 2019. They declined notably in the subsequent months (Figure 1C).

Figure 1A. Monthly Counts of Drug Overdose Deaths in Arizona, January 2019 – December 2020 (*N*=4,152)

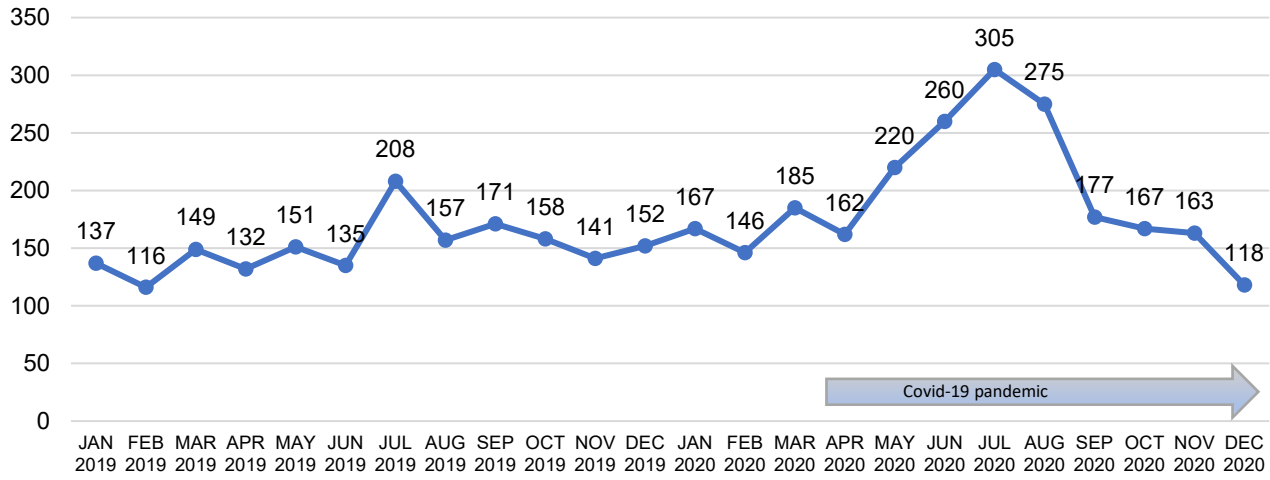


Figure 1B. Comparison of 2019 and 2020 Monthly Counts of Drug Overdose Deaths in Arizona, January 2019 – December 2020 (*N*=4,152)

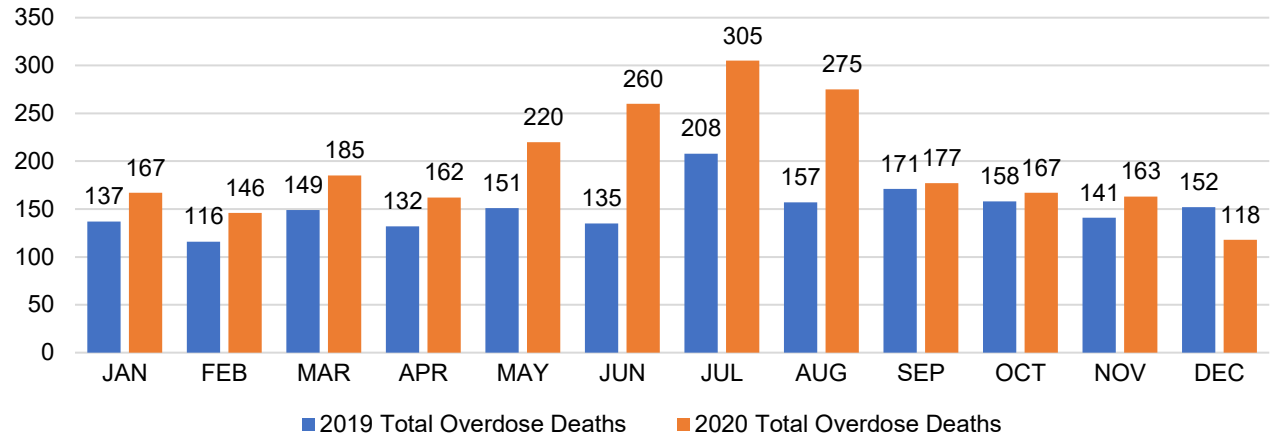
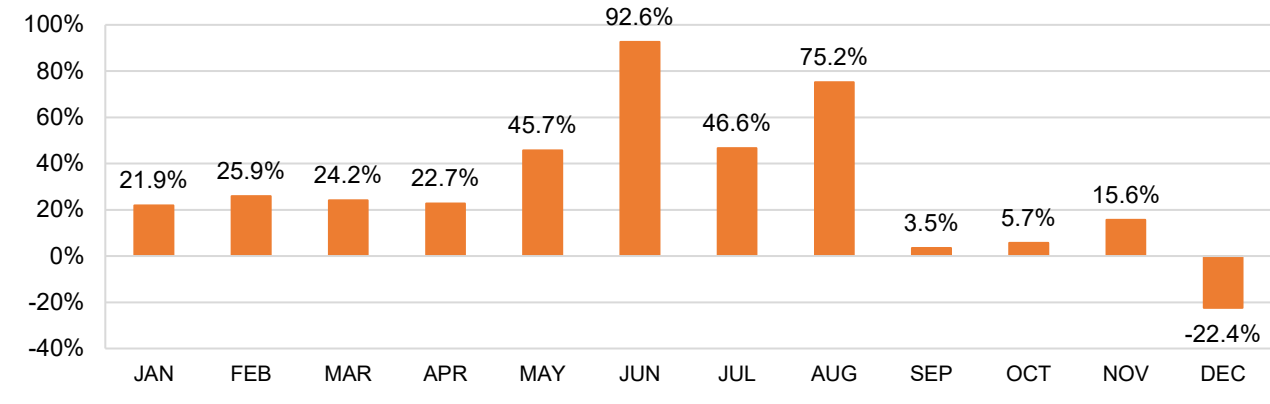


Figure 1C. Percent Change Between 2019 and 2020 in Monthly Counts of Drug Overdose Deaths in Arizona, January 2019 – December 2020 (*N*=4,152)



Opioid-related overdose death cases over time

Monthly counts of NPF-related overdose deaths in Arizona were on an increasing trajectory prior to the COVID-19 pandemic, but the numbers escalated dramatically during the period of May through August 2020, reaching 161 NPF-positive cases in July 2020 (Figure 2A). In terms of percent change between 2019 and 2020, the numbers of NPF-positive cases were over 75.4% and 97.7% higher in the months of January and February 2020 (before the start of the COVID-19 pandemic; Figure 2B). In comparison to 2019, NPF-positive cases increased more than 130% in March and May–July 2020, peaking at 225% in June 2020, compared to June 2019. In contrast, monthly counts of heroin and pharmaceutical opioid-positive cases in 2020 showed declines in comparison to the corresponding months of 2019, with slight increases in June–August 2020 (Figure 2B).

