

**An Evaluation of the Representativeness, Quality, and Acceptability
of the Arizona Violent Death Reporting System: 2015-2018**



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Introduction

The Arizona Violent Death Reporting System (AZ-VDRS) collects violent death data from multiple sources: death certificates issued by the Arizona Department of Health Services (ADHS), police reports obtained from investigating agencies, and death investigation reports, toxicology reports, and autopsy reports from medical examiner offices. The purpose of this project is to support stakeholders in strategic planning and prevention efforts aimed toward reducing the number of violent deaths that occur each year in Arizona. The data used for this report were drawn from the compilation and analysis of four years of AZ-VDRS data, from January 1, 2015 through December 31, 2018, completed as of August 31, 2020. These data were gathered from internal case tracking documents and downloaded data files from the Centers for Disease Control and Prevention (CDC) web-based portal system used for the National Violent Death Reporting System (NVDRS).

Arizona has a decentralized system of medical examiner (ME) offices and professionals. Generally, death certifications and autopsies for violent deaths qualifying for the AZ-VDRS are the responsibility of a county appointed official. Most often, these are medical examiners (i.e., forensic pathologists) working for a county-level ME office. Some of Arizona's smaller counties do not have a dedicated ME office as part of their governmental structure and instead use a variety of alternatives. Some contract directly with a larger county for ME services; others may use short-term (e.g., three- or five-year) contracts with local private physicians who may perform all of their ME services, while still others may use a combination of private physicians for death certifications and other county ME offices for autopsies. The AZ-VDRS must acquire data-sharing agreements with each county ME or the designated physician/death certifier.

In Arizona, law enforcement (LE) agency data systems are decentralized. LE agencies are organized according to local (e.g., city or town), county, state, federal, and tribal jurisdictions. Each agency manages its own records, with no comprehensive data sharing among them. Some US states require all jurisdictions to use centralized data-sharing protocols and to share or submit their data to a statewide clearinghouse, typically a state LE entity. Without a statewide data clearinghouse in Arizona, AZ-VDRS must develop individual agreements with each LE agency to establish its participation and for report gathering.

Relying on death certificates (DC) as the case definition for eligibility and data collection initiation, our analyses rely on these decedent records to establish our denominator in order to assess the proportion of records actually provided for all potential AZ-VDRS cases. AZ-VDRS initiated data collection in 2015, and although we began with a reasonable number of agreements with data provider partners for a statewide representative sample, these were not sufficient for comprehensive coverage in all Arizona counties. Since then, we have increased participation and, for example, we currently receive ME data from all 15 counties in Arizona. As discussed in the sections below, AZ-VDRS does not routinely receive ME reports of all eligible violent deaths. Some occur on sovereign tribal lands and may be handled by

tribal death certifiers or other entities; AZ-VDRS does not presently have data-sharing agreements with any tribal entity.

The AZ-VDRS recorded a total of 7,770 violent deaths for this reporting period. There were 230 decedents combined with other death incidents, leaving a total of 7,540 cases in the incident-level analyses. It should be noted that the AZ-VDRS case definition depends on *occurrent* deaths—that is, deaths for which the fatal injury occurred in Arizona. This differs from the more typical public health approach of examining resident mortality, which includes all state residents regardless of where they died and excludes nonresident decedents whose deaths occurred in Arizona.

An important part of the AZ-VDRS data collection and abstraction process depends on the detailed information provided in report narratives from coroners and medical examiners and law enforcement. The narratives are generally provided by death scene investigators (ME), death certifiers (ME), medical examiners (ME), police first responders (LE), police crime scene technicians (LE), and law enforcement investigators (LE). Narratives are abstracted by AZ-VDRS staff to provide a comprehensive description of the fatal incident and the decedent, as known and described by those professionals at the scene of the death or via investigation of the decedent. For this reason, ME and LE narratives provide a wealth of information about the characteristics and circumstances of the decedent and the fatal incident.

The AZ-VDRS uses the term *circumstance data* in a particular manner, in accord with the CDC's use of a web-based portal system for data collection and reporting. As part of the data abstraction process, multiple tabs organize specific data elements related to each fatal incident and the decedent. Tabs focus on specific types of information, such as victim demographics (e.g., race/ethnicity, sex, age, marital status, occupation, residential address); the injury and death (e.g., manner of death, injury and death locations, types of injuries/wounds, cause[s] of death); the weapons or methods used; the suspect (in the case of homicides); and toxicology results. Importantly, a circumstances tab collects a broad range of information about the victim, including that specific to homicides, suicides, and accidental firearm deaths. (See Appendix A.)

Methods

This report is presented in six sections, each focusing on a different component of AZ-VDRS data quality. Each section begins with a brief discussion of the purpose of the analyses conducted and the data used. Data details, for example, include the source or sources used, what denominators were used to measure performance and why, and other characteristics and criteria used for the analyses. Tables present our results, followed by summaries of the findings and their impact on the overall data representativeness and quality of the AZ-VDRS.

In this section, we describe the AZ-VDRS, the data used, and the types of data provider partners required. We also describe the methods used throughout the report and present the principal baseline of eligible violent deaths. This section briefly describes the absolute baseline denominator used to assess data completeness and quality.

Section 2, *Representativeness*, details our data provider partnerships. As mentioned above, ME and LE data providers must be acquired individually. Although death certificate data are provided by a single source, the Arizona Department of Health Services Bureau of Vital Records, all other data must be obtained through cooperative agreements with each ME and LE jurisdiction. Participation by ME and LE

partners is crucial to the reliability and validity of AZ-VDRS analyses. A sufficiently comprehensive participation rate allows for more accurate and representative analyses of how suicide and homicide affect various communities. This is true whether we are analyzing communities by local, county, tribal, and state geographic levels or by segments of the population, such as youth, veterans, and racial and ethnic minorities.

Section 3, *Accessibility of Reports among Participating Partners*, builds on the potential data partnerships to focus on the quality of participation of the AZ-VDRS partners. While Section 2 assesses our maximum potential data coverage based on our current partnership agreements, Section 3 assesses the accessibility of reports from partners. More precisely, this section focuses on partner agencies and the rate at which they provide their data. This is important for the AZ-VDRS to assess areas of improvement and specific data-providing partners who may require particular attention or resources to improve their level of participation.

Section 4, *Data Quality*, extends the analyses from Section 3 to assess the quality of the data received. The AZ-VDRS depends on combining disparate existing data sources into a single dataset (i.e., the NVDRS web-based portal). The most important part of the added value to these existing data are the abstractions of narrative from information into a usable, predefined set of variables, specifically termed our circumstance data. Section Four, therefore, focuses on the proportion of cases that have at least one of about four dozen circumstance variables coded. Although it is possible for a case to not have any qualifying circumstance, and this may also be the result of abstractor error, the absence of any coded circumstance data is a valuable proxy for assessing the relative quality and thoroughness of narrative data received.

Section 5, *Web-based Portal Abstraction Data Quality*, provides an inventory of the web-based portal data. The abstracted data are entered into the NVDRS web portal and can subsequently be downloaded as a combined dataset for analysis. The downloaded files represent the complete data submitted to and used by the CDC. Each state's data management system, including the AZ-VDRS, is assessed based largely on these data. Section Five pulls the completed data for the inclusive years (2015–2018) and examines each variable for valid entries. The analyses can then provide an aggregated assessment of the number of missing/invalid data entries, which should principally indicate abstractor errors.

Section 6, *Data Quality Improvements and Conclusion*, is a special section summarizing key areas for AZ-VDRS data quality improvements and our plans for addressing those areas. The section begins by highlighting key stakeholders or potential data providers who are not AZ-VDRS partners as of the 2018 data closeout. These agencies are highlighted due to their particular importance and conspicuous absence in the data. Each highlighted entity is critically important, not only for improving AZ-VDRS data quality but to sufficiently and appropriately understand how suicides and homicides differentially impact the communities these missing stakeholders represent. The section then identifies plans to improve the quality of the data received and concludes with a description of issues concerning the NVDRS web portal data management system.

Number of Violent Deaths

The AZ-VDRS gathers data on violent deaths that have occurred in Arizona, as determined by the official manner of death classification. The majority of eligible cases are homicides and suicides, but the definition also includes those deaths with an undetermined manner of death, unintentional deaths

caused by a firearm, and, rarely, those with a pending manner of death. Legal intervention deaths, officially classified as homicides on death certificates, are generally excluded from homicide-specific analyses and are treated as “other” deaths. This is due to important differences in the nature and circumstances of legal interventions and homicides as they are more commonly understood and defined.

Before beginning analyses of missing data and the representativeness of collected and abstracted AZ-VDRS data, we examined the total number of eligible decedents over the four years, based on death certificates. The AZ-VDRS recorded a total of 7,770 violent deaths for the analysis period. Exhibit 1 shows the distribution of violent deaths by manner of death and year.

Exhibit 1: Number of Death Certificates Obtained for Arizona Violent Deaths by Manner of Death and Year, 2015–2018 (N = 7770)

	2015		2016		2017		2018		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Suicide	1287	70.3	1266	66.2	1333	67.9	1459	70.7	5345	68.8
Homicide†	375	20.5	444	23.2	449	22.9	444	21.5	1712	22.0
Undetermined	165	9.0	196	10.3	173	8.8	152	7.4	686	8.8
Unintentional	3	0.2	6	0.3	7	0.4	8	0.4	24	0.3
Pending	0	0.0	0	0.0	1	0.1	2	0.1	3	0.0
Total	1830	100.0	1912	100.0	1963	100.0	2065	100.0	7770	100.0

† These deaths include legal interventions and unintentional firearm deaths caused by another, as the data are derived directly from the DC.

- For 2015-2018, in Arizona, about 7 in 10 (68.8%) violent deaths were suicides.
- Homicides comprised about one fifth (22.0%) of all violent deaths in Arizona.
- For most of the remaining deaths, the manner was undetermined (8.8%).
- Unintentional firearm deaths (*n* = 24) and deaths with a pending manner (*n* = 3) were rare (0.3%).

Section 2: Representativeness

The AZ-VDRS data abstraction and linking process is wholly dependent upon partnerships with data providers from ME and LE sources. The AZ-VDRS routinely receives complete death certificate data for all violent deaths directly from the AZDHS Bureau of Vital Statistics. These data are received as part of the cooperative agreement between AZDHS and the CVPCS, acknowledging the Center’s role as the bona fide agent for the State of Arizona in the NVDRS program. Death certificate data are the case initiation source data for the AZ-VDRS and are used as the baseline denominator for assessing the completeness of its data coverage.

As noted above, the AZ-VDRS depends on three principal data sources: death certificates (DC), medical examiners (ME), and law enforcement (LE). The agreement with AZDHS provides 100% of the necessary DC data from a single source; however, for ME and LE data, multiple agreements are required. Participation of ME and LE partners is crucial to the reliability and validity of AZ-VDRS analyses. A

sufficiently comprehensive participation rate allows for more accurate and representative analyses of how suicide and homicide affect our various communities. This is true whether we are analyzing communities by local, county, tribal, or state geographic levels, or by segments of the population such as, but not limited to, youth, veterans, and racial and ethnic minorities.

County-Level Representation

We first examined the representativeness of the AZ-VDRS data by examining data coverage at the county level. Geographic differences may substantially impact not only the incidence and prevalence of violent deaths, but also the circumstances surrounding fatal events. This is particularly true in Arizona, given the diverse nature of its population distribution. Most of the population lives in one of two urban centers in Maricopa and Pima counties (about 5.4 million, or 76.0%),¹ while the remaining 1.7 million (24.0%) residents live in rural and small communities across the state. Nonrandom differences in the representativeness of our ME and LE data across geographic areas can result in biased conclusions.

Exhibit 2.1 shows the number of violent deaths per county by year. We use the death certificate for determining manner of death and, given the general nature of jurisdictional authority, for determining the county where death occurred. It is important to note that the county of death may occasionally differ from a decedent's county of injury and county of residence. Analyses based on locations of injury and residence certainly have value; however, in Arizona, the county of death is the more fundamental unit of analysis because it determines the jurisdictional authority of medical examiners. The location of injury determines law enforcement jurisdiction, and injury and death locations rarely cross county lines.

Exhibit 2.1 presents the complete inventory of 7,770 cases, which will serve as the denominator for much of our analysis and will be used to measure the completeness of ME and LE data coverage at the county level. Percentages are reported by county and year to illustrate internal county-level changes in the distribution of violent deaths.

¹ United States Census Bureau. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2019. U.S. Census Bureau, Population Division. Web. May 2020. <http://www.census.gov/>
United States Census Bureau. B01001 SEX BY AGE, 2019 American Community Survey 5-Year Estimates. U.S. Census Bureau, American Community Survey Office. Web. 10 December 2020. <http://www.census.gov/>

Exhibit 2.1: Number of Death Certificates Obtained for Arizona Violent Deaths by County of Death and Year, 2015–2018 (N = 7770)

	2015		2016		2017		2018		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Arizona	1830	23.6	1912	24.6	1963	25.3	2065	26.6	7770	100.0
County of Death										
Apache	34	1.9	26	1.4	31	1.6	34	1.6	125	1.6
Cochise	39	2.1	36	1.9	34	1.7	21	1.0	130	1.7
Coconino	74	4.0	64	3.3	78	4.0	79	3.8	295	3.8
Gila	27	1.5	27	1.4	26	1.3	43	2.1	123	1.6
Graham	9	0.5	12	0.6	11	0.6	10	0.5	42	0.5
Greenlee	1	0.1	1	0.1	3	0.2	3	0.1	8	0.1
La Paz	12	0.7	9	0.5	16	0.8	14	0.7	51	0.7
Maricopa	987	53.9	1089	57.0	1069	54.5	1116	54.0	4261	54.8
Mohave	89	4.9	101	5.3	111	5.7	118	5.7	419	5.4
Navajo	48	2.6	58	3.0	59	3.0	55	2.7	220	2.8
Pima	266	14.5	262	13.7	318	16.2	317	15.4	1163	15.0
Pinal	89	4.9	81	4.2	83	4.2	103	5.0	356	4.6
Santa Cruz	4	0.2	9	0.5	4	0.2	10	0.5	27	0.3
Yavapai	109	6.0	96	5.0	94	4.8	96	4.6	395	5.1
Yuma	42	2.3	40	2.1	26	1.3	46	2.2	154	2.0
Unknown Location	0	0.0	1	0.1	0	0.0	0	0.0	1	0.0
Total	1830	100.0	1912	100.0	1963	100.0	2065	100.0	7770	100.0

- More than half of all violent deaths in Arizona occurred in Maricopa County (*N* = 4,261; 54.8%).
- Pima County accounted for 15.0% (*N* = 1,163) of violent deaths from 2015–2018.
- Eight of the 15 counties accounted for 2.0% or less of violent deaths each: Apache (1.6%), Cochise (1.7%), Gila (1.6%), Graham (0.5%), Greenlee (0.1%), La Paz (0.7%), Santa Cruz (0.3%), and Yuma (2.0%).

Medical Examiner Reports by County

In Arizona, medical examiner jurisdiction is organized at the county level, and authority is given to the location of death (with the exception of sovereign Native American tribal communities). Most Arizona counties have a permanent governmental entity identified as the medical examiner’s office. This is not true for all counties, however, and some may have contracted for ME services with the ME office of another county or as part of a combined arrangement. For the current report, when examining and reporting on county-level data completion and representativeness, note that the actual agency or physician who has participated or provided information on behalf of any county may in certain instances be another county’s ME office or a private physician with whom it has contracted for ME services. We do not distinguish between these sources.