Figure 2A. Monthly Counts of Drug Overdose Deaths Testing Positive for Non-Pharmaceutical Fentanyls (NPFs), Heroin, and Pharmaceutical Opioids in Arizona, January 2019 – December 2020 (*N*=3,956)

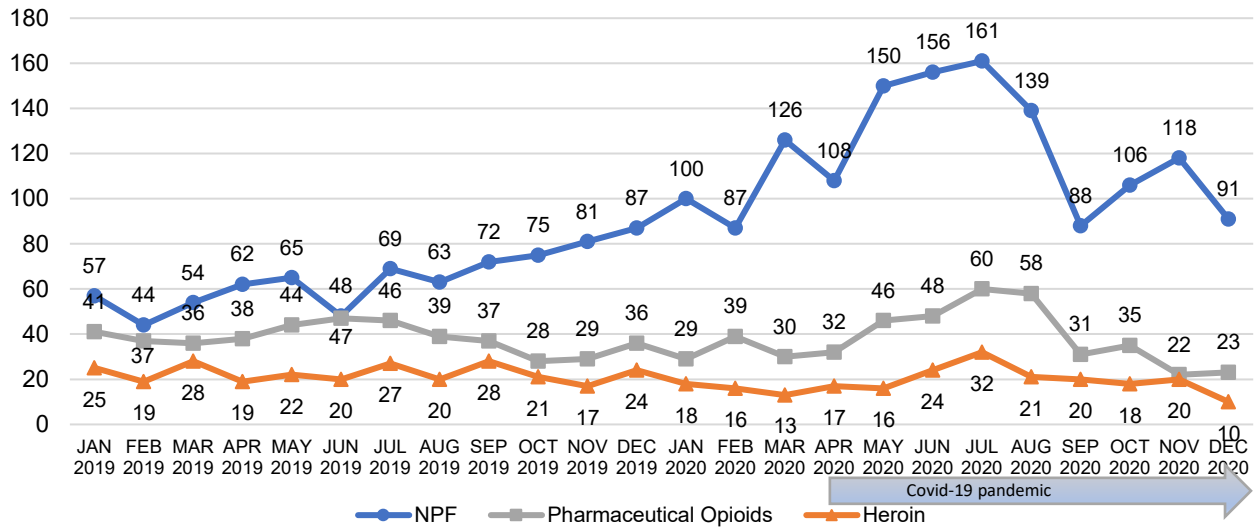
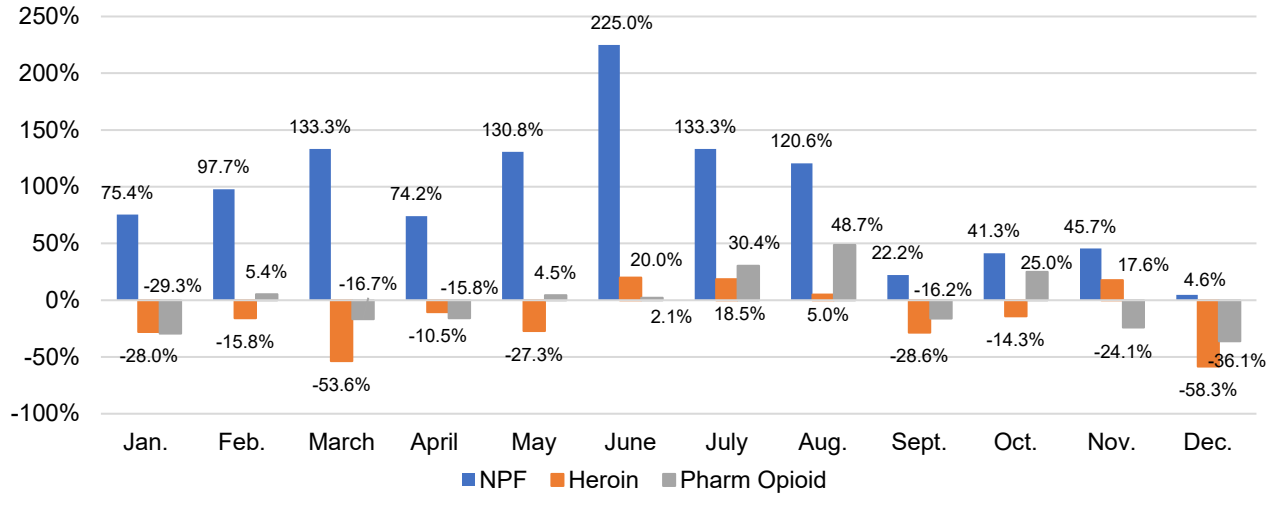


Figure 2B. Percent Change Between 2019 and 2020 in Monthly Counts of Drug Overdose Deaths in Arizona Testing Positive for Non-Pharmaceutical Fentanyls (NPFs), Heroin, and Pharmaceutical Opioids, January 2019 – December 2020 (*N*=3,956)



Stimulant-related overdose death cases over time

Monthly counts of methamphetamine-related overdose deaths increased significantly during the period of May through August 2020, reaching 161 methamphetamine-positive cases in July 2020 (Figure 3A). In terms of percent change, methamphetamine-positive cases increased more than 50% in May and July 2020 and over 100% in June and August 2020, compared to the corresponding months in 2019 (Figure 3B). Monthly counts of cocaine-positive cases were notably lower compared to methamphetamine, and they showed fluctuation over time in terms of percent change between the 2019 and 2020 counts (Figure 3B).

Figure 3A. Monthly Counts of Overdose Death Cases Testing Positive for Methamphetamine and Cocaine in Arizona, January 2019 – December 2020 (*N*=3,956)

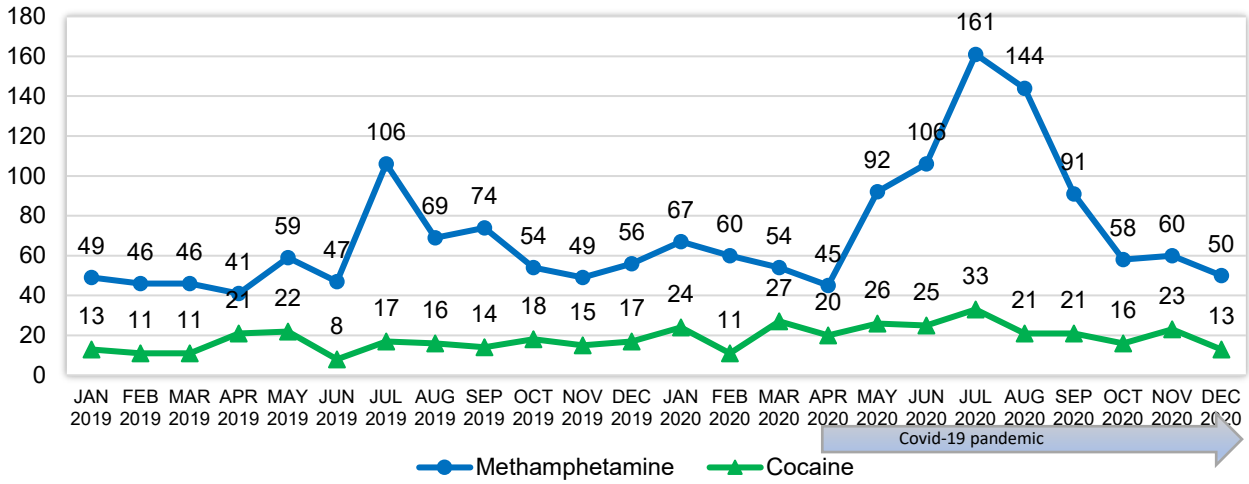
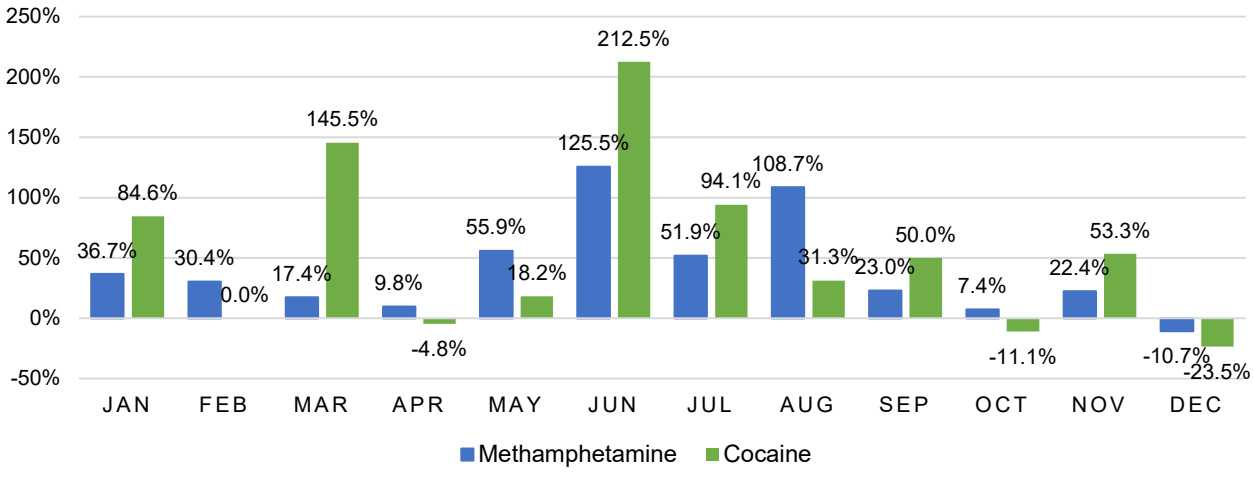