Exhibit 2.2 uses DC data from Exhibit 2.1 to establish the denominator ($N = 7,770$) for the ratio of ME reports obtained, by county. The AZ-VDRS uses an internal tracking system for incoming cases. The tracking sheet (TS) logs DC data as it is received each month and tracks the progress of each case through the system. The first step is to determine the responsible ME data source and then to request the reports attributed to that source.

The ratio represents a baseline measure of participation and compliance with AZ-VDRS data collection by county ME data sources. Exhibit 2.2 shows participation ratios by year, given that recruitment and participation have changed since the AZ-VDRS's inception in 2015.

Exhibit 2.2: Number of ME Reports Obtained for Arizona Violent Deaths by County of Death and Year, 2015–2018 (N = 7770)															
	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	1830	1714	93.7	1912	1857	97.1	1963	1888	96.2	2065	1990	96.4	7770	7449	95.9
<u>County of Death</u>															
Apache	34	8	23.5	26	15	57.7	31	8	25.8	34	9	26.5	125	40	32.0
Cochise	39	39	100.0	36	36	100.0	34	34	100.0	21	21	100.0	130	130	100.0
Coconino	74	71	95.9	64	61	95.3	78	72	92.3	79	68	86.1	295	272	92.2
Gila	27	7	25.9	27	23	85.2	26	26	100.0	43	40	93.0	123	96	78.0
Graham	9	1	11.1	12	2	16.7	11	3	27.3	10	7	70.0	42	13	31.0
Greenlee	1	1	100.0	1	1	100.0	3	2	66.7	3	2	66.7	8	6	75.0
La Paz	12	5	41.7	9	4	44.4	16	4	25.0	14	8	57.1	51	21	41.2
Maricopa	987	985	99.8	1089	1085	99.6	1069	1069	100.0	1116	1116	100.0	4261	4255	99.9
Mohave	89	89	100.0	101	99	98.0	111	110	99.1	118	118	100.0	419	416	99.3
Navajo	48	23	47.9	58	47	81.0	59	44	74.6	55	41	74.5	220	155	70.5
Pima	266	265	99.6	262	258	98.5	318	311	97.8	317	307	96.8	1163	1141	98.1
Pinal	89	87	97.8	81	81	100.0	83	82	98.8	103	102	99.0	356	352	98.9
Santa Cruz	4	4	100.0	9	9	100.0	4	4	100.0	10	9	90.0	27	26	96.3
Yavapai	109	87	79.8	96	96	100.0	94	93	98.9	96	96	100.0	395	372	94.2
Yuma	42	42	100.0	40	40	100.0	26	26	100.0	46	46	100.0	154	154	100.0
Unknown	0	0	0.0	1	0	0.0	0	0	0.0	0	0	0.0	1	0	0.0
Outside Arizona	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Total	1830	1714	93.7	1912	1857	97.1	1963	1888	96.2	2065	1990	96.4	7770	7449	95.9

- Statewide, the percentage of ME reports received by the AZ-VDRS as a proportion of total violent deaths has been stable at about 96% per year.
- Most of this stability is due to the outstanding participation rates of both Maricopa (99.9%) and Pima (98.1%) counties, as they accounted for 69.4% ($n = 5,396$) of all decedents in the state.
- As of 2018, nine of the 15 counties (Cochise, Gila, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, and Yuma) provided reports for 90% or more of their deaths.
- Coconino County provided 86.1% of their potential reports in 2018, although these missing cases are likely in tribal jurisdictions with Coconino County and not under the purview of the county medical examiner.
- Five counties still need significant improvement in participation: Apache (26.5%), Graham (70.0%), Greenlee (66.7%), La Paz (57.1%), and Navajo (74.5%). Apache and Navajo counties also include large portions of tribal land over which they do not have jurisdiction for death investigation.

Medical Examiner Reports by County Among Suicides

Further examining the participation rates by county, we looked more specifically at homicides and suicides independent of other violent deaths. This is important to examine because report availability and access may be significantly influenced by manner of death. Exhibit 2.3 displays the results for suicide manner of death. The denominator used for this table depends only on those deaths coded as suicide on the DC ($N = 5,345$) and the number of those same decedents for whom we received a report according to the AZ-VDRS tracking sheets.

Exhibit 2.3: Number of ME Reports Obtained for Arizona Suicide Deaths by County of Death and Year, 2015–2018 ($N = 5345$)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	1287	1217	94.6	1266	1224	96.7	1333	1278	95.9	1459	1399	95.9	5345	5118	95.8
County of Death															
Apache	19	6	31.6	16	7	43.8	17	1	5.9	27	6	22.2	79	20	25.3
Cochise	30	30	100.0	29	29	100.0	31	31	100.0	18	18	100.0	108	108	100.0
Coconino	54	51	94.4	43	40	93.0	52	47	90.4	59	48	81.4	208	186	89.4
Gila	20	6	30.0	18	16	88.9	14	14	100.0	31	28	90.3	83	64	77.1
Graham	6	0	0.0	11	1	9.1	9	1	11.1	7	4	57.1	33	6	18.2
Greenlee	0	0	0	1	1	100.0	3	2	66.7	3	2	66.7	7	5	71.4
La Paz	10	3	30.0	4	1	25.0	14	3	21.4	9	3	33.3	37	10	27.0
Maricopa	659	658	99.8	697	695	99.7	690	690	100.0	748	748	100.0	2794	2791	99.9
Mohave	70	70	100.0	69	69	100.0	75	75	100.0	88	88	100.0	302	302	100.0
Navajo	34	19	55.9	33	23	69.7	43	32	74.4	45	32	71.1	155	106	68.4
Pima	200	199	99.5	179	177	98.9	222	220	99.1	220	218	99.1	821	814	99.1
Pinal	68	67	98.5	61	61	100.0	58	58	100.0	81	81	100.0	268	267	99.6
Santa Cruz	4	4	100.0	6	6	100.0	4	4	100.0	6	6	100.0	20	20	100.0
Yavapai	77	68	88.3	70	70	100.0	80	79	98.8	83	83	100.0	310	300	96.8
Yuma	36	36	100.0	28	28	100.0	21	21	100.0	34	34	100.0	119	119	100.0
Unknown	0	0	0	1	0	0.0	0	0	0	0	0	0	1	0	0.0
Outside Arizona	0	0	0	1	0	0.0	0	0	0	0	0	0	1	0	0.0
Total	1287	1217	94.6	1267	1224	96.6	1333	1278	95.9	1459	1399	95.9	5346	5118	95.7

- Statewide, the percentage of ME reports as a proportion of total suicide deaths has been stable at about 96% per year.
- As of 2018, seven of the 15 counties (Cochise, Maricopa, Mohave, Pinal, Santa Cruz, Yavapai, and Yuma) provided reports for 100% of their suicides, and two other counties (Gila and Pima) provided more than 90%.
- As of 2018, five counties provided reports for fewer than 80% of suicides: Apache (22.2%), Graham (57.1%), Greenlee (66.7%), La Paz (33.3%), and Navajo (71.1%).

Medical Examiner Reports by County among Homicides

Further examining the participation rates by county, we also looked at homicides independent of other violent deaths. According to our DC data, there were 1,714 homicides during the 2015–2018 period. Exhibit 2.4 shown below displays the results for homicide.

Exhibit 2.4: Number of ME Reports Obtained for Arizona Homicide Deaths by County of Death and Year, 2015–2018 (N = 1714)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	375	351	93.6	445	435	97.8	449	435	96.9	444	434	97.7	1713	1655	96.6
County of Death															
Apache	13	2	15.4	7	6	85.7	12	6	50.0	4	2	50.0	36	16	44.4
Cochise	6	6	100.0	6	6	100.0	2	2	100.0	0	0	0	14	14	100.0
Coconino	9	9	100.0	9	9	100.0	14	13	92.9	11	11	100.0	43	42	97.7
Gila	1	0	0.0	3	3	100.0	4	4	100.0	4	4	100.0	12	11	91.7
Graham	1	1	100.0	1	1	100.0	2	2	100.0	2	2	100.0	6	6	100.0
Greenlee	1	1	100.0	0	0	0	0	0	0	0	0	0	1	1	100.0
La Paz	2	2	100.0	5	3	60.0	1	0	0.0	4	4	100.0	12	9	75.0
Maricopa	241	241	100.0	283	281	99.3	286	286	100.0	283	283	100.0	1093	1091	99.8
Mohave	8	8	100.0	22	20	90.9	9	9	100.0	11	11	100.0	50	48	96.0
Navajo	9	2	22.2	13	12	92.3	10	7	70.0	8	7	87.5	40	28	70.0
Pima	53	53	100.0	62	61	98.4	78	76	97.4	80	75	93.8	273	265	97.1
Pinal	14	14	100.0	16	16	100.0	19	18	94.7	14	13	92.9	63	61	96.8
Santa Cruz	0	0	0	0	0	0	0	0	0	4	3	75.0	4	3	75.0
Yavapai	13	8	61.5	7	7	100.0	7	7	100.0	8	8	100.0	35	30	85.7
Yuma	4	4	100.0	10	10	100.0	5	5	100.0	11	11	100.0	30	30	100.0
Unknown	0	0	0	1	0	0.0	0	0	0	0	0	0	1	0	0.0
Outside Arizona	0	0	0	1	0	0.0	0	0	0	0	0	0	1	0	0.0
Total	375	351	93.6	446	435	97.5	449	435	96.9	444	434	97.7	1714	1655	96.6

- Statewide, the percentage of ME reports as a proportion of total homicide deaths has been stable at about 97% per year.
- As of 2018, eight of the 15 counties (Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Yavapai, and Yuma) provided reports for 100% of their deaths, and two other counties (Pima and Pinal) provided more than 90%.

Law Enforcement Reports by County

In Arizona, law enforcement jurisdictional authority over violent deaths is generally determined by the location where the fatal injury occurred. Arizona does not have a centralized system of law enforcement record management and sharing. The initial process of determining the applicable law enforcement jurisdiction for any particular decedent within the AZ-VDRS largely depends on two sources of information.

The initial source used to identify the responsible LE agency is the ME report. ME reports are exceptionally reliable, as they routinely indicate the LE agency referring or responsible for the death. There are cases in which this information is not listed, available, or accurate for various reasons. It may

be that an LE agency was not involved with the decedent being referred to the ME office or was not involved in the case at the time, or it may be that responsibility for the LE investigation of the case was transferred to an agency other than the original LE agency. This information, when available, is a very reliable source for identifying the responsible LE agency, but it does not identify the LE agency for all cases.

The second source used in identifying the responsible law enforcement agency is the injury address information contained in the death certificate. The death certificate officially collects information about the street address, city, state, and zip code where the fatal injury occurred. Generally, more than 95% of cases have some injury location information in the DC data. There are, however, significant shortfalls in these data that affect the identification of the correct/responsible LE jurisdiction. One shortfall is that as much as 20% of the street addresses are invalid, unknown, or vague. Actual examples include “N 20th Street,” “6.4 miles south of US [redacted] milepost 350,” and “1/4 mile south of low rent housing.” Further, address information regarding the city may or may not actually correspond to the jurisdictional city. For example, an address, even a clear and legitimate one, for a given city or town may actually be in the legal limits (and thereby the LE jurisdiction) of an adjacent municipality, an unincorporated county, or another jurisdiction (e.g., tribal or federal lands). Following failure to ascertain the correct agency from this information, the AZ-VDRS also relies on a type of referral process.

Subsequent sources for identifying the LE agency handling the violent death depend on references or referrals, both in the data and from other data provider partners. When these measures fail, we may depend on death locations or referrals from other LE agencies, but there remain cases for which it can be very difficult to identify the responsible LE agency.

Exhibit 2.5 is presented to show the inventory of law enforcement partners who were actively participating and providing reports during the 2015-2018 period. The table lists the 43 participating LE agencies (alphabetically), the county where the agency is located, and the year in which the agency began participating as an AZ-VDRS LE data provider partner.

It should be noted that where the term *Year Joined* is used, for the purposes of this report, it refers to the earliest year in which the partner supplied data prior to the data closeout. For example, the Mohave County Sheriff’s Office signed its partnership agreement and officially joined the AZ-VDRS in October of 2019, but it began supplying data dating back to the start of 2018, and these data were abstracted before the 2018 closeout; thus, this sheriff’s office is considered to have joined in 2018 for these analyses. This office had also supplied earlier historical data, which, pending internal AZ-VDRS resource availability, will be abstracted and added to existing data. This practice has been typical for other LE partners as they have been added.

These agencies are the principal sources of reports detailed in Exhibit 2.6, but they are not necessarily the only sources. Some participating and nonparticipating LE data are received through ME reports, but these instances are rare.

Exhibit 2.5: Participating Law Enforcement Agencies by County and Year Joined AZ-VDRS, 2015-2018 (N = 43)

LE Agency	County	Year Joined	LE Agency	County	Year Joined
Apache Junction PD	Pinal	2015	Paradise Valley PD	Maricopa	2017
Avondale PD	Maricopa	2018	Peoria PD	Maricopa	2015
Buckeye PD	Maricopa	2017	Phoenix PD	Maricopa	2015
Bullhead City PD	Mohave	2018	Pima Sheriff	Pima	2015
Casa Grande PD	Pinal	2015	Pinal Sheriff	Pinal	2017
Chandler PD	Maricopa	2016	Prescott PD	Yavapai	2015
Chino Valley PD	Yavapai	2017	Prescott Valley PD	Yavapai	2015
Cochise Sheriff	Cochise	2018	Safford PD	Graham	2015
Coconino Sheriff	Coconino	2015	Sahuarita PD	Pima	2015
Douglas PD	Cochise	2016	Scottsdale PD	Maricopa	2015
Flagstaff PD	Coconino	2015	Sedona PD	Yavapai	2015
Gilbert PD	Maricopa	2016	Show Low PD	Navajo	2015
Glendale PD	Maricopa	2015	Sierra Vista PD	Cochise	2015
Kingman PD	Mohave	2015	St Johns PD	Apache	2017
Lake Havasu PD	Mohave	2015	Surprise PD	Maricopa	2015
Marana PD	Pima	2015	Tempe PD	Maricopa	2015
Maricopa City PD	Pinal	2015	Tucson PD	Pima	2015
Mesa PD	Maricopa	2018	Winslow PD	Navajo	2016
Mohave Sheriff	Mohave	2018	Yavapai Sheriff	Yavapai	2018
Navajo Sheriff	Navajo	2017	Yuma PD	Yuma	2016
Nogales PD	Santa Cruz	2017	Yuma Sheriff	Yuma	2015
Oro Valley PD	Pima	2015			

Exhibit 2.6 uses the DC data (as seen in Exhibit 2.1) to establish the denominator for the ratio of LE reports obtained by county to the number of violent deaths attributed to that county. The ratio represents a baseline measure of participation and compliance with AZ-VDRS data collection by LE agencies within a given county. Exhibit 2.6 shows these participation ratios by year, as recruitment and participation have changed since the AZ-VDRS’s inception.