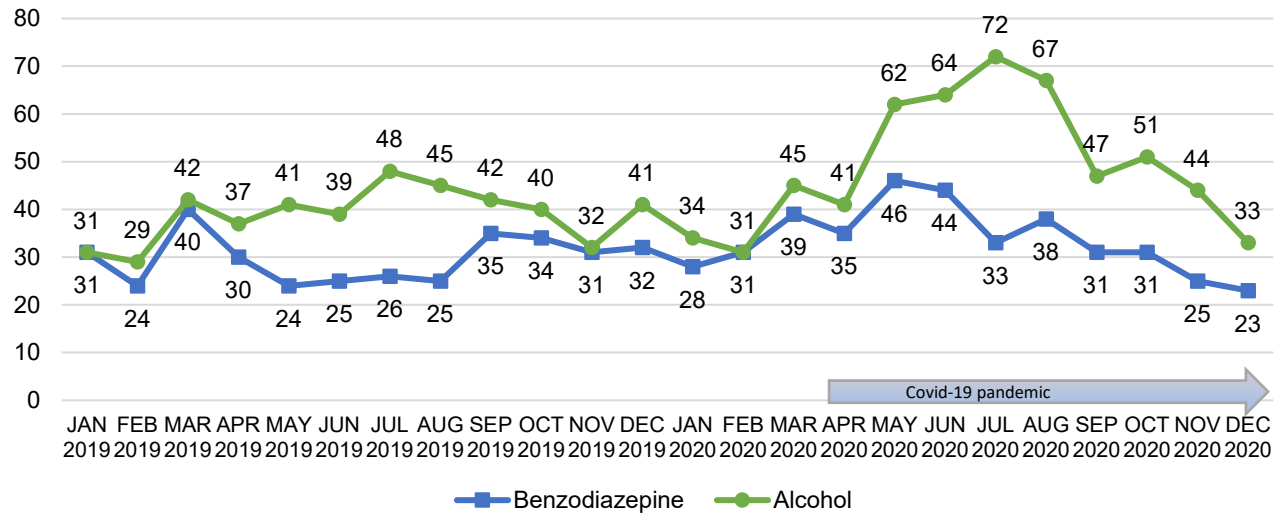
Figure 3B. Percent Change Between 2019 and 2020 in Monthly Counts of Drug Overdose Deaths in Arizona Testing Positive for Methamphetamine and Cocaine, January 2019 – December 2020 (*N*=3,956)



Benzodiazepine and alcohol-related overdose death cases over time

Monthly counts of alcohol-related overdose deaths increased from May through August 2020, reaching 72 alcohol-positive cases in July 2020 (Figure 4A). In terms of percent change, alcohol-positive cases increased about 50 or more percent in the months of May through August 2020. The percent change in alcohol-positive cases remained elevated at 11.9%, 27.5%, and 37.5% in the months of September, October, and November and declined by nearly 20% in the month of December 2020, compared to the corresponding months in 2019. Benzodiazepine cases also showed an increase in May and June 2020. In terms of percent change, benzodiazepine-positive cases increased over 90% in May, 76% in June, 26.9% in July, and 52% in August but declined in the subsequent months of 2020, compared to the corresponding months of 2019 (Figure 4B).

Figure 4A. Monthly Counts of Overdose Death Cases Testing Positive for Benzodiazepines and Alcohol in Arizona, January 2019 – December 2020 (*N*=3,956)



Overdose death cases by four opioid-involvement categories over time

Figure 4B. Percent Change Between 2019 and 2020 in Monthly Counts of Drug Overdose Deaths in Arizona Testing Positive for Alcohol and Benzodiazepines, January 2019 – December 2020 (*N*=3,956)