Exhibit 2.6: Number of LE Reports Obtained for Arizona Violent Deaths by County of Injury and Year, 2015–2018 (N = 7770)															
	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	1827	1335	73.1	1906	1421	74.6	1962	1409	71.8	2065	1624	78.6	7760	5789	74.6
County of Injury															
Apache	35	6	17.1	30	8	26.7	33	8	24.2	33	3	9.1	131	25	19.1
Cochise	37	13	35.1	33	10	30.3	41	11	26.8	24	18	75.0	135	52	38.5
Coconino	68	50	73.5	53	33	62.3	72	46	63.9	73	47	64.4	266	176	66.2
Gila	20	0	0.0	23	0	0.0	26	0	0.0	43	13	30.2	112	13	11.6
Graham	5	0	0.0	4	0	0.0	6	2	33.3	5	1	20.0	20	3	15.0
Greenlee	1	0	0.0	1	0	0.0	2	0	0.0	4	0	0.0	8	0	0.0
La Paz	9	0	0.0	10	0	0.0	16	0	0.0	18	3	16.7	53	3	5.7
Maricopa	939	791	84.2	1023	816	79.8	1014	804	79.3	1054	878	83.3	4030	3289	81.6
Mohave	89	48	53.9	99	62	62.6	106	50	47.2	108	106	98.1	402	266	66.2
Navajo	45	13	28.9	54	27	50.0	59	24	40.7	63	27	42.9	221	91	41.2
Pima	263	247	93.9	254	236	92.9	304	267	87.8	305	272	89.2	1126	1022	90.8
Pinal	99	75	75.8	91	75	82.4	95	71	74.7	114	85	74.6	399	306	76.7
Santa Cruz	5	2	40.0	9	2	22.2	4	1	25.0	11	3	27.3	29	8	27.6
Yavapai	80	36	45.0	69	60	87.0	82	67	81.7	98	92	93.9	329	255	77.5
Yuma	42	19	45.2	41	34	82.9	27	20	74.1	49	36	73.5	159	109	68.6
Unknown Arizona County	17	12	70.6	22	14	63.6	14	5	35.7	4	2	50.0	57	33	57.9
Unknown County	73	23	31.5	90	44	48.9	61	33	54.1	59	38	64.4	283	138	48.8
Outside Arizona	3	0	0.0	6	2	33.3	1	1	100.0	0	0	0.0	10	3	30.0
Total	1830	1335	73.0	1912	1423	74.4	1963	1410	71.8	2065	1624	78.6	7770	5792	74.5

- Statewide, the percentage of LE reports received as a proportion of total violent deaths has ranged from about 72% to 79% in a given year.
- In 2018, Maricopa (83.3%), Mohave (98.1%), Pima (89.2%), and Yavapai (93.9%) counties each had higher participation rates than the statewide average of 78.6%.
- There were very few violent deaths in Greenlee County in 2018, but the AZ-VDRS received no LE reports for deaths originating in that county.
- Six counties had poor LE report participation: Apache (9.1%), Gila (30.2%), Graham (20.0%), La Paz (16.7%), Navajo (42.9%), and Santa Cruz (27.3%).
- Mohave County represents the importance of sheriff’s office participation. The increase from 47.2% of 2017 cases with reports received to 98.1% in 2018 is nearly exclusively explained by the onboarding of the Mohave County Sheriff’s Office.

Law Enforcement Reports by County among Suicides

Further examining the participation rates by county, we looked more specifically at homicides and suicides independent of other violent deaths. Exhibit 2.7 displays the results specifically for suicide manner of death. Suicides totaled 5,345 in the AZ-VDRS data from 2015-2018.

	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	1285	980	76.3	1266	971	76.7	1333	972	72.9	1459	1179	80.8	5343	4102	76.8
County of Injury															
Apache	19	5	26.3	19	7	36.8	20	2	10.0	26	3	11.5	84	17	20.2
Cochise	28	10	35.7	28	8	28.6	37	10	27.0	20	17	85.0	113	45	39.8
Coconino	51	39	76.5	39	25	64.1	48	32	66.7	56	36	64.3	194	132	68.0
Gila	18	0	0.0	18	0	0.0	18	0	0.0	35	13	37.1	89	13	14.6
Graham	3	0	0.0	3	0	0.0	4	1	25.0	3	0	0.0	13	1	7.7
Greenlee	0	0	0.0	1	0	0.0	2	0	0.0	4	0	0.0	7	0	0.0
La Paz	7	0	0.0	5	0	0.0	15	0	0.0	14	1	7.1	41	1	2.4
Maricopa	644	562	87.3	678	543	80.1	669	526	78.6	726	602	82.9	2717	2233	82.2
Mohave	71	40	56.3	69	44	63.8	74	34	45.9	87	85	97.7	301	203	67.4
Navajo	33	12	36.4	33	17	51.5	41	20	48.8	50	24	48.0	157	73	46.5
Pima	201	195	97.0	177	169	95.5	215	203	94.4	215	205	95.3	808	772	95.5
Pinal	76	59	77.6	69	61	88.4	68	55	80.9	88	74	84.1	301	249	82.7
Santa Cruz	4	1	25.0	6	1	16.7	4	1	25.0	7	2	28.6	21	5	23.8
Yavapai	65	30	46.2	61	54	88.5	75	62	82.7	85	82	96.5	286	228	79.7
Yuma	36	17	47.2	30	25	83.3	21	16	76.2	35	30	85.7	122	88	72.1
Unknown Arizona County	3	2	66.7	3	3	100.0	1	0	0.0	1	1	100.0	8	6	75.0
Unknown County	26	8	30.8	27	14	51.9	21	10	47.6	7	4	57.1	81	36	44.4
Outside Arizona	2	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	2	0	0.0
Total	1287	980	76.1	1266	971	76.7	1333	972	72.9	1459	1179	80.8	5345	4102	76.7

- Statewide, the percentage of LE reports received as a proportion of total suicide deaths has remained stable at around 76%, although it was a low of about 73% in 2018.
- In 2018, Cochise (85.0%), Maricopa (82.9%), Mohave (97.7%), Pima (95.3%), Pinal (84.1%), Yavapai (96.5%), and Yuma (85.7%) counties each had a significantly higher participation rate than the statewide average of 80.8%.
- In 2018, despite having both Flagstaff (the largest city in Coconino County) and the Coconino County Sheriff's Office participating, the AZ-VDRS received only 64.3% of LE suicide reports from suicide deaths in Coconino County.
- In 2018, seven counties had very poor LE report participation for suicides. These were Apache (11.5%), Gila (37.1%), Graham (0.0%), Greenlee (0.0%), La Paz (7.1%), Navajo (48.0%), and Santa Cruz (28.6%).

Law Enforcement Reports by County among Homicides

Further examining the participation rates by county, we looked at homicides independent of other violent deaths. Exhibit 2.8 displays the results specifically for homicide.

Exhibit 2.8: Number of LE Reports Obtained for Arizona Homicide Deaths by County of Injury and Year, 2015-2018 (N = 1712)															
	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	374	263	70.3	441	327	74.1	449	333	74.2	444	332	74.8	1708	1255	73.5
County of Injury															
Apache	14	1	7.1	6	0	0.0	10	5	50.0	5	0	0.0	35	6	17.1
Cochise	6	2	33.3	4	2	50.0	2	1	50.0	2	1	50.0	14	6	42.9
Coconino	7	3	42.9	8	4	50.0	15	10	66.7	9	5	55.6	39	22	56.4
Gila	1	0	0.0	4	0	0.0	5	0	0.0	4	0	0.0	14	0	0.0
Graham	1	0	0.0	1	0	0.0	2	1	50.0	2	1	50.0	6	2	33.3
Greenlee	1	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	1	0	0.0
La Paz	2	0	0.0	4	0	0.0	1	0	0.0	4	2	50.0	11	2	18.2
Maricopa	227	183	80.6	265	218	82.3	272	227	83.5	261	227	87.0	1025	855	83.4
Mohave	7	4	57.1	21	10	47.6	8	3	37.5	7	7	100.0	43	24	55.8
Navajo	10	1	10.0	15	7	46.7	13	4	30.8	9	1	11.1	47	13	27.7
Pima	50	42	84.0	59	51	86.4	76	53	69.7	77	55	71.4	262	201	76.7
Pinal	17	12	70.6	17	10	58.8	21	12	57.1	20	7	35.0	75	41	54.7
Santa Cruz	1	1	100.0	0	0	0.0	0	0	0.0	4	1	25.0	5	2	40.0
Yavapai	14	6	42.9	7	6	85.7	7	5	71.4	9	8	88.9	37	25	67.6
Yuma	4	1	25.0	10	8	80.0	5	4	80.0	13	5	38.5	32	18	56.3
Unknown															
Arizona	11	7	63.6	12	8	66.7	7	4	57.1	1	1	100.0	31	20	64.5
County															
Unknown	1	0	0.0	8	3	37.5	5	4	80.0	17	11	64.7	31	18	58.1
County															
Outside	1	0	0.0	3	2	66.7	0	0	0.0	0	0	0.0	4	2	50.0
Arizona															
Total	375	263	70.1	444	329	74.1	449	333	74.2	444	332	74.8	1712	1257	73.4

- Statewide, the percentage of LE reports received as a proportion of total homicide deaths has remained stable at around 74% since 2016.
- In 2018, only Maricopa (87.0%), Mohave (100.0%), and Yavapai (88.9%) counties had higher participation rates than the statewide average of 74.8%.
- In 2018, no homicide reports were received from law enforcement for deaths in Apache and Gila Counties.
- In eight Arizona counties, about half or less of the potential homicide reports were provided to the AZ-VDRS in 2018. These were Cochise (50.0%), Coconino (55.6%), Graham (50.0%), La Paz (50.0%), Navajo (11.1%), Pinal (35.0%), Santa Cruz (25.0%), and Yuma (38.5%).

Missing Law Enforcement Reports by Agency

We further examined missing LE reports by agency. Identifying those LE agencies having the most missing reports assesses the representativeness of the AZ-VDRS data for particular jurisdictions and allows us to focus efforts on improving their representation. Collectively, over the 4-year period from 2015 through 2018, there were 1,976 (25.4%) decedents for whom an LE report was not provided/available. Of these, 1,540 (19.8%) missing reports were due to the nonparticipation of the responsible jurisdiction. Exhibit 2.9 identifies the 22 nonparticipating agencies with a total of 10 or more missing reports. The table identifies each agency, the county(ies) of the jurisdiction (or whether the agency has statewide jurisdiction), the number of missing reports by manner of death, and the percentage of the total represented by that agency. The table also summarizes the missing reports associated with nonparticipating agencies with fewer than a total of 10 reports from 2015 through 2018 ($N = 60$), those missing because there was no associated LE report/investigation (i.e., not applicable), and those missing because the LE agency was unknown/unidentified.

LE Agency	County	Total Missing Suicides	Total Missing Homicides	Total Missing Undetermined / Other	Total Missing Violent Deaths	% of Total
Maricopa Sheriff ††	Maricopa	329	72	45	446	29.0
Navajo Nation PD	Apache, Coconino, & Navajo	61	21	6	88	5.7
AZ DOC	Statewide	29	22	6	57	3.7
Gila Sheriff	Gila	39	3	13	55	3.6
Gila River Tribal PD	Maricopa & Pinal	22	24	3	49	3.2
Unspecified Tribal Police	Statewide	31	9	1	41	2.7
FBI	Statewide	5	20	12	37	2.4
BIA	Statewide	20	11	5	36	2.3
AZ DPS †	Statewide	13	2	14	29	1.9
La Paz Sheriff †	La Paz	20	5	3	28	1.8
Goodyear PD †	Maricopa	18	2	2	22	1.4
Santa Cruz Sheriff †	Santa Cruz	16	2	2	20	1.3
Salt River PD	Maricopa	14	3	2	19	1.2
Tohono O'Odham PD	Pima, Maricopa, & Pinal	11	4	4	19	1.2
National Park Service	Statewide	10	0	8	18	1.2
Camp Verde Marshal	Yavapai	14	2	1	17	1.1
Graham Sheriff	Graham	15	1	1	17	1.1
Payson PD †	Gila	12	1	1	14	0.9
Globe PD †	Gila	5	4	3	12	0.8
Florence PD †	Pinal	10	0	1	11	0.7
Wickenburg PD †	Yavapai	10	0	1	11	0.7
Cottonwood PD †	Yavapai	6	0	4	10	0.6
All other LE agencies ($n = 60$)	Statewide	136	25	32	193	12.5
Not Applicable	Statewide	31	1	14	46	3.0
Unknown or Unidentified	Statewide	161	28	56	245	15.9
Total		1038	262	240	1540	100.0

† These agencies joined the AZ-VDRS as a data provider partner after the 2018 data closeout year and are thus nonparticipating for this report period; they will be reflected as partners in future reports.

†† The Maricopa County Sheriff's Office signed an agreement to participate in 2016. The Sheriff's Office provided a portion of cases from 2015 ($n = 46$; 42.2%) and 2016 ($n = 45$; 25.1%) before discontinuing its participation.

- Maricopa County Sheriff's Office represented the largest number ($N = 446$) and proportion (29.0%) of missing reports. They are the largest nonparticipating agency in the state in terms of number of violent deaths.
- Other important nonparticipating agencies include Navajo Nation PD ($N = 88$; 5.7%), Arizona Department of Corrections and Rehabilitation (AZ DOC; $N = 57$; 3.7%), and Gila County Sheriff ($N = 55$; 3.6%).
- There were 193 (12.5%) missing reports from a combined 60 agencies, each with nine or fewer missing reports.
- Unknown or unidentified law enforcement agencies represent about 16% ($N = 245$) of missing reports from nonparticipating agencies.

Conclusion

The agreement that the AZ-VDRS has in place with the Arizona Department of Health Services provides a highly reliable and timely mechanism for reception of death certificate data. Therefore, the quality and completeness of death certificate data in the AZ-VDRS dataset is high.

Additionally, the AZ-VDRS has, overall, quite strong medical examiner participation. All 15 counties in Arizona are represented by participating medical examiner agencies; all public county medical examiner's offices participate, and the percentage of decedents for which the AZ-VDRS is not able to access medical examiner records is small, averaging under 5% over the lifetime of the AZ-VDRS program. Additionally, Arizona's two most populated counties, which account for nearly three quarters of the state population, have extremely high report fulfillment rates, with Maricopa County at 99.9% and Pima County at 98.1% as of the 2018 dataset, and nine of the 15 counties provided data for at least 90% of decedents in their jurisdiction. The percentage of reports received for suicides, at 95.8%, lags slightly behind that for homicides, at 96.6%, but both numbers are strong with fewer than 5% of decedents unaccounted for. Thus, the medical examiner portion of the AZ-VDRS dataset is strong.

Although law enforcement participation is notably lower, the heavily populated counties of Maricopa and Pima both boast a participation rate of over 80% as of 2018. This percentage has continued to improve in the ensuing years for which analyses were not yet finalized and available for inclusion in this report.

Most of the challenges encountered by the AZ-VDRS in relation to partnerships are driven by difficulty recruiting tribal entities and rural and county law enforcement agencies. Arizona has a sizable amount of sovereign tribal land within its borders, which falls under the jurisdiction of the relevant tribe and the FBI/BIA, and substantial portions of the state are very rural and sparsely populated. These areas either have small municipal law enforcement agencies that are difficult to recruit for partnership, or they are under the jurisdiction of that county's sheriff's office, reinforcing the importance of sheriff participation for adequate representation of rural communities. We have identified four major challenges in regard to these partnership issues. Below, we summarize these challenges, note potential strategies to address them, and indicate who is responsible for addressing each challenge.