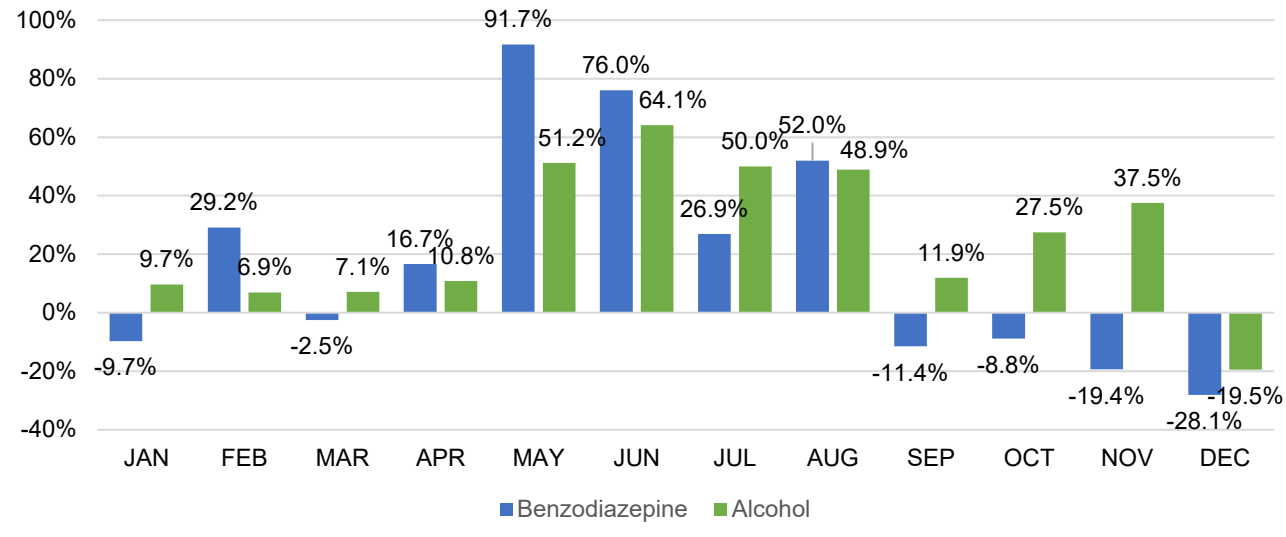
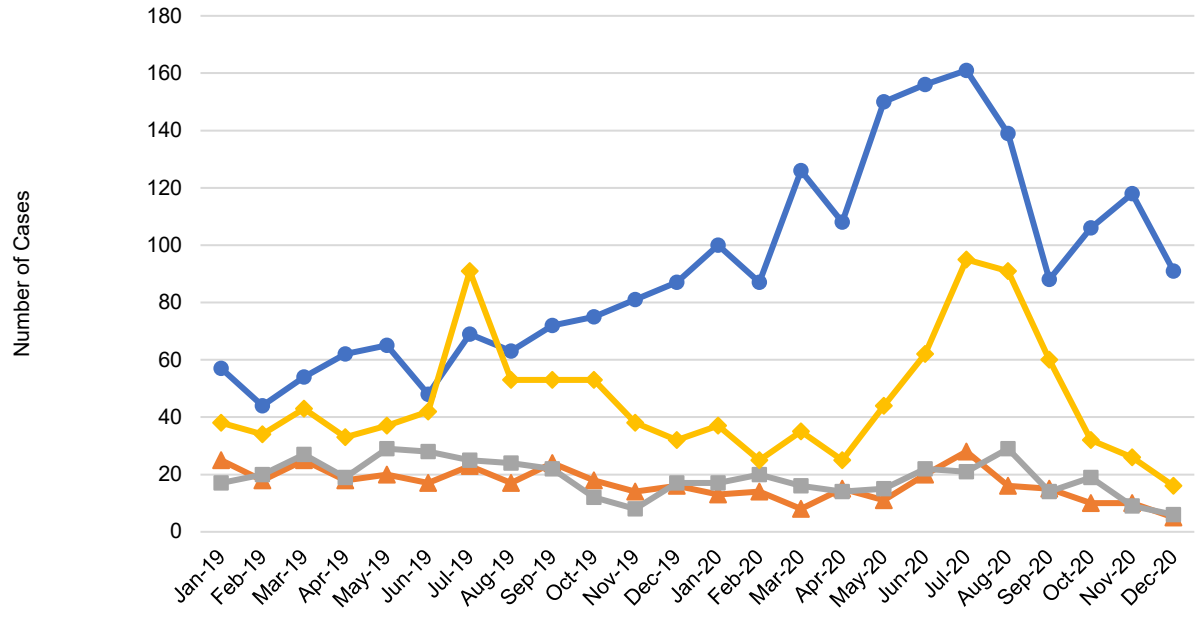


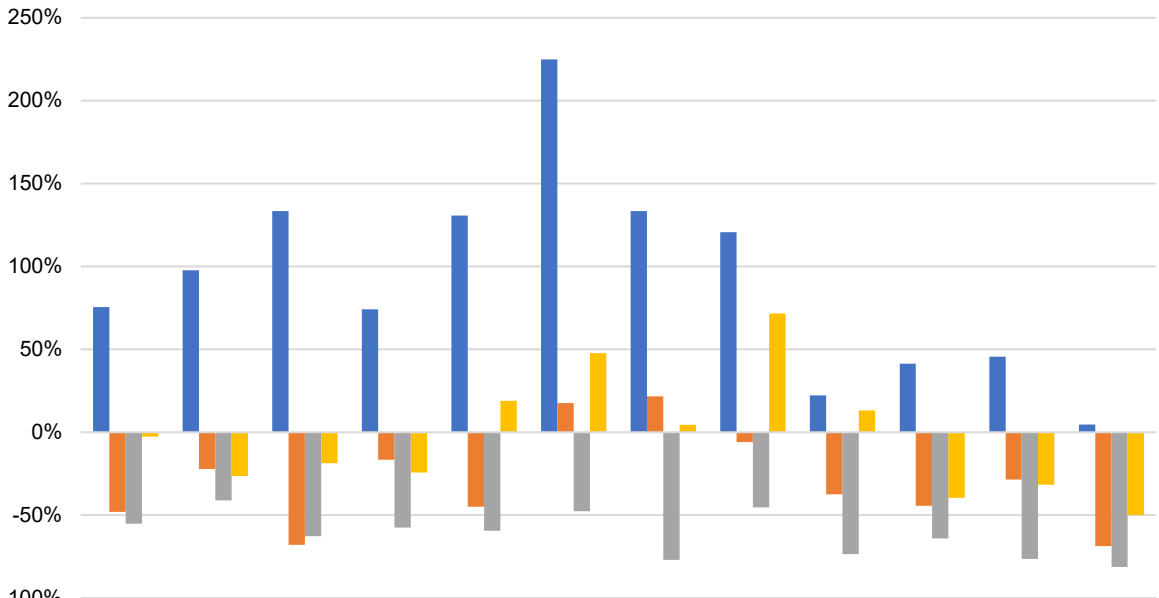
Figure 5A shows overdose death counts for four mutually exclusive groups: the NPF group, which includes all cases that tested positive for NPFs; the heroin group, which includes all cases that tested positive for heroin but negative for NPFs; the pharmaceutical opioid group, which includes cases that tested positive for pharmaceutical opioids but negative for NPFs and heroin; and the non-opioid group, which includes all cases that tested negative for any type of opioid. Monthly counts of NPF overdose deaths in Arizona were on an increasing trajectory throughout 2019 and in the early months of 2020, prior to the COVID-19 pandemic, increasing from 57 in January 2019 to 87 in December 2019 and 100 in January 2020. The numbers increased dramatically from May through August 2020, reaching 150 NPF-positive cases in May 2020, 156 in June 2020, and 161 in July 2020. The NPF-positive cases declined significantly to 88 in September 2020. In terms of percent change between 2019 and 2020, NPF-positive cases were over 75.4% and 97.7% greater in the months of January and February 2020 (before the start of the COVID-19 pandemic), and percent change increased further during the summer months, reaching a 225% increase in June 2020, compared to June 2019. In contrast to NPFs, the heroin and pharmaceutical opioid groups showed a decline over time (Figures 5A, 5B). The non-opioid group showed a notable increase during the period of May through August 2020, compared to the months prior to the COVID-19 pandemic. In terms of percent change between 2019 and 2020, the non-opioid group showed an increase in the months of May through September but lower numbers in all other months of 2020, compared to the corresponding months of 2019 (Figure 5B).

Figure 5A. Monthly Counts of Overdose Death Cases in Arizona by Four Opioid-Involvement Groups, January 2019 – December 2020 (*N*=3,956)



	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
NPF	57	44	54	62	65	48	69	63	72	75	81	87	100	87	126	108	150	156	161	139	88	106	118	91
Heroin	25	18	25	18	20	17	23	17	24	18	14	16	13	14	8	15	11	20	28	16	15	10	10	5
Pharm Opioids	17	20	27	19	29	28	25	24	22	12	8	17	17	20	16	14	15	22	21	29	14	19	9	6
Non-opioid	38	34	43	33	37	42	91	53	53	53	38	32	37	25	35	25	44	62	95	91	60	32	26	16

Figure 5B. Percent Change Between 2019 and 2020 in Monthly Counts of Drug Overdose Deaths in Arizona by Four Opioid Involvement Groups, January 2019 – December 2020 (*N*=3,956)



	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
NPF	75.4%	97.7%	133.3%	74.2%	130.8%	225.0%	133.3%	120.6%	22.2%	41.3%	45.7%	4.6%
Heroin	-48.0%	-22.2%	-68.0%	-16.7%	-45.0%	17.6%	21.7%	-5.9%	-37.5%	-44.4%	-28.6%	-68.8%
Pharm. Opioids	-55.3%	-41.2%	-62.8%	-57.6%	-59.5%	-47.6%	-76.9%	-45.3%	-73.6%	-64.2%	-76.3%	-81.3%
Non-Opioids	-2.6%	-26.5%	-18.6%	-24.2%	18.9%	47.6%	4.4%	71.7%	13.2%	-39.6%	-31.6%	-50.0%

Discussion

AZ-SUDORS data indicate notable increases in overdose mortality cases during the months of May through August 2020, which correspond to the initial phases of the evolving COVID-19 pandemic. Overdose death numbers declined considerably from September through December 2020. Similar patterns were observed by another study that analyzed overdose mortality trends during the first seven months of COVID-19 in Ohio (Currie et al., 2021). It is important to note that these increases in overdose mortality cases correspond to the summer months in Arizona, which are associated with increased risk of heat-related injuries and vulnerabilities. To account for the impact of seasonal variation in overdose mortality in Arizona, we assessed percent changes in monthly counts of overdose mortality cases between 2019 and 2020 for each corresponding month. The percent change comparison showed significantly greater numbers in the summer months of 2020, compared to the summer months of 2019.

When analyzed individually, nearly all drugs showed increases in monthly counts during the period of May through August 2020. These increases were particularly notable in overdose cases testing positive for NPFs. When all overdose cases were categorized into mutually exclusive groups by opioid-involvement type, NPF-group numbers showed sustained increases that peaked in the summer months of 2020 and were significantly greater than those in the summer months of 2019. Heroin and pharmaceutical opioid-group numbers showed a decline in 2020, compared to the corresponding months in 2019. In contrast, monthly numbers of cases in the non-opioid group also showed an increase in the summer months of 2020, and these increases were greater than those in the summer months of 2019. It is important to acknowledge that summer temperatures in Arizona were higher in 2020, compared to 2019. For example, in Maricopa County, which is the most

populous county in Arizona, the National Weather Service issued 12 excessive heat warnings for a total of 48 days in 2020, while in 2019, 10 excessive heat warnings were issued for a total of 25 days (Maricopa County Department of Public Health [MCDPH], 2021).

Overall, our findings indicate that overdose mortality cases peaked in the summer months of 2020, and these increases were primarily driven by non-pharmaceutical fentanyls. NPFs are highly potent opioids that are produced in clandestine laboratories and may include fentanyl analogs (e.g., carfentanil, acetyl fentanyl) and other novel synthetic opioids (Pardo et al., 2019). Fentanyl is approximately 35–100 times more potent than heroin (Ciccarone et al., 2017; Suzuki & El-Haddad, 2017), and fentanyl analogs display significant variation in potency, which makes them even more dangerous in terms of overdose risk (Suzuki & El-Haddad, 2017).

It is important to acknowledge that NPF presence in Arizona was increasing prior to the COVID-19 pandemic. Acceleration in the rise of NPF-related overdose death cases in the summer months of 2020 is likely due to complex, interconnected factors, including shifts in the illicit drug market dynamics (some of these shifts may have been influenced by the COVID-19 pandemic) and increased vulnerability of certain segments of the population that were potentially further exacerbated by the COVID-19 pandemic. More research is needed to determine the causal pathways between the changing patterns of overdose mortality and the broader impacts of the COVID-19 pandemic in the context of heat-related risk factors in Arizona.

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Characteristics of Non-Pharmaceutical Fentanyl-Related Overdose Deaths in Arizona

Arizona State Unintentional Drug Overdose Reporting System (AZ-SUDORS)
July 2019 – June 2020

AZ SUDORS
State Unintentional Drug Overdose Reporting System

August 2021

Center for Violence Prevention and Community Safety
Arizona State University

College of Health Solutions
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Characteristics of Non-Pharmaceutical Fentanyl-Related Overdose Deaths in Arizona, July 2019 – June 2020

Raminta Daniulaityte; Lance Ruhter; Charles Katz

Introduction

Provisional data from the US Centers for Disease Control and Prevention (CDC) estimate that in 2020, more than 91,000 people died from drug-related overdoses in the US, which represents an increase of more than 30%, compared to 2019 (Ahmad et al., 2021). The worsening of the overdose crisis has been linked to the profound societal impacts of the COVID-19 pandemic and the continuing proliferation of non-pharmaceutical fentanyl (NPF)-type drugs (Ciccarone, 2021; Health Alert Network, 2020; Mattson et al., 2021). The continuing spread of NPFs shows new geographic patterns with more significant increases in the Western part of the country (Shover et al., 2020), including Arizona (Mully et al., 2020). The new wave of NPFs spread is linked to an increased presence of counterfeit pills that may contain fentanyl (DEA, 2021). NPF products are produced in clandestine laboratories and may include fentanyl analogs (e.g., carfentanil, acetyl fentanyl) and other novel synthetic opioids (Pardo et al., 2019). Fentanyl is approximately 35–100 times more potent than heroin (Ciccarone et al., 2017; Suzuki & El-Haddad, 2017), and fentanyl analogs display significant variation in potency, which makes them even more dangerous in terms of overdose risks (Suzuki & El-Haddad, 2017).

To improve epidemiological surveillance of opioid-involved and other drug-related deaths and inform policy responses, the Centers for Disease Control and Prevention (CDC) launched the State Unintentional Drug Overdose Reporting System (SUDORS). As of 2019, 47 states and Washington, DC participate in SUDORS, with Arizona first funded for participation in 2019. The Center for Violence Prevention and Community Safety (CVPCS) at Arizona State University (ASU), on behalf of the Arizona Department of Health Services (AZDHS), is responsible for data collection in the state of Arizona. Comprehensive data on all accidental and undetermined drug overdoses are collected from death certificates issued by the AZDHS and from medical examiner reports, including postmortem toxicology testing.

The key aims of this report are to describe the socio-demographic, geographic, and drug-related characteristics of NPF-related overdose deaths in comparison to non-NPF overdose deaths in Arizona between July 1, 2019, and June 30, 2020.

Methods

The data used for this report include all drug overdose deaths from July 1, 2019, through June 30, 2020, recorded by AZ-SUDORS. We relied on post-mortem toxicology results in classifying drug involvement. If a decedent tested positive for more than one type of drug, each drug type was recorded. For the purposes of this report, *drug involvement* does not necessarily imply that the substance in question was determined to be a cause of death; rather, we classify a substance as involved if the decedent's toxicology results reported the presence of that substance. AZ-SUDORS

data included overdose cases from 14 of Arizona's 15 counties. There were no drug overdose deaths reported for La Paz County during the time period analyzed. Out of a total of 2,127 cases, 98 had no toxicology data available; these cases were excluded from further analyses.