Challenge	Activity	Responsible Party
Nonparticipating state corrections and local police agencies/sheriff's offices	Continue to recruit agencies, focusing on those with higher numbers of violent deaths annually. The inclusion of the following four (non-tribal) agencies would be the most beneficial: Maricopa County Sheriff's Office, Gila County Sheriff's Office, AZ Department of Corrections, and Graham County Sheriff's Office.	AZ-VDRS leadership
Nonparticipating tribal LE manages ME investigation/death certification	Nearly exclusive to Navajo Nation; determine whether separate ME-style reports are being completed; meet with leaders from multiple sectors such as overall tribal leadership, public health, and law enforcement to discuss the value of participation for the tribe.	AZ-VDRS leadership
Tribal LE participation	Begin with Navajo Nation (included as part of the above) as the tribal entity accounting for the largest proportion of AZ-VDRS decedents and Tohono O'odham as a tribe known to be more open to working with non-tribal organizations.	AZ-VDRS leadership
Federal agency participation	Work with CDC and other VDRS states to determine possible approaches to either gaining participation or accessing full or partial data from the FBI, BIA, and National Park Service.	AZ-VDRS leadership CDC Other VDRS sites

Section 3: Accessibility of Reports Among Participating Partners

The participation of dozens of ME and LE data providers is only the first critical step in improving the AZ-VDRS data quality and the representativeness of its findings. Once participation by data providers is secured, the next major hurdle is the actual receipt of quality ME and LE data. Section 2 assessed the AZ-VDRS's maximum potential data coverage based on the partnership agreements in place during 2015–2018. Section 3 assesses the level of the partners' participation. More precisely, this section focuses on partner agencies and the rate at which they provide reports. This is important in order for the AZ-VDRS to assess areas of improvement and to determine data-providing partners that may require particular attention or resources to improve their level of participation, as measured by providing reports in a timely manner.

It should be noted here that as new data provider partners are added, they often supply historic data. Given resource limitations, data acquired during a given year's collection period is prioritized. Thus, "timely manner" may include new partners who may have provided data for prior years, after the data closeout for those years, that may, therefore, be reflected as missing in our analytical files. We discuss a plan to correct and improve these data further below.

The analyses for this section begin with examining the coverage of violent deaths for both ME and LE data. While there is some data overlap across the three principal data-source types (DC, ME, and LE),

each data type offers unique data and information. As an overall assessment of the complete data coverage, we look at the number of cases with ME and LE reports both independently and collectively. This analysis is presented in Exhibit 3.1 and uses a denominator that includes all violent deaths, that is, those from both participating and nonparticipating partners.

After comparing the coverage of ME and LE data, we examine these independently of one another. The principal measure used to assess whether a report was provided is abstracted narratives. The AZ-VDRS abstraction process involves completing data collection fields covering a broad range of incident- and individual-level data elements. It also includes the abstraction of provided reports into a text-derived narrative format. These narratives, as they are termed, are very important to the utility of the AZ-VDRS. The close-ended data elements (e.g., age, sex, race/ethnicity, wounds, toxicology, location details, etc.) are valuable, but the narrative component of the reports offers data unique to the NVDRS system. Narratives provide invaluable context regarding the decedent, the fatal incident, and the conditions and circumstances contributing to the death. For the purposes of the analyses conducted in this section, we make no assessment as to the quality or comprehensiveness of the information contained in the abstracted reports. Instead, we use a dichotomous (i.e., yes or no) measure of whether a given case has an abstracted narrative saved into the NVDRS web portal as reflected in the raw data output. We use this as a proxy for whether or not AZ-VDRS received a report from the data-provider partner for a given decedent prior to the data closeout year.

Comparative ME/LE Report Coverage

An important aspect of data acquisition and abstraction is the comprehensive coverage of the three major data sources for the AZ-VDRS: death certificates (DC), medical examiner (ME) reports, and law enforcement (LE) investigations. ME reports may include scene investigation summaries, autopsies, and toxicology reports as applicable/available. Exhibit 3.1 describes the data coverage of acquiring ME and LE reports separately and in combination. While Exhibit 3.1 is not limited to participating partners it is included here as a reference to the summative coverage of ME and LE data for all potential violent death decedents.

	2015			2016			2017			2018			Total		
	DC	Report	%	DC	Report	%	DC	Report	%	DC	Report	%	DC	Report	%
ME Reports	1830	1714	93.7	1912	1857	97.1	1963	1888	96.2	2065	1990	96.4	7770	7449	95.9
LE Reports	1830	1335	73.0	1912	1423	74.4	1963	1410	71.8	2065	1624	78.6	7770	5792	74.5
ME Report Only	1830	384	21.0	1912	441	23.1	1963	483	24.6	2065	375	18.2	7770	1683	21.7
LE Report Only	1830	5	0.3	1912	7	0.4	1963	5	0.3	2065	9	0.4	7770	26	0.3
One of Either Report	1830	1719	93.9	1912	1864	97.5	1963	1893	96.4	2065	1999	96.8	7770	7475	96.2
Neither ME or LE Report Received	1830	111	6.1	1912	48	2.5	1963	70	3.6	2065	66	3.2	7770	295	3.8
Both ME and LE Reports Received	1830	1330	72.7	1912	1416	74.1	1963	1405	71.6	2065	1615	78.2	7770	5766	74.2

- ME reports were significantly more likely than LE reports to be provided overall (95.9% vs. 74.5%, respectively).
- It was rare to have received only an LE report for a given decedent (overall, 0.3%).
- Overall, an ME or LE report was provided for 96.2% of decedents.

Missing ME Abstracted Report Data

Among the 7,770 decedents, 7,507 (96.6%) decedents were attributed to a participating ME data provider. Exhibit 3.2 shows the distribution of decedents with and without an abstracted report, by abstraction status. The abstraction status categories are defined and used locally by AZ-VDRS program management for case processing and tracking. The analysis is conducted by merging AZ-VDRS internal tracking sheet data with downloaded data from the NVDRS web-based portal, from which the assessment of “No Report Abstracted” or “Abstracted Report” is derived. If any narrative information is recorded in the portal, the result is coded as “Abstracted Report.” This is not an assessment of the quality of the report; for that, we examined the completion of circumstance codes, later in this report (see Section Four: Data Quality).

Exhibit 3.2: ME Report Abstracted by Abstraction Tracking Status among Participating Partners, 2015–2018 (N = 7507)

	No Report Abstracted		Abstracted Report		Total	
	N	%	N	%	N	%
Requested, Not Received	55	0.7	3	0.0	58	0.8
In-Progress	38	0.5	0	0.0	38	0.5
Completed	12	0.2	7399	98.6	7411	98.7
Total	107	1.4	7400	98.6	7507	100.0

- For 2015-2018, in Arizona, there were almost 99% of decedents with abstracted report data provided.
- There were a very small number (N = 12, 0.2%) of incidents that were recorded as completed but for which no narrative was present in the NVDRS web portal data. This likely reflects abstractor or system error.²

Missing ME Abstracted Report Data by Year

Exhibit 3.3 shows the percentage of cases by year that have an abstracted ME report. This exhibit offers no assessment of the quality of information contained in the report, just that an ME report was provided and abstracted. During the first year of the AZ-VDRS, in 2015, there were a greater number of missing or

² Of the 12 cases that were recorded as completed but that had no narrative, we could not determine the source of the discrepancy in seven cases. We believe that two of these cases were related to system errors and three were related to abstractor errors.

non-abstracted ME reports, hence the 3.8% of deaths with no abstracted ME report from participating partners. From 2016–2018, this percentage declined and stabilized to less than 1%.

Exhibit 3.3: Abstracted ME Reports among Participants by year, 2015-2018 (N = 7507)

	No		Yes		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
2015	66	3.8	1673	96.2	1739	100.0
2016	14	0.7	1856	99.3	1870	100.0
2017	11	0.6	1885	99.4	1896	100.0
2018	14	0.7	1988	99.3	2002	100.0
Total	105	1.4	7402	98.6	7507	100.0

Missing Abstracted ME Report Data by County

For Exhibit 3.4, we examined the rate at which ME reports were abstracted among participating data providers by the county where the death occurred. Arizona has a complex system of medical examiner jurisdictional authority, and while dividing violent deaths into a county-level analysis cannot completely assess the performance of participating ME partners, it does provide important information about potential data collection and reporting characteristics on a county-level geographic scale.

The table displays the number of ME reports abstracted, as measured by the narrative field of the CDC web portal. The denominators used are based on those deaths identified as the responsibility of a participating partner. Using the county of death as an organizing assessment of potential geographic impact, we found very little difference across counties. There was improvement over time, such that by 2018 there was less than 3% of cases from any given county for which we did not have an abstracted report for a decedent from a participating data provider.

Exhibit 3.4: Number of ME Reports Abstracted among Participating ME Data Providers by County of Death and Year, 2015–2018 (N = 7507)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	1739	1673	96.2	1870	1856	99.3	1896	1885	99.4	2002	1988	99.3	7507	7402	98.6
County of Death															
Apache ²	8	8	100.0	16	14	87.5	9	8	88.9	9	9	100.0	42	39	92.9
Cochise ²	39	37	94.9	36	36	100.0	34	34	100.0	21	21	100.0	130	128	98.5
Coconino ¹	70	68	97.1	61	61	100.0	72	72	100.0	68	68	100.0	271	269	99.3
Gila ²	10	7	70.0	27	23	85.2	26	26	100.0	41	41	100.0	104	97	93.3
Graham ²	1	1	100.0	2	2	100.0	3	3	100.0	7	7	100.0	13	13	100.0
Greenlee ²	1	1	100.0	1	1	100.0	2	2	100.0	2	2	100.0	6	6	100.0
La Paz ²	5	5	100.0	4	4	100.0	4	4	100.0	8	8	100.0	21	21	100.0
Maricopa ¹	985	955	97.0	1088	1083	99.5	1067	1065	99.8	1117	1116	99.9	4257	4219	99.1
Mohave ¹	89	86	96.6	101	101	100.0	111	111	100.0	118	118	100.0	419	416	99.3
Navajo ²	23	22	95.7	47	47	100.0	45	45	100.0	41	40	97.6	156	154	98.7
Pima ¹	265	265	100.0	260	257	98.8	317	310	97.8	317	308	97.2	1159	1140	98.4
Pinal ¹	87	87	100.0	82	82	100.0	83	82	98.8	101	99	98.0	353	350	99.2
Santa Cruz ²	4	4	100.0	9	9	100.0	4	4	100.0	10	9	90.0	27	26	96.3
Yavapai ¹	110	88	80.0	96	96	100.0	93	93	100.0	96	96	100.0	395	373	94.4
Yuma ¹	42	39	92.9	40	40	100.0	26	26	100.0	46	46	100.0	154	151	98.1
Total	1739	1673	96.2	1870	1856	99.3	1896	1885	99.4	2002	1988	99.3	7507	7402	98.6

¹ County has a dedicated medical examiner office that handles all violent deaths.

² County uses a modified system of certifying violent deaths.

Missing Abstracted Report Data

After report acquisition, the next step in the process is data abstraction. An important part of the reports received is the narrative sections, which allow for details not routinely covered in closed-end form questions on official reporting documents. Narratives are the primary source of information used by abstractors to identify and endorse the circumstances surrounding the violent death.

We attempted to analyze the comparative coverage of abstracted reports within and between participating ME and LE data providers. There were substantial changes in participation from the beginning of the AZ-VDRS in 2015 through the end of the study period for this report in 2018. These changes and the differences in ME and LE participation status for a given decedent made this an extremely difficult task. We were unable to create a meaningful and reasonably understandable analysis of this report crossover, and we have thus omitted the analysis for this report.

Missing LE Abstracted Report Data

A total of 5,877 (75.6%) LE reports were available from participating LE data providers during our study period, 2015–2018. Exhibit 3.5 shows the distribution of decedents with and without abstracted reports by abstraction status. The abstraction status categories are defined and used locally by AZ-VDRS program management for case processing and tracking. The analysis was conducted following the merging of the AZ-VDRS internal tracking sheet data with downloaded incident data from the NVDRS web portal.

As with the ME reports analysis above, the progress categories are recorded on AZ-VDRS internal tracking documents as data are abstracted. The AZ-VDRS tracking sheet data are merged with incident data downloaded from the NVDRS web portal, from which the assessment of “no report abstracted” or “report abstracted” is derived. If any report information is recorded in the LE Narrative field of the web portal, the result is coded as “report abstracted.” This is not an assessment of the quality of the reports; for that, we examine the completion of circumstance codes later in this report (see Section Four: *Data Quality*).

Some of the progress categories for LE reports, as shown in Exhibit 3.5, indicated status categories that reflected cases that had been received but not yet abstracted (“in progress”) or that had been requested from a newly recruited agency but not yet provided (“requested”). A small portion of these also likely reflect coding errors, as a “requested” case would not be expected to have an abstracted report ($N = 8$, 0.1%) because no report would have yet been received. These inconsistent status categories likely represent internal AZ-VDRS recordkeeping errors. Conversely, also as noted in the table, while the responsible LE agency may be “nonparticipating,” the AZ-VDRS will occasionally receive part or all of an LE report with receipt of the ME report, and the LE data can then be abstracted ($N = 20$; 0.3%).

Exhibit 3.5: LE Report Progress by Abstraction Status among Participating Partners, 2015–2018 ($N = 5877$)

	No Report Abstracted		Report Abstracted		Total	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Requested	208	3.5	8	0.1	216	3.7
In Progress	141	2.4	11	0.2	152	2.6
Completed	24	0.4	5274	89.7	5298	90.1
Unknown Source †	13	0.2	2	0.0	15	0.3
Re-request Open Case	80	1.4	20	0.3	100	1.7
Nonparticipating †	39	0.7	20	0.32	59	1.0
Abstracted, Not Cleared	0	0.0	37	0.6	37	0.6
Total	505	8.6	5372	91.4	5877	100.0

† Suspected source of abstracted LE information derived from LE reports' inclusion in ME reports.

Missing LE Abstracted Report Data by Agency

We further examined the LE reports by LE agency. Exhibit 3.6 shows the distribution of missing LE abstracted report data by the source law enforcement agency. A total of 505 (8.6%) violent deaths in participating LE jurisdictions ($N = 5,877$; not shown) were missing abstracted LE reports. The 505 cases were distributed across 31 agencies. The modal number per agency was 1, and the mean was 7.5. The table is organized in descending order of the number of missing abstracted incident reports from LE agencies with at least five missing reports.

Exhibit 3.6: Missing Law Enforcement Abstracted Reports among Participating LE Agencies, 2015–2018 (N = 505)

<i>N</i>	Agency	<i>N</i>	Agency
116	Mohave Sheriff	10	Surprise PD
70	Phoenix PD	8	Chandler PD
63	Pinal Sheriff	8	Gilbert PD
47	Tucson PD	8	Marana PD
41	Avondale PD	7	Yuma Sheriff
24	Tempe PD	5	Kingman PD
22	Glendale PD	5	Maricopa City PD
17	Winslow PD	28	All other agencies (<i>N</i> = 15)
16	Mesa PD		
15	Bullhead City PD	505	TOTAL

- Phoenix (*N* = 70), Tucson (*N* = 47), Tempe (*N* = 24), Glendale (*N* = 22), and Mesa (*N* = 16) are all longstanding participating agencies, but also represent agencies that are responsible for a higher volume of cases than most agencies in Arizona. Collectively, these five agencies accounted for 35.4% (*N* = 179) of missing abstracted LE reports.
- The Mohave Sheriff (*N* = 116; 22.9%), Pinal Sheriff (*N* = 63; 12.5%), and Avondale PD (*N* = 41; 8.1%) had higher numbers of missing reports because they joined in 2018, 2017, and 2018, respectively. These numbers reflect both reports that have not yet been received and those that were received but have not yet been abstracted.

Conclusion

The AZ-VDRS receives a high percentage of ME reports, at nearly 96%. Additionally, it is rare that an LE report is received for a decedent for whom the ME report was not received, as this occurred for only 0.3% of decedents in the AZ-VDRS data. At least one of the two sources provided data for over 96% of decedents, while both sources provided data for almost 72% of these decedents. Only a small percentage of decedents for whom a report was received and abstracted showed no narrative in the CDC portal (ME = 0.6%; LE = 0.3%).

The analysis presented in this section reinforces the results of the analysis in Section 2, showing that lack of participation is the primary cause of incomplete data in the AZ-VDRS dataset. Additionally, many LE agencies and a small number of ME's offices sometimes withhold reports for incidents that are still under investigation, are still being litigated, relate to officer-involved shootings, or involve minors as victims. Furthermore, some decedents' deaths fall under the jurisdiction of a participating agency, but the agency either did not respond to the incident or responded only briefly, did not investigate and did not create reports for the incident. This is primarily an issue with suicides, particularly in cases in which the decedent was transported and admitted to a hospital before ultimately dying.

In a small number of instances, AZ-VDRS records reflect that a report has been abstracted for an incident but that there is no narrative in the CDC portal for that case. This may be due to the abstractor forgetting to paste the narrative into the portal and/or save the update, or it may be due to an internal database problem with the CDC portal in which saved narratives seem to “disappear,” a problem that has been discussed previously among VDRS states. Moreover, the coding between the AZ-VDRS tracking

sheets and the portal is occasionally inconsistent, whereby the tracking sheet may reflect that a source is unknown, yet the portal reflects a narrative for that source. Finally, a number of narratives reflect as blank for incidents for which a report was received following closeout for that data year—perhaps due to a lack of time and manpower to work backward and abstract those reports, that is, the deprioritization of such reports.

We have identified six major challenges in regard to these participation quality issues. Below, we summarize these challenges, note potential strategies to address them, and indicate who is responsible for addressing each challenge.

Challenge	Activity	Responsible party
Nonparticipating LE agencies and tribal entities who handle ME services internally	Continue to recruit nonparticipating agencies with special focus on sheriff’s offices and tribal communities; see Section 2 for further detail.	AZ-VDRS leadership
Participating agencies not sharing open cases/unable to release certain reports	Discuss with such agencies the possibility of sending an abstractor to abstract open cases on site at the agency.	AZ-VDRS leadership
Participating agency had jurisdiction of a death but did not investigate/complete a report	Develop training materials that impress upon law enforcement entities the value of investigating what are often considered “obvious suicides;” provide checklist-style pocket cards for officers to carry when responding to such scenes to guide them on useful observations to record.	AZ-VDRS leadership; Report writer Project partners
Blank web-portal narrative fields for abstracted cases	Retrain abstractors on ensuring narratives are added and saved in the CDC portal—emphasize the importance of carefully checking; continue checking during data cleaning for blank narratives and completing the narratives for such cases; carefully track cases in which it seems a narrative has “disappeared” from the portal after being added and saved, an indication of a database problem that has been mentioned by several VDRS states.	AZ-VDRS abstractors Lead abstractor AZ-VDRS leadership CDC
Inconsistent coding between tracking sheet and CDC portal	Retrain abstractors on the importance of ensuring that the tracking sheet coding and the CDC portal coding match; review tracking sheets and crosscheck against portal to ensure coding matches appropriately.	AZ-VDRS abstractors Lead abstractor
Cases for which reports have been received but not yet abstracted	Consider extra staffing to allow for working backward to abstract reports received after data closeout.	AZ-VDRS leadership Lead abstractor

Section 4: Data Quality

Section Four, *Data Quality*, extends the analyses from Section 3 to focus on assessing the quality of the data received. The AZ-VDRS depends on combining disparate existing data sources into a single dataset (i.e., the NVDRS web-based portal). The most important aspect of the added value to these existing data is the abstractions of narrative information into a usable, predefined set of variables specifically termed our Circumstance data. Section Four, therefore, focuses on the proportion of cases that have at least one of about four dozen circumstance variables coded. While it is possible for a case to have no qualifying circumstances, and a lack of coded circumstances may also be the result of abstractor error (discussed in greater detail below), the absence of any coded circumstance data is a valuable proxy for assessing the relative quality and thoroughness of narrative data received.

The analyses in this section depend on assessing the quality of data as it actually is received from ME and LE data-provider partners. Due to the importance and added value of abstracting unredacted investigative narratives from the provided reports, using the minimal threshold of having at least one circumstance endorsed is an effective proxy for assessing the overall quality of the information. Circumstance variables are endorsed independently according to strict definitions for qualifying endorsement, and there are separate sets of circumstance variables for ME and LE sources.

The analyses below first look at ME data sources' data quality and then examine LE data sources. Among ME data providers, we also examined the rates of circumstance endorsement based on cases handled by individual death certifiers. The coded numbers used to "identify" individual death certifiers are anonymously generated placeholders. They are not derived from any identifiable information (e.g., name, license number, etc.) and, outside of internal, confidential AZ-VDRS records, are not immediately available to the public. In similar fashion, for LE data providers, we examined the data quality at the LE agency level. These agencies are identified by the organization's name in Exhibits 4.11 and 4.12.

Quality of Medical Examiner Narrative Data

Arizona uses a medical examiner system, generally organized at the county level. Most counties have a dedicated office of the medical examiner within the county manager's administrative structure. In Apache and Yuma counties, the medical examiner is administratively within the sheriff's office. Other rural counties subcontract with the Pima or Coconino County ME to serve as the forensic ME, and still others (e.g., Mohave) contract with private physicians (some of whom may be qualified pathologists) for medical death certifiers. Although the AZ-VDRS has agreements with most of these ME offices and certifiers, the decentralized structure still leaves some gaps in participation and data availability/quality.

Examining the proportion of deaths with at least one ME circumstance abstracted by year and county, we can make an initial assessment of the data quality of the ME data abstracted. Exhibit 4.1 shows the proportion of cases with sufficient narrative information in an ME report for at least one circumstance to have been abstracted. The analyses examined the ME circumstance completion by year and county, as the quality of ME data is largely the responsibility of county-level officials. These analyses only include those deaths from participating data providers with a provided and abstracted report.

Exhibit 4.1: Number of Decedents with at Least One ME Circumstance Coded among Participating and Abstracted ME Partner Reports by Death County, 2015–2018 (N = 7402)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	1673	1538	91.9	1856	1716	92.5	1885	1769	93.8	1988	1833	92.2	7402	6856	92.6
County of Death															
Apache	8	3	37.5	14	8	57.1	8	7	87.5	9	6	66.7	39	24	61.5
Cochise	37	35	94.6	36	33	91.7	34	32	94.1	21	16	76.2	128	116	90.6
Coconino	68	61	89.7	61	55	90.2	72	70	97.2	68	63	92.6	269	249	92.6
Gila	7	7	100.0	23	17	73.9	26	22	84.6	41	24	58.5	97	70	72.2
Graham	1	1	100.0	2	2	100.0	3	1	33.3	7	4	57.1	13	8	61.5
Greenlee	1	1	100.0	1	1	100.0	2	2	100.0	2	2	100.0	6	6	100.0
La Paz	5	5	100.0	4	3	75.0	4	2	50.0	8	7	87.5	21	17	81.0
Maricopa	955	895	93.7	1083	1035	95.6	1065	1034	97.1	1116	1069	95.8	4219	4033	95.6
Mohave	86	81	94.2	101	96	95.0	111	101	91.0	118	109	92.4	416	387	93.0
Navajo	22	21	95.5	47	40	85.1	45	41	91.1	40	32	80.0	154	134	87.0
Pima	265	259	97.7	257	236	91.8	310	278	89.7	308	276	89.6	1140	1049	92.0
Pinal	87	77	88.5	82	61	74.4	82	76	92.7	99	96	97.0	350	310	88.6
Santa Cruz	4	4	100.0	9	9	100.0	4	4	100.0	9	8	88.9	26	25	96.2
Yavapai	88	51	58.0	96	82	85.4	93	73	78.5	96	77	80.2	373	283	75.9
Yuma	39	37	94.9	40	38	95.0	26	26	100.0	46	44	95.7	151	145	96.0
Total	1673	1538	91.9	1856	1716	92.5	1885	1769	93.8	1988	1833	92.2	7402	6856	92.6

- There were substantial and significant differences among counties overall in regard to the comparative quality of their ME narrative data.
- Cochise, Coconino, Greenlee, Maricopa, Mohave, Pima, Santa Cruz, and Yuma counties all had more than 90% of their potential cases provide narrative data sufficient to code at least one ME circumstance.
- Gila (72.2%), La Paz (81.0%), Navajo (87.0%), Pinal (88.6%), and Yavapai (75.9%) each had satisfactory to good data quality.
- Apache (61.5%) and Graham (61.5%) counties had overall poor quality narratives in their reports.

Quality of Medical Examiner Report Narrative Data by Manner of Death

As a further examination of the ME circumstance data quality, we examined the data by manner of death. The quality of detailed investigative narratives may differ significantly based on the death being either a suicide or a homicide. As seen in Exhibit 4.2, when we looked at the coded ME circumstance data by manner of death, we found that homicide data were of slightly poorer quality than suicide data (88.8% vs. 93.5%).

Exhibit 4.2: Number of Decedents with at Least One ME Circumstance Known by Manner of Death among Participating ME Partners, 2015–2018 (N = 7402)

	No		Yes		Total	
	n	%	n	%	n	%
Suicide	330	6.5	4780	93.5	5110	100.0
Homicide	161	11.2	1272	88.8	1433	100.0
Undetermined	54	8.3	600	91.7	654	100.0
Other†	1	0.5	204	99.5	205	100.0
Total	546	7.4	6856	92.6	7402	100.0

† Legal intervention and other manners of death.

Quality of Medical Examiner Report Narrative Data Among Suicides and Homicides

Exhibits 4.3 and 4.4 provide detailed analyses of ME circumstances coded by year and county for suicides (Exhibit 4.3) and homicides (Exhibit 4.4) independently. Notable differences between suicides and homicides were found in nine of the 15 counties. Comparing the rates for the entire time period between suicides and homicides, these nine counties had the following percentages of coded circumstance data by manner of death: Apache (66.7% vs. 53.3%), Gila (67.2% vs. 90.0%), Graham (33.3% vs. 80.0%), La Paz (90.0% vs. 66.7%), Navajo (87.7% vs. 72.0%), and Santa Cruz (100.0% vs. 66.7%).

Exhibit 4.3: Number of Suicide Cases with At Least One ME Circumstance Coded by Death County, 2015–2018 (N = 5139)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	1217	1118	91.9	1222	1142	93.5	1273	1204	94.6	1398	1316	94.1	5110	4780	93.5
County of Death															
Apache	6	2	33.3	6	5	83.3	0	0	0.0	6	5	83.3	18	12	66.7
Cochise	30	28	93.3	29	26	89.7	31	30	96.8	18	15	83.3	108	99	91.7
Coconino	51	45	88.2	40	35	87.5	47	47	100.0	48	46	95.8	186	173	93.0
Gila	6	6	100.0	16	11	68.8	14	10	71.4	28	16	57.1	64	43	67.2
Graham	0	0	0.0	1	1	100.0	1	0	0.0	4	1	25.0	6	2	33.3
Greenlee	0	0	0.0	1	1	100.0	2	2	100.0	2	2	100.0	5	5	100.0
La Paz	3	3	100.0	1	1	100.0	3	2	66.7	3	3	100.0	10	9	90.0
Maricopa	659	627	95.1	694	677	97.6	685	673	98.2	749	733	97.9	2787	2710	97.2
Mohave	70	66	94.3	69	66	95.7	75	71	94.7	88	84	95.5	302	287	95.0
Navajo	19	19	100.0	23	20	87.0	33	29	87.9	31	25	80.6	106	93	87.7
Pima	199	195	98.0	177	164	92.7	220	197	89.5	219	205	93.6	815	761	93.4
Pinal	67	57	85.1	61	43	70.5	59	57	96.6	79	77	97.5	266	234	88.0
Santa Cruz	4	4	100.0	6	6	100.0	4	4	100.0	6	6	100.0	20	20	100.0
Yavapai	68	33	48.5	70	59	84.3	78	61	78.2	83	65	78.3	299	218	72.9
Yuma	35	33	94.3	28	27	96.4	21	21	100.0	34	33	97.1	118	114	96.6
Total	1217	1118	91.9	1222	1142	93.5	1273	1204	94.6	1398	1316	94.1	5110	4780	93.5

Exhibit 4.4: Number of Homicide Cases with At Least One ME Circumstance Coded by Death County, 2015–2018 (N = 1433)

	2015			2016			2017			2018			Total		
	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%	DC	ME	%
Arizona	306	274	89.5	383	335	87.5	379	349	92.1	365	314	86.0	1433	1272	88.8
County of Death															
Apache	0	0	0.0	6	2	33.3	6	5	83.3	3	1	33.3	15	8	53.3
Cochise	4	4	100.0	6	6	100.0	2	1	50.0	0	0	0.0	12	11	91.7
Coconino	8	8	100.0	6	5	83.3	12	11	91.7	10	9	90.0	36	33	91.7
Gila	0	0	0.0	3	3	100.0	2	2	100.0	5	4	80.0	10	9	90.0
Graham	1	1	100.0	1	1	100.0	2	1	50.0	1	1	100.0	5	4	80.0
Greenlee	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
La Paz	1	1	100.0	3	2	66.7	0	0	0.0	2	1	50.0	6	4	66.7
Maricopa	216	189	87.5	249	223	89.6	252	240	95.2	234	212	90.6	951	864	90.9
Mohave	5	4	80.0	17	16	94.1	6	5	83.3	9	8	88.9	37	33	89.2
Navajo	2	1	50.0	10	6	60.0	6	6	100.0	7	5	71.4	25	18	72.0
Pima	47	45	95.7	51	44	86.3	64	56	87.5	65	47	72.3	227	192	84.6
Pinal	11	11	100.0	16	15	93.8	18	15	83.3	10	9	90.0	55	50	90.9
Santa Cruz	0	0	0.0	0	0	0.0	0	0	0.0	3	2	66.7	3	2	66.7
Yavapai	7	6	85.7	7	5	71.4	5	3	60.0	6	6	100.0	25	20	80.0
Yuma	4	4	100.0	8	7	87.5	4	4	100.0	10	9	90.0	26	24	92.3
Total	306	274	89.5	383	335	87.5	379	349	92.1	365	314	86.0	1433	1272	88.8

Quality of Medical Examiner Report Narrative Data by Death Certifier

Exhibit 4.5 shows the type of death certifier by title, among participating ME data providers. The vast majority (79.1%) were Doctors of Medicine (N = 1,993; 51.1%) or Osteopathy (N = 1,174; 30.1%). The AZ-VDRS does not have any participating sovereign tribal authorities, but four decedents were identified as participating cases whose deaths were certified by a tribal authority. These instances are likely due to receiving information from a participating ME data provider who shared, on some level, jurisdiction with a tribal authority. Data related to the death certifier were not made available to AZ-VDRS for 2015 and 2016 deaths; therefore, the data used for Exhibits 4.5 and 4.6 below are limited to 2017–2018.

Exhibit 4.5: Number of Certified Deaths by Type and Title of Certifier among Participating ME Data Providers, 2017–2018 (N = 3898)

	<i>n</i>	%
Type of Certifier		
Medical Examiner	3885	99.7
Tribal Authority	4	0.1
Other	1	0.0
Missing, Unknown, or Not Classified	8	0.2
Total	3898	100.0
Title of Certifier		
Doctor of Medicine	1993	51.1
Doctor of Osteopathy	1174	30.1
Physician Assistant	3	0.1
Tribal Law Enforcement	1	0.0
Other	361	9.3
Missing / Unknown	366	9.4
Total	3898	100.0

Our final analysis of narrative data in ME reports examined the rate at which an ME narrative was of sufficient quality to abstract circumstance data by individual death certifier. Initially, there were 47 individual death certifiers responsible for 3,898 violent death certifications. This yielded an average of 82.9 cases, with a median of 55 cases per certifier (not shown). Exhibit 4.6 shows each death certifier with at least 10 deaths certified for 2017-2018, the number of deaths certified, and the proportion with abstracted circumstances. The analysis yielded 34 identified certifiers who were responsible for a total of 3,865 death certifications, or about 99.2% of cases, with abstracted circumstance data. The remaining 13 certifiers were collectively gathered into "All Others" in the exhibit.