Key sociodemographic and geographic indicators

Sociodemographic information was obtained from death certificate and medical examiner reports and included age, sex, ethnic/racial background, education, marital status, and homelessness. We also analyzed county of injury data to assess geographic patterns of NPF and other drug-related deaths. We relied upon the CDC's approach for urban-rural county classification, which uses a six-tier framework: 1) large central metro, 2) large fringe metro, 3) medium metro, 4) small metro, 5) micropolitan, and 6) noncore (Ingram & Franco, 2014). Because of the small numbers of overdose mortality cases in some of Arizona's counties classified as small, micropolitan, and noncore, we consolidated all three types of counties into one "Small Metro and Rural" group (Table 1). Additionally, we combined large fringe metro and medium metro into a "Mid-size metro" group. In summary, all cases were grouped into three categories: 1) large metro, 2) mid-size metro, and 3) small metro and rural (Table 1).

Information on the county of injury was available for a total of 2,084 cases. Of the 43 cases with missing county-of-injury information, nine had information indicating that the injury occurred in the decedent's home. In those cases, we used the decedent's residence county as a county of injury, raising the total for the county of injury identification to 2,093.

Table 1. AZ county classification

AZ County Grouping	CDC Classification[1]	AZ Counties
Large Metro	Large Central Metro	Maricopa
Mid-Size Metro	Large Fringe Metro	Pinal
	Medium Metro	Pima
Small Metro and Rural	Small Metro	Cochise, Coconino, Mohave, Yavapai, Yuma
	Micropolitan	Gila, Graham, Navajo, Santa Cruz
	Noncore	Apache, Greenlee, La Paz[2]

[1] Classification provided by the CDC/National Center for Health Statistics: Ingram, D. D., & Franco, S. J. (2014). 2013 NCHS Urban-Rural Classification Scheme for Counties. *Vital Health Stat 2*(166), 1-73. https://www.ncbi.nlm.nih.gov/pubmed/24776070

[2] No drug-related overdose mortality cases were reported for La Paz County during the current reporting period.

Drug-related indicators

NPF-positive cases were identified if they tested positive for fentanyl and/or norfentanyl, 4-ANPP (precursor chemical; its presence is indicative of illicitly manufactured fentanyl use; *n*=760), acetyl fentanyl (*n*=24), and other fentanyl analogs (1 positive case was identified for each of the following fentanyl analogs: butyrfentanyl, carfentanil, and cyclopropylfentanyl). Following the classification approach used in prior studies of opioid-related overdose mortality (O'Donnell et al., 2020), we classified detection of fentanyl as a potential pharmaceutical fentanyl case (*n*=15) if the decedent was negative for 4-ANPP or fentanyl analogs and, according to the medical examiner's report, evidence of use of prescription fentanyl was identified at the scene or by witness account. These cases were excluded from the NPF category and were added to the pharmaceutical opioid category.

An overdose case was defined as heroin-related a) if the decedent tested positive for the heroin-specific metabolite 6-monoacetylmorphine (6-MAM; *n*=182); b) if the case was classified as heroin-related by the medical examiner (*n*=6; 5 out 6 cases also tested positive for 6-MAM); or c) following the approach used in the prior research (Gladden et al., 2019; O'Donnell et al., 2020), if morphine was detected in the absence of 6-MAM (*n*=121) and the case also tested positive for one or more common impurities in heroin, such as codeine (Ellis et al., 2016; Somerville et al., 2017).

Pharmaceutical opioid-positive cases included those that tested positive for oxycodone, oxymorphone, hydrocodone, hydromorphone, dihydrocodeine, tramadol, morphine (if the case was not classified as heroin-positive to exclude morphine as a heroin metabolite), and codeine (if the case was not classified as heroin-positive to exclude codeine as a potential heroin impurity). We acknowledge limitations related to the identification of heroin, pharmaceutical morphine, and pharmaceutical codeine cases. Similar strategies for the interpretation of toxicology reports have been adopted in prior analyses of overdose mortality data (O'Donnell et al., 2020). Cases that tested positive for fentanyl (but negative of 4-ANPP or other analogs) and were noted as containing evidence of use of prescription fentanyl at the scene or by witness account were added to the pharmaceutical opioid category.

Cocaine cases included those that tested positive for cocaine and its metabolites cocaethylene and benzoylecgonine. Methamphetamine cases included all cases that tested positive for methamphetamine. Eighty-nine percent of methamphetamine-positive cases also tested positive for amphetamine, which is a primary metabolite of methamphetamine. Pharmaceutical stimulant cases included those that tested positive for amphetamine but did not include methamphetamine. Amphetamine-positive-only cases may indicate the use of pharmaceutical amphetamines (e.g., Adderall, dextroamphetamine). They also included methylphenidate (Ritalin)-positive cases.

Benzodiazepine cases included all cases that tested positive for pharmaceutical benzodiazepines, including alprazolam, diazepam, clonazepam, temazepam, lorazepam, and oxazepam. Alcohol cases included all cases that tested positive for alcohol/metabolites. Cannabis cases included all cases that tested positive for cannabis/metabolites.

Data analyses

First, sociodemographic data are presented for all cases (*N*=2,127) and for cases that include toxicology reports (*N*=2,029; Table 2). Drug-related information is presented for all cases that had toxicology reports (*N*=2,029; Table 3). Next, decedents were categorized into four mutually exclusive analysis groups based on the types of opioids involved in the overdose deaths. The analysis categories are 1) NPF-positive cases (all cases that tested positive for fentanyl and/or other NPFs; they may or may not have tested positive for other types of opioids), 2) heroin-positive cases that are negative for NPFs (which may or may not also have tested positive for pharmaceutical opioids), 3) pharmaceutical opioid-positive cases that are negative for NPFs and heroin, and 4) cases that tested negative for any types of opioids.

The chi-square statistic for categorical variables and ANOVA for a continuous variable (age) were used to assess differences among the four opioid involvement groups in terms of demographic characteristics, geographic characteristics (county of injury), and other drug-related characteristics. SPSS was used for all analyses.

Results

The majority of the overdose mortality cases were male (73.9%). The mean age was 39.7 years. Nearly 30% were of Hispanic ethnicity, and about 81% were of the White race. About 57% were identified as non-Hispanic Whites. Only about 13% were married or living as married. About 23% had less than high school education (Table 2).

Table 2. Sociodemographic characteristics of drug-related overdose mortality cases in Arizona, July 2019 – June 2020.