Exhibit 4.6 is organized by death certifier, the number of deaths certified, and the percentage of cases in which the ME narrative was sufficient to allow for ME circumstances to be endorsed. The table shows the 34 certifiers with 10 or more cases in descending order of their total number of cases. Most of the high-volume death certifiers performed very well, with only eight of them significantly below the statewide average of 92.5%.

Exhibit 4.6: Percentage of Provided ME Reports from which At Least One Circumstance was Abstracted by Death Certifier, 2017–2018 (N = 3898)

Certifier	ME Circumstance Abstracted			
	No	Yes	Total	% Abstracted
1001	9	106	115	92.2
1031	20	210	230	91.3
1037	7	202	209	96.7
1048	11	193	204	94.6
1004	9	185	194	95.4
1033	10	181	191	94.8
1009	9	175	184	95.1
1011	10	172	182	94.5
1045	3	178	181	98.3
1034	14	152	166	91.6
1028	44	111	155	71.6
1041	24	128	152	84.2
1010	20	128	148	86.5
1032	6	140	146	95.9
1050	2	138	140	98.6
1030	18	115	133	86.5
1013	5	127	132	96.2
1014	4	126	130	96.9
1012	2	118	120	98.3
1003	9	97	106	91.5
1051	1	93	94	98.9
1043	3	83	86	96.5
1029	13	70	83	84.3
1049	0	55	55	100.0
1025	8	44	52	84.6
1016	1	44	45	97.8
1026	8	36	44	81.8
1052	3	39	42	92.9
1047	7	31	38	81.6
1042	1	29	30	96.7
1053	1	24	25	96.0
1046	2	18	20	90.0
1015	1	17	18	94.4
1044	0	15	15	100.0
All others	8	25	33	75.8
Total	293	3605	3898	92.5

Quality of Law Enforcement Report Narrative Data

Arizona has a decentralized law enforcement structure, with most jurisdictions defined by municipal, political boundaries. Other unincorporated communities rely on the county sheriff’s office for general law enforcement support and service. Additionally, some incorporated towns/communities will contract with a neighboring agency, most typically the sheriff, to provide law enforcement services in lieu of creating and maintaining their own police department.

By examining the proportion of deaths with at least one LE circumstance abstracted by year and injury county, we can make an initial assessment of the data quality of the LE data abstracted. Exhibit 4.7 shows the proportion of cases with sufficient narrative information in an LE report for at least one circumstance to have been abstracted. The analyses examined the LE circumstance completion by year and county. While, for the most part, the quality of LE data is not the responsibility of county-level agencies and officials, the representativeness of LE data at the county level is an important aspect of understanding the geographic context of violent deaths in Arizona.

It is important to distinguish that Exhibit 4.7 provides a relative assessment of the data quality from participating agencies and can help identify critical areas of improvement. Overall, 93.8% ($N = 4,777$) of reports from participating agencies had at least one circumstance coded. Examining the entire period of 2015–2018, 11 counties exceeded 90%: Apache (100.0%), Cochise (91.8%), Coconino (93.2%), Gila (100.0%), Graham (100.0%), La Paz (100.0%), Maricopa (95.8%), Mohave (94.0%), Pima (92.7%), Pinal (91.9%), and Yuma (97.8%). Another three counties approached a fair to good performance standard according to CDC expectations of 70% and 80%, respectively: Navajo (85.5%), Santa Cruz (85.7%), and Yavapai (80.3%). The remaining county, Greenlee, did not have any participating agencies with abstracted reports in the years 2015–2018.

Exhibit 4.7: Number of Decedents with At Least One LE Circumstance Coded by Injury County among Participating LE Agencies and Abstracted Reports, 2015–2018 ($N = 5091$)

	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	1068	991	92.8	1183	1117	94.4	1288	1223	95.0	1552	1446	93.2	5091	4777	93.8
County of Injury															
Apache	0	0	0.0	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0
Cochise	8	8	100.0	10	10	100.0	14	13	92.9	17	14	82.4	49	45	91.8
Coconino	49	41	83.7	33	32	97.0	47	46	97.9	47	45	95.7	176	164	93.2
Gila	0	0	0.0	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0
Graham	0	0	0.0	0	0	0.0	2	2	100.0	0	0	0.0	2	2	100.0
Greenlee	0	0	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	1	1	100.0	1	1	100.0
Maricopa	642	595	92.7	763	732	95.9	763	746	97.8	845	812	96.1	3013	2885	95.8
Mohave	29	28	96.6	44	43	97.7	39	34	87.2	104	98	94.2	216	203	94.0
Navajo	3	3	100.0	4	4	100.0	22	20	90.9	26	20	76.9	55	47	85.5
Pima	239	234	97.9	232	214	92.2	259	237	91.5	272	244	89.7	1002	929	92.7
Pinal	23	21	91.3	25	19	76.0	70	64	91.4	79	77	97.5	197	181	91.9
Santa Cruz	2	2	100.0	2	2	100.0	1	1	100.0	2	1	50.0	7	6	85.7
Yavapai	23	16	69.6	21	19	90.5	28	23	82.1	85	68	80.0	157	126	80.3
Yuma	18	17	94.4	15	15	100.0	17	17	100.0	39	38	97.4	89	87	97.8
Unknown	32	26	81.3	34	27	79.4	24	18	75.0	35	28	80.0	125	99	79.2
Total	1068	991	92.8	1183	1117	94.4	1288	1223	95.0	1552	1446	93.2	5091	4777	93.8

Quality of Law Enforcement Report Narrative Data by Manner of Death

As a further examination of the LE circumstance data quality, we examined the data by manner of death. The quality of detailed law enforcement investigative narratives may differ significantly based on the death being a suicide, a homicide, or a death of undetermined manner. In terms of the presence of coded LE circumstance data by manner of death, we found that homicides were of slightly poorer quality than suicides (90.% vs. 95.0%). It should be noted that decedents whose manner of death was

officially left as “undetermined” (N = 368) had the poorest quality of data, with only 89.4% (N = 329) of participating and abstracted cases having at least one LE circumstance coded (Exhibit 4.8).

Exhibit 4.8: Number of Decedents with At Least One LE Circumstance Known by Manner of Death among Abstracted Reports from Participating LE Agencies, 2015–2018 (N = 5091)

	No		Yes		Total	
	n	%	n	%	n	%
Suicide	179	5.0	3396	95.0	3575	100.0
Homicide	96	9.6	908	90.4	1004	100.0
Undetermined	39	10.6	329	89.4	368	100.0
Other †	0	0.0	144	100.0	144	100.0
Total	314	6.2	4777	93.8	5091	100.0

† Includes legal interventions and unintentional firearm deaths.

Quality of Law Enforcement Report Narrative Data among Suicides and Homicides

Exhibits 4.9 and 4.10 provide detailed analyses of LE circumstances coded by year and county for suicides (Exhibit 4.9) and homicides (Exhibit 4.10) independently. Notable differences between suicides and homicides were found for four of the 15 counties. Comparing the rates over the entire time period between suicides and homicides, these four counties had the following percentages of coded circumstance data by manner of death: Cochise (93.2% vs. 80.0%), Navajo (82.6% vs. 100.0%), Santa Cruz (80.0% vs. 100.0%), and Yavapai (79.4% vs. 92.9%).

Exhibit 4.9: Number of Suicide Cases with At Least One LE Circumstance Coded by Injury County among Participating and Abstracted Cases, 2015–2018 (N = 3575)

	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	764	719	94.1	787	748	95.0	901	863	95.8	1123	1066	94.9	3575	3396	95.0
County of Injury															
Apache	0	0	0.0	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0
Cochise	7	7	100.0	8	8	100.0	12	12	100.0	17	14	82.4	44	41	93.2
Coconino	39	34	87.2	25	24	96.0	33	33	100.0	36	34	94.4	133	125	94.0
Gila	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0	1	1	0.0
Graham	0	0	0.0	0	0	0.0	1	1	100.0	0	0	0.0	1	1	100.0
Greenlee	0	0	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	0.0
Maricopa	440	418	95.0	485	473	97.5	508	500	98.4	578	568	98.3	2011	1959	97.4
Mohave	23	22	95.7	32	31	96.9	28	25	89.3	83	79	95.2	166	157	94.6
Navajo	3	3	100.0	2	2	100.0	18	16	88.9	23	17	73.9	46	38	82.6
Pima	189	185	97.9	169	155	91.7	199	181	91.0	206	193	93.7	763	714	93.6
Pinal	20	18	90.0	21	16	76.2	55	52	94.5	68	67	98.5	164	153	93.3
Santa Cruz	1	1	100.0	1	1	100.0	1	1	100.0	2	1	50.0	5	4	80.0
Yavapai	18	11	61.1	21	19	90.5	26	22	84.6	76	60	78.9	141	112	79.4
Yuma	16	15	93.8	12	12	100.0	13	13	100.0	30	29	96.7	71	69	97.2
Unknown	8	5	62.5	11	7	63.6	5	5	0.0	4	4	0.0	28	21	75.0
Total	764	719	94.1	787	748	95.0	901	863	95.8	1123	1066	94.9	3575	3396	95.0

Exhibit 4.10: Number of Homicide Cases with At Least One LE Circumstance Coded by Injury County among Participating and Abstracted Cases, 2015–2018 (N = 1004)

	2015			2016			2017			2018			Total		
	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%	DC	LE	%
Arizona	202	184	91.1	260	237	91.2	276	256	92.8	266	231	86.8	1004	908	90.4
County of Injury															
Apache	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cochise	1	1	100.0	2	2	100.0	2	1	50.0	0	0	0.0	5	4	80.0
Coconino	2	2	100.0	1	1	100.0	9	8	88.9	3	3	100.0	15	14	93.3
Gila	0	0	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	1	1	100.0	0	0	0.0	1	1	100.0
Greenlee	0	0	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	0.0
Maricopa	148	131	88.5	201	183	91.0	193	185	95.9	179	162	90.5	721	661	91.7
Mohave	1	1	100.0	5	5	100.0	4	3	75.0	5	5	100.0	15	14	93.3
Navajo	0	0	0.0	0	0	0.0	3	3	100.0	1	1	100.0	4	4	100.0
Pima	34	33	97.1	38	34	89.5	42	38	90.5	47	34	72.3	161	139	86.3
Pinal	2	2	100.0	2	2	100.0	11	8	72.7	6	6	100.0	21	18	85.7
Santa Cruz	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0	1	1	100.0
Yavapai	5	5	100.0	0	0	0.0	2	1	50.0	7	7	100.0	14	13	92.9
Yuma	1	1	100.0	2	2	100.0	3	3	100.0	7	7	100.0	13	13	100.0
Unknown	7	7	100.0	9	8	0.0	6	5	83.3	11	6	0.0	33	26	78.8
Total	202	184	91.1	260	237	91.2	276	256	92.8	266	231	86.8	1004	908	90.4

Quality of Law Enforcement Report Narrative Data by Agency

Exhibit 4.11 shows 43 participating LE agencies with suicide cases and their ratio of reports provided. It identifies those participating agencies with the most missing or poor quality reports. The exhibit lists the agencies in alphabetical order, the county where the agency is located, the year the agency began participating in the AZ-VDRS, the number of cases without a report, the number with a report, the total number of cases, and, finally, the percentage of cases with missing reports. The CDC uses 80% as a minimum standard for “excellent” performance on data completion expectations. Using 80% as our minimally satisfactory benchmark, we can assess the missing data quality of our LE data provider partners. There were 38 (88.4%) agencies with less than 10% of reports missing and another two (4.7%) agencies that met or exceeded the 80% minimum standard for data completion (not shown). Three (7.0%) of the agencies had more than 20% of their cases with missing reports: Avondale PD (82.1% missing), Winslow PD (66.7% missing), and Yuma PD (47.2% missing).

Exhibit 4.11: Law Enforcement Reports Provided or Missing for Suicides by Participating LE Agency, 2015–2018 (N = 3687)

LE Agency	County	Partnered	LE Report			
			None	Provided	Total	% Missing
Apache Junction PD	Pinal	2015	0	33	33	0.0
Avondale PD	Maricopa	2018	23	5	28	82.1
Buckeye PD	Maricopa	2017	0	14	14	0.0
Bullhead City PD	Mohave	2018	0	13	13	0.0
Casa Grande PD	Pinal	2015	0	32	32	0.0
Chandler PD	Maricopa	2015	2	88	90	2.2
Chino Valley PD	Yavapai	2017	0	7	7	0.0
Cochise Sheriff	Cochise	2018	0	11	11	0.0
Coconino Sheriff	Coconino	2015	1	47	48	2.1
Douglas PD	Cochise	2016	0	1	1	0.0
Flagstaff PD	Coconino	2015	0	79	79	0.0
Gilbert PD	Maricopa	2016	1	86	87	1.1
Glendale PD	Maricopa	2015	2	120	122	1.6
Kingman PD	Mohave	2015	4	43	47	8.5
Lake Havasu PD	Mohave	2015	0	70	70	0.0
Marana PD	Pima	2015	7	28	35	20.0
Maricopa City PD	Pinal	2015	2	22	24	8.3
Mesa PD	Maricopa	2015	2	333	335	0.6
Mohave Sheriff	Mohave	2018	1	37	38	2.6
Navajo Sheriff	Navajo	2017	0	27	27	0.0
Nogales PD	Santa Cruz	2015	0	4	4	0.0
Oro Valley PD	Pima	2015	0	30	30	0.0
Paradise Valley PD	Maricopa	2017	0	2	2	0.0
Peoria PD	Maricopa	2015	2	92	94	2.1
Phoenix PD	Maricopa	2015	9	929	938	1.0
Pima Sheriff	Pima	2015	0	306	306	0.0
Pinal Sheriff	Pinal	2017	2	77	79	2.5
Prescott PD	Yavapai	2015	0	47	47	0.0
Prescott Valley PD	Yavapai	2015	0	49	49	0.0
Safford PD	Graham	2015	0	7	7	0.0
Sahuarita PD	Pima	2015	0	17	17	0.0
Scottsdale PD	Maricopa	2015	0	171	171	0.0
Sedona PD	Yavapai	2015	0	17	17	0.0
Show Low PD	Navajo	2015	0	15	15	0.0
Sierra Vista PD	Cochise	2015	2	30	32	6.3
St. Johns PD	Apache	2017	0	1	1	0.0
Surprise PD	Maricopa	2015	2	77	79	2.5
Tempe PD	Maricopa	2015	13	107	120	10.8
Tucson PD	Pima	2015	2	385	387	0.5
Winslow PD	Navajo	2016	6	3	9	66.7
Yavapai Sheriff	Yavapai	2018	0	41	41	0.0
Yuma PD	Yuma	2015	25	28	53	47.2
Yuma Sheriff	Yuma	2015	4	44	48	8.3
Total			112	3575	3687	3.0

Exhibit 4.12 shows the participating LE agencies and their ratio of missing reports for homicides. It is presented similarly to Exhibit 4.11. We found 27 (62.8%; not shown) agencies with more than 90% completion, and another five that met our 80% completion goal. Chandler PD (21.4% missing), Glendale PD (22.0% missing), Kingman PD (25.0% missing), Tucson PD (28.1% missing), and Yuma County Sheriff (25.0% missing) are all above 70% complete but fall short of the goal. The remaining six participating LE agencies each have problematically high missing report rates: Avondale PD (*N* = 22 homicides; 68.2% missing), Maricopa City PD (*N* = 5 homicides; 40.0% missing), Nogales PD (*N* = 2 homicides; 50.0% missing), Tempe PD (*N* = 25 homicides; 40.0% missing), Winslow PD (*N* = 3 homicides; 66.7% missing), and Yuma PD (*N* = 15 homicides; 60% missing). (See Ex. 4.12, continued on next page.)

Exhibit 4.12: Law Enforcement Narratives Provided or Missing for Homicides by Participating LE Agency, 2015–2018 (*N* = 1136)

LE Agency	County	Partnered	LE Narrative			
			None	Provided	Total	% Missing
Apache Junction PD	Pinal	2015	0	0	0	0.0
Avondale PD	Maricopa	2018	15	7	22	68.2
Buckeye PD	Maricopa	2017	0	5	5	0.0
Bullhead City PD	Mohave	2018	0	1	1	0.0
Casa Grande PD	Pinal	2015	1	9	10	10.0
Chandler PD	Maricopa	2015	3	11	14	21.4
Chino Valley PD	Yavapai	2017	0	2	2	0.0
Cochise Sheriff	Cochise	2018	0	0	0	0.0
Coconino Sheriff	Coconino	2015	0	9	9	0.0
Douglas PD	Cochise	2016	0	1	1	0.0
Flagstaff PD	Coconino	2015	0	8	8	0.0
Gilbert PD	Maricopa	2016	1	8	9	11.1
Glendale PD	Maricopa	2015	13	46	59	22.0
Kingman PD	Mohave	2015	1	3	4	25.0
Lake Havasu PD	Mohave	2015	0	7	7	0.0
Marana PD	Pima	2015	0	5	5	0.0
Maricopa City PD	Pinal	2015	2	3	5	40.0
Mesa PD	Maricopa	2015	12	65	77	15.6
Mohave Sheriff	Mohave	2018	0	6	6	0.0
Navajo Sheriff	Navajo	2017	0	3	3	0.0
Nogales PD	Santa Cruz	2015	1	1	2	50.0
Oro Valley PD	Pima	2015	0	0	0	0.0
Paradise Valley PD	Maricopa	2017	0	0	0	0.0
Peoria PD	Maricopa	2015	0	9	9	0.0
Phoenix PD	Maricopa	2015	7	540	547	1.3
Pima Sheriff	Pima	2015	2	49	51	3.9
Pinal Sheriff	Pinal	2017	0	11	11	0.0
Prescott PD	Yavapai	2015	1	5	6	16.7
Prescott Valley PD	Yavapai	2015	0	2	2	0.0
Safford PD	Graham	2015	0	1	1	0.0
Sahuarita PD	Pima	2015	0	0	0	0.0
Scottsdale PD	Maricopa	2015	1	21	22	4.5
Sedona PD	Yavapai	2015	0	0	0	0.0
Show Low PD	Navajo	2015	0	0	0	0.0
Sierra Vista PD	Cochise	2015	1	4	5	20.0
St. Johns PD	Apache	2017	0	0	0	0.0

Exhibit 4.12: Law Enforcement Narratives Provided or Missing for Homicides by Participating LE Agency, 2015–2018 (N = 1136)

Surprise PD	Maricopa	2015	3	14	17	17.6
Tempe PD	Maricopa	2015	10	15	25	40.0
Tucson PD	Pima	2015	45	115	160	28.1
Winslow PD	Navajo	2016	2	1	3	66.7
Yavapai Sheriff	Yavapai	2018	0	5	5	0.0
Yuma PD	Yuma	2015	9	6	15	60.0
Yuma Sheriff	Yuma	2015	2	6	8	25.0
Total			132	1004	1136	11.6

Conclusion

The AZ-VDRS receives overall high quality reports from the MEs of Arizona’s most populous counties, leading to a high percentage of deaths for which at least one circumstance is observed being reported. As such circumstances can often provide potential intersection points for prevention, this is of great value for the purpose of the NVDRS program. Suicides show a particularly high overall percentage, with nearly 94% of reports for decedents from 2015 through 2018 indicating at least one relevant circumstance. Additionally, regarding individual death certifiers, our results showed that the majority of high volume certifiers had a rate of over 90% for cases for which at least one circumstance could be endorsed, indicating that they generally produced high quality, informative reports.

Over 93% of decedents from 2015–2018 for whom the AZ-VDRS received an LE report had at least one circumstance endorsed, suggesting overall high quality of these LE reports. Nearly 95% of suicides for which a report was provided had at least one circumstance endorsed. As in the case of ME reports, this suggests that the LE reports being provided for suicides are of particularly high quality. In regard to suicides, nearly nine in 10 participating LE agencies showed a rate of 90% or higher for reports from which at least one circumstance could be abstracted.

The quality of ME reports provided varies dramatically by county, with some counties showing very low quality reports. Homicide reports showed lower quality overall than did suicide reports. While many of the highest volume death certifiers showed overall high percentages of circumstance abstraction, lower volume certifiers showed a fairly low percentage, indicating that the quality of their reports is likely low. In regard to LE reports, the rate of circumstance abstraction for total received homicide reports is lower than that of suicide reports, at about 90%. Crucially, less than two thirds of participating LE agencies showed a rate of 90% or higher for homicide reports from which at least one circumstance could be abstracted. We have identified five major challenges in regard to these issues with report/data quality. Below, we summarize these challenges, note potential strategies to address them, and indicate who is responsible for addressing each challenge.

Challenge	Activity	Responsible party
High variability in quality of ME reports by county	Identify counties with lower quality overall; develop and provide training materials and funding for training and software or other tools to improve recordkeeping.	AZ-VDRS leadership ME leadership
Homicide ME reports show lower quality than suicide ME reports	Train ME office to follow up with law enforcement and update preliminary/investigation reports accordingly; provide checklist of victim-focused and homicide-specific variables for death investigators to look for during their investigations.	AZ-VDRS leadership ME leadership Death investigators
Lower volume death certifiers show indications of lower quality reports	Offer training, materials, and tools/funding for tools to improve the quality of investigations and reports, to include checklist-style pocket cards for death investigators to carry to scenes, as well as training sessions on important variables to look for and why they are of value.	AZ-VDRS leadership Report writers ME leadership Death investigators
LE homicide reports show indications of lower quality than do LE suicide reports	Provide checklist-style pocket cards for officers to carry with important variables, particularly regarding victim-specific variables as LE reports often focus on suspects; consider approach/system to check back on homicide reports that have been provided but may still be open/incomplete for potential updates.	AZ-VDRS leadership Report writers Lead abstractors LE agency leadership
High variability in quality of reports among LE agencies	Identify agencies on the lower end to focus more closely on offering training and materials aimed at improving collection and recording of the variables, including in the NVDRS circumstance list.	AZ-VDRS leadership LE leadership

Section 5: Web-Based Portal Abstraction Data Quality

Section Five, *Web-Based Portal Abstraction Data Quality*, examines the inventory of the web-based portal data. The abstracted data are entered into the NVDRS web portal and can subsequently be downloaded as a combined dataset for analyses. These downloaded files represent the complete data submitted and used by the CDC. Each state's system, including the AZ-VDRS, is assessed based largely on these data. Section Five examines the completed data for the inclusive years (2015–2018) and examines each variable for valid entries. This is not to identify findings of the responses but to assess missing versus valid entries. The analyses can then provide an aggregated assessment of the number of missing/invalid data entries, which should principally indicate abstractor errors, but we also find errors likely generated by the system or its data download function.

We begin by reviewing the quality of abstracted data, focusing on data entry completeness and validity of entered responses. Missing data in these analyses represent abstractor errors. During the abstraction process, any variable must have an abstracted value, and if the information is unknown or unavailable, it must be coded as such; if it is not, this demonstrates an error made by the abstractor.

We examined the victim, suspect, and weapon datasets. Starting with the victim data, we examined each variable for whether a valid response was abstracted into the web portal. This analysis does not assess the relative accuracy or value of the entered responses, merely the coding validity. For example, an entry of “unknown” into a particular variable would still be counted as a valid response, although it may not be of particular analytic use for report writing or understanding the broader context of violent deaths.

Generally, the CDC sets a standard for data completion of valid responses with a 90% threshold categorized as “excellent.” Using this as the minimum goal for AZ-VDRS data completion, each of the variables examined below was assessed with an expectation of 90% completed abstractions with a valid response.

Victim Dataset

The ten exhibits that follow report victim data. The first five focus on the demographic details of the victim (Exhibits 5.1 and 5.2), the specifics regarding the victim’s injury and death (Exhibits 5.3 and 5.4), and the wounds suffered (Exhibit 5.5). The next five (Exhibits 5.6–5.10) review the circumstance data collected from coroner/medical examiner (CME) and law enforcement (LE) sources.

Many of the variables in Exhibits 5.1 and 5.2 are imported directly from the death certificate (DC), while others are entered and coded by abstractors. Although imported from DC data, information still must be verified by an abstractor where appropriate. For example, *Residence City* (see Exhibit 5.2) had 143 missing cases. Where the DC data are unable to provide a valid response, an abstractor is required to recode an appropriate response (e.g., 999999 for Unknown). These 143 (1.8%) missing values represent abstraction errors.

The majority of variables had no missing values in the abstracted data, for a 100% completion of an abstracted valid response, in comparison to our 90% goal. In the example above, we stated that there were 143 (1.8%) missing values for *Residence City*, and similarly, there were 109 (1.4%) cases with a missing value for *Residence County*. Each of these still perform well above our 90% goal. There were, however, three variables in the demographics section that did have a high amount of missing data: *Usual Occupation* ($n = 4,987$; 64.2%), *Occupation Text* ($n = 1,457$; 18.8%), and *Industry* ($n = 4,981$; 64.1%). CDC guidelines expect these variables to be abstracted directly from entries on the DC; they are not expected to be interpreted by abstractors from other sources of information. The *Occupation Text* variable is a verbatim entry from the DC, and if the DC is blank, the abstractor should indicate this during the abstraction process to signify that the field was blank/missing on the DC. *Usual Occupation* and *Industry* are numerically coded according to the US Census Bureau’s *Industry and Occupation*, but this information is not provided in Arizona’s DC data. If this information is missing, unknown, or N/A, the abstractor would use “080,” “090,” or “999,” respectively, according to the CDC’s NVDRS Coding Manual; thus, Arizona cases should be coded as “080” for these fields. All of these options would be considered valid responses for the purposes of our missing data assessment, as presented in Exhibit 5.2.

**Exhibit 5.1: Ratio of Valid Responses in Victim Demographics (Part 1), 2015–2018
(N = 7770)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Height in Feet	7770	100.0	0	0.0
Height in Inches	7770	100.0	0	0.0
Weight	7770	100.0	0	0.0
Sex	7770	100.0	0	0.0
Sex of Partner	7770	100.0	0	0.0
Sexual Orientation	7769	100.0	1	0.0
Transgender	7768	100.0	2	0.0
Age	7770	100.0	0	0.0
Age Unit	7770	100.0	0	0.0
Birth Day Of Month	7770	100.0	0	0.0
Race Black	7770	100.0	0	0.0
Race White	7770	100.0	0	0.0
Race American Indian	7770	100.0	0	0.0
Race Asian	7768	100.0	2	0.0
Race Pacific Islander	7768	100.0	2	0.0
Race Unspecified	7768	100.0	2	0.0
Ethnicity	7770	100.0	0	0.0
Birthplace	7743	99.7	27	0.3
Education Level	7770	100.0	0	0.0
Education Years	7769	100.0	1	0.0
Relationship Status	7770	100.0	0	0.0
Marital Status	7770	100.0	0	0.0

**Exhibit 5.2: Ratio of Valid Responses in Victim Demographics Tab (Part 2), 2015–2018
(N = 7770)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Pregnant	7768	100.0	2	0.0
Military	7763	99.9	7	0.1
Occupation Current Text	7739	99.6	31	0.4
Usual Occupation	2783	35.8	4987	64.2
Occupation Text	6313	81.2	1457	18.8
Industry	2789	35.9	4981	64.1
Industry Text	7761	99.9	9	0.1
Homeless	7770	100.0	0	0.0
Residence City	7627	98.2	143	1.8
Residence County	7661	98.6	109	1.4
Residence State	7770	100.0	0	0.0
Residence Country	7770	100.0	0	0.0
Residence Zip	7770	100.0	0	0.0
Residence Census Block	7743	99.7	27	0.3
Residence Census Tract	7748	99.7	22	0.3

Exhibits 5.3 and 5.4 present details of the victim’s injury and death. As in Exhibits 5.1 and 5.2, some of these values are auto-populated when DC data are imported into the web portal system and then confirmed and completed by an abstractor. All *Injury* variables (see Exhibit 5.3) had less than 3% missing values, and all but two were at or near 0.0%. Similar to the demographic data in Exhibit 5.2, *Injury City* and *Injury County* had the most missing data, at 2.8% ($n = 215$) and 1.9% ($n = 148$), respectively.

Exhibit 5.3: Ratio of Valid Responses in Victim Injury Tab, 2015–2018 (N = 7770)

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Injury City	7555	97.2	215	2.8
Injury County	7622	98.1	148	1.9
Injury State	7770	100.0	0	0.0
Injury Zip	7770	100.0	6	0.1
Injury Location	7770	100.0	1	0.0
Injured At Victim Home	7770	100.0	0	0.0
Injured At Work	7770	100.0	0	0.0
Injury Date	7770	100.0	0	0.0
Injury Time	7770	100.0	0	0.0
Survival Time	7743	99.7	27	0.3
Survival Time Unit	7770	100.0	0	0.0
Recent Release	7770	100.0	0	0.0
Victim In Custody	7770	100.0	0	0.0
EMS Present	7769	100.0	1	0.0
Alcohol Use Suspected	7770	100.0	0	0.0

Exhibit 5.4 shows the death-related variables from the injury tab of the portal. With the exception of the Death Place Other Text field, there were virtually no missing data. The Death Place Other Text field still only had 1.0% missing ($n = 81$), performing well above our 90% completion standard. This field is used when the death place does not adequately fit into one of the optional categories of Death Place and requires a corresponding text description when the “other” code is used in the Death Place variable. As this field is not available unless Death Place is coded as “other,” missing values for this variable may indicate an abstractor error or a database error in the CDC’s system.

Exhibit 5.4: Ratio of Valid Responses in Victim Injury Tab, 2015-2018 (N = 7770)

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Autopsy Performed	7769	100.0	1	0.0
Death Cause	7769	100.0	1	0.0
Underlying Cause Code Label	7770	100.0	0	0.0
Death Date	7769	100.0	1	0.0
Death Place	7770	100.0	0	0.0
Death Place Other Text	7689	99.0	81	1.0
Death State	7770	100.0	0	0.0
Death Manner Abstractor	7770	100.0	0	0.0
Death Manner CME	7770	100.0	0	0.0
Death Manner DC	7770	100.0	0	0.0
Death Manner LE	7770	100.0	0	0.0

Exhibit 5.5 presents the details of the victim’s wounds as abstracted into the Injury Tab of the NVDRSD web portal. Unlike some of the variables in Exhibits 5.1 through 5.4, these values are not auto-populated when the DC data is imported, but instead require the abstractor to abstract data from ME reports. Each of these variables had at least a few missing data points, but none exceeded 0.2% missing.