Characteristics	All cases (*N*=2,127)	Cases with toxicology reports (*N*=2,029)
Sex		
Male	1,572 (73.9%)	1,500 (73.9%)
Female	555 (26.1%)	529 (26.1%)
Ethnicity[1]		
Non-Hispanic	1,502 (70.6%)	1,429 (70.5%)
Hispanic	624 (29.4%)	599 (29.5%)
Race[2]		
White	1,713 (80.5%)	1,648 (81.2%)
Black	165 (7.8%)	161 (7.9%)
American Indian	141 (6.6%)	126 (6.2%)
Asian and/or Pacific Islander	20 (0.9%)	20 (1.0%)
Race/Ethnicity (combined)		
White, non-Hispanic	1,216 (57.2%)	1,160 (57.2%)
Other	911 (42.8%)	869 (42.8%)
Age[3] (mean, std. dev)	39.7 (Std. Dev. 14.2)	39.7 (Std. Dev.14.2)
Marital Status		
Married or living as married	273 (12.8%)	259 (12.8%)
Other	1764 (82.9%)	1683 (82.9%)
Unknown	90 (4.2%)	87 (4.3%)
Education		
Less than high school	491 (23.1%)	458 (22.6%)
High school or some college	1379 (64.8%)	1322 (65.2%)
Bachelor's degree or higher	137 (6.4%)	131 (6.5%)
Unknown education	120 (5.6%)	118 (5.8%)
Unsheltered (homeless)[4]	206 (10.6%)	203 (10.6%)
County of Injury[5]		
Large Metro (Maricopa)	1459 (69.7%)	1441 (72.0%)
Mid-Size Metro (Pinal, Pima)	410 (19.6%)	372 (18.6%)
Small Metro and Rural combined	224 (10.7%)	189 (9.4%)

[1] Information on ethnicity was missing for one case.
[2] Out of all 1,715 cases that were identified as being of the White race, one was also identified as Black and one as American Indian. To keep racial groups mutually exclusive to facilitate comparisons, we removed these two cases from the White group and retained their original classification as Black or American Indian. Out of 13 cases that were identified as Pacific Islander, 12 were also identified as Asian (or out of a total of 19 cases that were identified as Asian, 12 were also identified as Pacific Islander). To facilitate comparison, we combined these two racial categories into one category of "Asian and/or Pacific Islander." Information on race was missing for 88 cases out of a total of 2,127 and for 74 cases out of 2,029 cases with toxicology reports.
[3] One case had missing information on age.
[4] Information on unsheltered status was available for *n*=1,948 of all cases (*n*=1921 cases with toxicology reports).
[5] Information on the county of injury was available for *n*=2093 of all cases (*n*=2,002 for cases with toxicology reports).

Table 3. Drug-related characteristics of overdose mortality cases (with available toxicology information, *N*=2,029) in Arizona, July 2019 – June 2020.		
Types of drugs identified by the drug toxicology analysis	***N* (%)**	
	All cases, *N*=2,029	**Opioid-positive cases, *n*=1,579**
Any type of opioid	1,579 (77.8%)	1,579 (100%)
Non-pharmaceutical fentanyl (NPF)	1,174 (57.9%)	1,174 (74.4%)
Heroin	241 (11.9%)	241 (15.3%)
Pharmaceutical opioids	439 (21.6%)	439 (27.8%)
Any type of stimulant[1]	1,047 (51.6%)	664 (42.1%)
Cocaine	230 (11.3%)	188 (11.9%)
Methamphetamine	832 (41.0%)	487 (30.8%)
Pharmaceutical stimulants	43 (2.1%)	32 (2.0%)
Other drugs		
Benzodiazepines	406 (20.0%)	372 (23.6%)
Cannabis	517 (25.5%)	428 (27.1%)
Alcohol	525 (25.9%)	437 (27.7%)
Four groups by opioid involvement		
1) NPF-positive	1,174 (57.9%)	1,174 (74.4%)
2) Heroin-positive, NPF-negative	193 (9.5%)	193(12.2%)
3) Pharmaceutical opioid-positive, heroin/NPF-negative	212 (10.5%)	212(13.4%)
4) Negative for any type of opioid	450 (22.2%)	0

[1] Any type of stimulant included cases that tested positive for methamphetamine, cocaine, or pharmaceutical stimulants.

Of the 2,029 overdose mortality cases with completed toxicology analysis reports, nearly 78% tested positive for some type of opioid (Table 3). NPFs were the most commonly identified drugs, with 1,174 (57.9%) decedents testing positive for NPFs. Of the 1,579 cases that tested positive for some type of opioid, nearly 75% were positive for NPFs. About 12% of cases tested positive for heroin, and about 22% were identified as positive for pharmaceutical opioids. More than half of all cases tested positive for any type of stimulant. Methamphetamine was the most common illicit stimulant identified in the overdose mortality cases, with about 41% of all cases testing positive for methamphetamine, while 11.3% tested positive for cocaine (Table 3).

To assess differences between NPF-positive and other drug-related overdose mortality cases, we grouped all cases into four mutually exclusive categories: 1) NPF-positive, 2) heroin-positive, negative for NPFs, 3) pharmaceutical opioid-positive, negative for other types of opioids, 4) negative for any type of opioid. The largest was the NPF-positive group (57.9%); it included over five times more decedents, compared to heroin-positive (NPF-negative) or pharmaceutical opioid-positive (other opioid-negative) groups. The non-opioid-related group included 22.2% of all cases (Table 3).

Table 4 provides a comparison of sociodemographic and drug-related characteristics of NPFs, heroin, other-opioid, and non-opioid drug groups. In contrast to other groups, the pharmaceutical opioid group had a greater proportion of women (39.6%), compared to the NPF (24.4%), heroin (22.3%), and non-opioid drug groups (25.6%), and the difference was statistically significant at $p<0.001$. The NPF group had a greater proportion of Hispanic individuals (33.8%), compared to the heroin (28.5%), pharmaceutical opioid (15.1%), and non-opioid groups (25.6) ($p<0.001$). Overall, the NPF group was the least likely (51.4%) of all four groups to include non-Hispanic Whites, while the pharmaceutical opioid group was the most likely (75.9%), and the differences were statistically significant at $p<0.001$. There were also significant ($p<0.001$) age differences among the four groups, with the NPF group being the youngest of the four (mean age of 35.0 years).

Table 4. Sociodemographic and drug-related characteristics of non-pharmaceutical fentanyl, heroin, pharmaceutical opioid, and non-opioid groups of overdose mortality cases (*N*=2,029 with available toxicology reports) in Arizona, July 2019 – June 2020.

Characteristics	NPF group (*n*=1,174)	Heroin group (*n*=193)	Pharm opioid group (*n*=212)	Non-opioid group (*n*=450)	*p* value[1]
Sex					
Male	887 (75.6%)	150 (77.7%)	128 (60.4%)	335 (74.4%)	<0.001
Female	287 (24.4%)	43 (22.3%)	84 (39.6%)	115 (25.6%)	
Ethnicity[2]					
Non-Hispanic	777 (66.2%)	138 (71.5%)	180 (84.9%)	334 (74.2%)	<0.001
Hispanic	397 (33.8%)	55 (28.5%)	32 (15.1%)	115 (25.6%)	
Race/Ethnicity (combined)					
White, non-Hispanic	603 (51.4%)	125 (64.8%)	161 (75.9%)	271 (60.2%)	<0.001
Other	571 (48.6%)	68 (35.2%)	51 (24.1%)	179 (39.8%)	
Age[2] (Mean, Std. Dev)	35.0 (12.9)	42.8 (13.4)	46.3 (14.4)	47.4 (12.6)	<0.001
Marital Status[3]					
Married/living as married	132 (11.5%)	31 (16.8%)	46 (22.2%)	50 (12.4%)	<0.001
Other	1,015 (88.5%)	153 (83.2%)	161 (77.8%)	354 (87.6%)	
Education[4]					
Less than high school/GED	272 (23.9%)	35 (19.1%)	37 (18.4%)	114 (29.2%)	<0.01
High school/GED or more	864 (76.1%)	148 (80.9%)	164 (81.6%)	277 (70.8%)	
Unsheltered (homeless)[5]	64 (5.6%)	28 (15.7%)	17 (8.4%)	94 (22.8%)	<0.001
By County of Injury[6]					
Large Metro (Maricopa)	911 (78.2%)	105 (55.3%)	132 (62.6%)	293 (67.2%)	<0.001
Medium Metro (Pima, Pinal)	174 (14.9%)	60 (31.6%)	49 (23.2%)	89 (20.4%)	
Small Metro and Rural	80 (6.9%)	25 (13.2%)	30 (14.2%)	54 (12.4%)	
Drug Characteristics					
NPFs	1174 (100%)	0	0	0	-
Heroin	48 (4.1%)	193 (100%)	0	0	-
Pharmaceutical opioids	188 (16.0%)	39 (20.2%)	212 (100%)	0	-
Methamphetamine	292 (24.9%)	123 (63.7%)	72 (34.0%)	345 (76.7%)	<0.001
Cocaine	154 (13.1%)	24 (12.4%)	10 (4.7%)	42 (9.3%)	<0.01
Pharmaceutical stimulants	27 (2.3%)	¶	¶	11 (2.4%)	
Benzodiazepines	268 (22.8%)	38 (19.7%)	66 (31.1%)	34 (7.6%)	<0.001
Alcohol	338 (28.8%)	47 (24.4%)	52 (24.5%)	88 (19.6%)	<0.01
Cannabis	368 (31.3%)	32 (16.6%)	28 (13.2%)	89 (19.8%)	<0.001

[1] Chi-square *p* values for comparison of categorical variables (ANOVA for comparison of the continuous variable 'age') across four drug groups were calculated; $p<0.05$ is considered statistically significant. [2]One case had missing information on age; [3] 87 cases had missing information on marital status; [4] 118 cases had missing information on education; [5] 108 cases had missing information on homelessness status; [6] 27 cases had missing information on county of injury. ¶ Data were suppressed when the cell contained fewer than 10 cases.

The NPF group was also the least likely of the four to include individuals who were married or living as married (p<0.001) and those who had high school education or more (p<0.01; Table 4). Lower levels of education and fewer married individuals in the NPF group may be partially explained by the fact that the NPF group had more younger-age individuals. The non-opioid-related group had the greatest proportion of unsheltered individuals (22.8%), while the NPF group had the lowest (5.6%; Table 4).

There was a greater concentration of NPF-positive cases in the large urban area, compared to other opioid-related cases (78.2% of the NPF group, compared to 55.3% of the heroin group and 62.6% of the pharmaceutical opioid group, were located in the large urban area/Maricopa County; Table 4). Medium-size urban counties had a greater proportion of heroin cases, while small urban and rural counties had a greater proportion of pharmaceutical opioid cases compared to other opioid-related groups (Table 4).

In terms of other drug-use characteristics, the NPF group was the least likely to also test positive for methamphetamine (24.9%, in comparison to 63.7% of the heroin group and 76.7% of the non-opioid group, p<0.001). The NPF group had a greater proportion of cocaine-, alcohol-, and cannabis-positive cases, while the pharmaceutical opioid group was more likely to test positive for benzodiazepines than other groups (Table 4).

Discussion

During the current reporting period, about 78% of all overdose mortality cases in Arizona tested positive for opioids, with NPFs being the most commonly identified drugs (nearly 58% of all cases and 75% of opioid-related cases). Our data suggest that NPFs are the most significant contributor to the current overdose mortality crisis in Arizona. These findings are consistent with law enforcement data in Arizona that suggests dramatic increases in fentanyl available in counterfeit pill form. According to the report compiled by the Arizona Criminal Justice Commission, the number of seized counterfeit pharmaceutical pills that contain fentanyl increased from 8,788 in 2018 to 18,004 in 2019 and 155,574 in 2020 (Arizona Substance Abuse Partnership, 2020; Mully et al., 2020).

It is important to note that only about 4% of all NPF-positive cases also tested positive for heroin. These findings contrast with the earlier stages of the NPF epidemic in the Northeastern and Midwestern states, where powder-type NPF drugs that were sold as fentanyl-adulterated heroin became commonly available (Ciccarone, 2021; Mars et al., 2018; Pardo et al., 2019). As a result, the prevalence of heroin-positive cases among NPF-positive cases was notably greater, especially in the earlier stages of NPF spread (Daniulaityte et al., 2019).

Differences between the NPF and heroin groups in terms of socio-demographic and other drug characteristics indicate that NPF spread in Arizona is not limited to heroin-using populations. Unlike the eastern part of the country, where powder-type heroin is the most commonly available form and is thus easier to contaminate with fentanyl, Arizona and other western states have traditionally been more exposed to black tar heroin (Bobashev et al., 2019). Black tar heroin was believed to be less commonly mixed and contaminated with NPFs, compared to powder-type heroin. The increasing proliferation of NPFs in counterfeit pills indicates a broader reach to wider segments of vulnerable populations, including individuals who use non-prescribed pharmaceutical opioids but do not use heroin (DEA, 2021; Pardo et al., 2019). Pharmaceutical drugs are generally viewed as less risky and stigmatized than heroin (Daniulaityte et al., 2012). “Repackaging” dangerous illicit NPFs into counterfeit pharmaceutical-like products may also contribute to broader appeal and a new pathway of transition from pharmaceutical opioid use to use of NPFs by skipping the heroin stage (Carlson et al., 2016; Ciccarone, 2019).

Our data indicate that the NPF group was more likely to be younger and include Hispanics and other ethnic minorities. Younger individuals may be more naïve users, have less extensive drug use histories, and have lower tolerance for opioids. As a result, they are particularly vulnerable to adverse risks associated with the use of counterfeit fentanyl pills because fake pills are often very difficult to distinguish from legitimate pharmaceuticals (PSM, 2020).

Sociodemographic and drug-related characteristics indicated that the pharmaceutical opioid group was more likely than the NPF and other groups to be female, non-Hispanic White, older, and from small metro/rural areas as well as to also test positive for benzodiazepines. These characteristics are consistent with the typical profiles of non-medical pharmaceutical opioid users identified in prior studies (Ciccarone, 2021). They are also potentially linked to racial healthcare disparities and reduced access to prescription opioids and other prescribed drugs among Hispanics and other ethnic minority populations (Pouget et al., 2018).

Most of the non-opioid group tested positive for methamphetamine, and this group was also more likely to include individuals who were unsheltered. Prior studies have noted an increased use of methamphetamine among unsheltered individuals as a lay survival strategy to reduce vulnerability associated with the risks of homelessness and the challenges of constant movement throughout the day (Damon et al., 2019; Daniulaityte et al., 2020; Fast et al., 2014).

The NPF group was more likely than other groups to also test positive for cannabis and cocaine. These patterns may indicate concomitant drug use practices that intentionally combine these drugs along with alcohol as typical “party” drugs. On the other hand, an increased presence of cannabis- and cocaine-positive cases among NPF-positive cases may also indicate potential cases of non-opioid drug contamination with NPF drugs (Pardo et al., 2019).

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