**Exhibit 5.5: Ratio of Valid Responses in Victim Injury Tab, 2015–2018
(N = 7770)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Hospital Admit	7768	100.0	2	0.0
Number Bullets	7759	99.9	11	0.1
Number Wounds	7758	99.8	12	0.2
Wound To Abdomen	7752	99.8	18	0.2
Wound To Face	7752	99.8	18	0.2
Wound To Head	7759	99.9	14	0.2
Wound To Lower Extremity	7752	99.8	18	0.2
Wound To Neck	7752	99.8	18	0.2
Wound To Spine	7751	99.8	19	0.2
Wound To Thorax	7752	99.8	18	0.2
Wound To Upper Extremity	7752	99.8	18	0.2

Exhibits 5.6–5.10 present the status of missing values in the circumstance data analyzed separately for CME and LE data sources. The circumstances in Exhibit 5.6 apply broadly to all manners of death in the NVDRS data system and are derived specifically from CME data sources. There were a total of 7,770 victims in the raw data covering 2015–2018. Overall, for 6.2% (*n* = 482) of decedents, the *CME_CircumstancesKnown* variable did not have a valid response. These are errors generated from within the web portal system and are not abstractor errors. The variable is collected by the system with the use of a checkbox that is endorsed if true and left blank if no circumstances are known. This should yield data that are only coded as "true" or "false" by the system, with no missing/invalid responses. These are, however, still an effective assessment of data quality.

These missing data effectively indicate an absence or sufficiency of circumstance data available from the CME data sources. These non-“True” values may be the result of abstractor error, but given the AZ-VDRS re-abstraction protocols when no circumstance is coded by the initial abstractor, these are significantly more likely to be a result of inadequate information in the CME report narratives to code any circumstances. Analyzing the variables individually, there were about 6.5% missing for the vast majority. Only one variable, *CME_GangType*, did not meet our 90% completion goal, with 12.4% (*n* = 962) missing. These errors may possibly be either abstractor or database errors.

Of note, we found that both the second mental health diagnosis (i.e., *CME_MentalHealthDiagnosis2*) and the second nature of other precipitating crime (i.e., *CME_NatureOtherCrime2*), about 6–8% of eligible cases (*n* = 2,244 and *n* = 483, respectively) had missing (i.e., invalid) coded values. These likely represent abstractor errors.

**Exhibit 5.6: Ratio of Valid Responses in CME General Circumstances, 2015–2018
(N = 7770)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
CME_CircumstancesKnown	7293	93.9	482	6.2
CME_AbusedAsChild	7269	93.6	506	6.5
CME_AlcoholProblem	7272	93.6	503	6.5
CME_Argument	7274	93.6	501	6.4
CME_DeathAbuse	7269	93.6	506	6.5
CME_DepressedMood	7271	93.6	504	6.5
CME_FamilyRelationship	7269	93.6	506	6.5
CME_FightBetweenTwoPeople	7271	93.6	504	6.5
CME_GangType	6813	87.7	962	12.4
CME_HistoryMentalIllnessTreatment	7272	93.6	503	6.5
CME_InterpersonalViolencePerpetrator	7270	93.6	505	6.5
CME_InterpersonalViolenceVictim	7269	93.6	506	6.5
CME_MentalHealthProblem	7275	93.6	500	6.4
CME_MentalHealthDiagnosis1	2243	100.0	1	0.0
CME_MentalHealthDiagnosis2	2120	94.5	124	5.5
CME_MentalIllnessTreatmentCurrent	7272	93.6	503	6.5
CME_PrecipitatedbyOtherCrime	7272	93.6	503	6.5
CME_NatureOtherCrime1	481	99.6	2	0.4
CME_NatureOtherCrime2	466	96.5	17	3.5
CME_OtherCrimeInProgress	7272	93.6	503	6.5
CME_OtherAddiction	7269	93.6	506	6.5
CME_Prostitution	7269	93.6	506	6.5
CME_RelationshipProblemOther	7270	93.6	505	6.5
CME_Stalking	7269	93.6	506	6.5
CME_SubstanceAbuseOther	7274	93.6	501	6.4
CME_TerroristAttack	7269	93.6	506	6.5
CME_WalkByAssault	7269	93.6	506	6.5

Exhibit 5.7 repeats the general circumstance variables but changes the analysis to the completion of the abstractions from LE data sources. Generally, the distribution of missing/invalid responses parallels that for the CME data sources, which suggests good internal validity and reliability, comparing CME and LE data sources. Overall, there were 6.1% ($n = 471$) of cases with a missing/invalid response for the catch-all *CircumstancesKnown* variable. As in Exhibit 5.6 above, these missing/invalid values for *LE_CircumstancesKnown* are web portal system errors, not abstractor errors. However, given that these missing values are effectively false responses, they do indicate LE narrative reports that were either unavailable or inadequate to code any circumstance data.

The only variable that did not meet our 90% completion goal, as with CME data, was the *LE_GangType* variable. This variable saw 34.3% ($n = 2,667$) of the cases with missing values. If we account for a system baseline error of 6.1% ($n = 471$), this still leaves 28.3% ($n = 2,196$) missing cases (not shown). These remaining missing values likely represent abstractor errors. Moreover, similar to CME data sources, we

found that for both the second mental health diagnosis (i.e., *LE_MentalHealthDiagnosis2*) and the second nature of other precipitating crime (i.e., *LE_NatureOtherCrime2*) variables, there were about 8–9% of eligible cases ($n = 1,586$ and $n = 623$, respectively) with missing/invalid coded values. These also likely represent abstractor errors.

**Exhibit 5.7: Ratio of Valid Responses in LE General Circumstances, 2015–2018
($N = 7770$)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
LE_CircumstancesKnown	7304	94.0	471	6.1
LE_AbusedAsChild	7268	93.5	507	6.5
LE_AlcoholProblem	7269	93.6	506	6.5
LE_Argument	7274	93.6	501	6.4
LE_DeathAbuse	7268	93.5	507	6.5
LE_DepressedMood	7272	93.6	503	6.5
LE_FamilyRelationship	7268	93.5	507	6.5
LE_FightBetweenTwoPeople	7269	93.6	506	6.5
LE_GangType	5108	65.7	2667	34.3
LE_HistoryMentalIllnessTreatment	7271	93.6	504	6.5
LE_InterpersonalViolencePerpetrator	7268	93.5	507	6.5
LE_InterpersonalViolenceVictim	7267	93.5	508	6.5
LE_MentalHealthProblem	7274	93.6	501	6.4
LE_MentalHealthDiagnosis1	1580	100.0	6	0.4
LE_MentalHealthDiagnosis2	1441	91.2	139	8.8
LE_MentalIllnessTreatmentCurrent	7270	93.6	505	6.5
LE_PrecipitatedbyOtherCrime	7271	93.6	504	6.5
LE_NatureOtherCrime1	615	98.7	8	1.3
LE_NatureOtherCrime2	574	92.1	49	7.9
LE_OtherCrimeInProgress	7269	93.6	506	6.5
LE_OtherAddiction	7267	93.5	508	6.5
LE_Prostitution	7267	93.5	508	6.5
LE_RelationshipProblemOther	7268	93.5	507	6.5
LE_Stalking	7268	93.5	507	6.5
LE_SubstanceAbuseOther	7274	93.6	501	6.4
LE_TerroristAttack	7267	93.5	508	6.5
LE_WalkByAssault	7268	93.5	507	6.5

Exhibits 5.8 and 5.9 summarize the circumstance variables specific to suicides, showing analyses for CME and LE data sources, respectively. There were 5,347 suicide decedents in the raw data covering 2015–2018. As discussed above, the table shows a baseline of system error missing values for the *CME/LE Circumstances-Known* variables. These were very similar, with 5.5% ($n = 295$) and 5.4% ($n = 291$) missing for CME and LE sources, respectively. Among both CME and LE data sources, there were very similar missing/invalid counts of about 315–319 decedents. Collectively, there are still about 317 (about 6%) cases from 2015–2018 with missing/invalid coded responses. Accounting for the 5.5%/5.4% baseline missing values, this leaves about 0.4% missing values, which likely represent abstractor errors. Importantly, across all of the suicide-specific circumstance variables, for both CME and LE sources, no variable exceeded 6.0% missing, in compliance with our 90% completion goal.

**Exhibit 5.8: Ratio of Valid Responses in CME Suicide-Specific Circumstances, 2015–2018
(N = 5347)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Medical Examiner sources				
CME_CircumstancesKnown	5052	94.5	295	5.5
CME_DeathFriendOrFamilyOther	5030	94.1	317	5.9
CME_DisasterExposure	5030	94.1	317	5.9
CME_SuicideIntentDisclosed	5032	94.1	315	5.9
CME_DisclosedIntentToWhom	1040	99.9	1	0.1
CME_EvictionOrLossOfHome	5030	94.1	317	5.9
CME_FinancialProblem	5030	94.1	317	5.9
CME_IntimatePartnerProblem	5039	94.2	308	5.8
CME_JobProblem	5030	94.1	317	5.9
CME_LegalProblemOther	5030	94.1	317	5.9
CME_PhysicalHealthProblem	5033	94.1	314	5.9
CME_RecentCriminalLegalProblem	5030	94.1	317	5.9
CME_RecentSuicideFriendFamily	5030	94.1	317	5.9
CME_SchoolProblem	5030	94.1	317	5.9
CME_SuicideAttemptHistory	5032	94.1	315	5.9
CME_SuicideNote	5037	94.2	310	5.8
CME_SuicideThoughtHistory	5036	94.2	311	5.8
CME_TraumaticAnniversary	5030	94.1	317	5.9

**Exhibit 5.9: Ratio of Valid Responses in LE Suicide-Specific Circumstances, 2015-2018
(N = 5347)**

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Law Enforcement Sources				
LE_CircumstancesKnown	5056	94.6	291	5.4
LE_DeathFriendOrFamilyOther	5030	94.1	317	5.9
LE_DisasterExposure	5028	94.0	319	6.0
LE_SuicideIntentDisclosed	5032	94.1	315	5.9
LE_DisclosedIntentToWhom	1056	100.0	0	0.0
LE_EvictionOrLossOfHome	5030	94.1	317	5.9
LE_FinancialProblem	5030	94.1	317	5.9
LE_IntimatePartnerProblem	5037	94.2	310	5.8
LE_JobProblem	5028	94.0	319	6.0
LE_LegalProblemOther	5029	94.1	318	5.9
LE_PhysicalHealthProblem	5033	94.1	314	5.9
LE_RecentCriminalLegalProblem	5028	94.0	319	6.0
LE_RecentSuicideFriendFamily	5028	94.0	319	6.0
LE_SchoolProblem	5029	94.1	318	5.9
LE_SuicideAttemptHistory	5030	94.1	317	5.9
LE_SuicideNote	5037	94.2	310	5.8
LE_SuicideThoughtHistory	5038	94.2	309	5.8
LE_TraumaticAnniversary	5028	94.0	319	6.0

Exhibits 5.10 and 5.11 summarize the circumstance variables specific to homicides, showing analyses for both CME and LE data sources, respectively. There were 1,486 homicide decedents in the raw data covering 2015–2018. Among both CME and LE data sources, there was a very similar number of missing/invalid data by circumstance. Similar to the above, there were a small number of baseline missing values caused by the web portal system. There were 6.3% ($n = 94$) and 5.9% ($n = 88$) missing CME and LE baseline cases, respectively. Even including these cases, no variable exceeded a 7.0% missing rate, indicating excellent abstractor performance.

Exhibit 5.10: Ratio of Valid Responses in CME Homicide-Specific Circumstances, 2015–2018 (N = 1486)

	Valid		Missing	
	n	%	n	%
Medical Examiner Sources				
CME_CircumstancesKnown	1392	93.7	94	6.3
CME_Brawl	1384	93.1	102	6.9
CME_Bystander	1384	93.1	102	6.9
CME_DrugInvolvement	1384	93.1	102	6.9
CME_IntervenerAssistingVictim	1384	93.1	102	6.9
CME_IntimatePartnerViolence	1390	93.5	96	6.5
CME_Jealously	1384	93.1	102	6.9
CME_JustifiableSelfDefense	1384	93.1	102	6.9
CME_VictimPoliceOfficeOnDuty	1384	93.1	102	6.9
CME_VictimUsedWeapon	1385	93.2	101	6.8
CME_HateCrime	1385	93.2	101	6.8
CME_MercyKilling	1384	93.1	102	6.9
CME_DriveByShooting	1384	93.1	102	6.9
CME_RandomViolence	1384	93.1	102	6.9

Exhibit 5.11: Ratio of Valid Responses in LE Homicide-Specific Circumstances, 2015–2018 (N = 1486)

	Valid		Missing	
	n	%	n	%
Law Enforcement Sources				
LE_CircumstancesKnown	1398	94.1	88	5.9
LE_Brawl	1383	93.1	103	6.9
LE_Bystander	1383	93.1	103	6.9
LE_DrugInvolvement	1384	93.1	102	6.9
LE_IntervenerAssistingVictim	1383	93.1	103	6.9
LE_IntimatePartnerViolence	1392	93.7	94	6.3
LE_Jealously	1383	93.1	103	6.9
LE_JustifiableSelfDefense	1383	93.1	103	6.9
LE_VictimPoliceOfficeOnDuty	1383	93.1	103	6.9
LE_VictimUsedWeapon	1383	93.1	103	6.9
LE_HateCrime	1383	93.1	103	6.9
LE_MercyKilling	1383	93.1	103	6.9
LE_DriveByShooting	1383	93.1	103	6.9
LE_RandomViolence	1384	93.1	102	6.9

Exhibits 5.12 and 5.13 summarize those circumstance variables specific to either an undetermined manner of death or one attributed as an accidental firearm death, showing analyses for CME and LE data sources, respectively. There were 731 decedents assigned these manners in the raw data covering 2015–2018. Among both CME and LE data sources, there were nearly identical missing/invalid counts of decedents. There were 12.2% ($N = 89$) and 11.9% ($N = 87$) of cases from 2015–2018 with missing data in the baseline *CME/LE Circumstances-Known* variables for CME and LE sources, respectively. As in the suicide and homicide analyses above, these missing cases represent a web portal system baseline error rate. Those missing cases from the individual variables over and above these proportions (CME = 12.2% and LE = 11.9%) likely represent abstractor errors, the numbers of which were consistent across variables ($N = 7$ for CME source data and $N = 8$ for LE source data). While the overall missing values exceeded the 10.0% maximum to meet our 90% goal, there were only about 1.0% missing that were likely to be abstractor errors.

Exhibit 5.12: Ratio of Valid Responses in CME Undetermined or Accidental Firearm Circumstances, 2015–2018 ($N = 731$)

	Valid		Missing	
	n	%	n	%
Medical Examiner Sources				
CME_CircumstancesKnown	642	87.8	89	12.2
CME_BulletRicochet	635	86.9	96	13.1
CME_CelebratoryFiring	635	86.9	96	13.1
CME_GunCleaning	635	86.9	96	13.1
CME_GunDefectMalfunction	635	86.9	96	13.1
CME_GunDropped	635	86.9	96	13.1
CME_GunFiredHolstering	635	86.9	96	13.1
CME_GunFiredLoadingUnloading	635	86.9	96	13.1
CME_GunFiredOperatingSafetyLock	635	86.9	96	13.1
CME_GunPlaying	635	86.9	96	13.1
CME_GunShowing	635	86.9	96	13.1
CME_GunThoughtSafetyEngaged	635	86.9	96	13.1
CME_GunThoughtToy	635	86.9	96	13.1
CME_GunThoughtUnloadedMagazineDisengaged	635	86.9	96	13.1
CME_GunThoughtUnloadedOther	635	86.9	96	13.1
CME_GunUnintentionallyPulledTrigger	635	86.9	96	13.1
CME_Hunting	635	86.9	96	13.1
CME_OtherContextInjury	635	86.9	96	13.1
CME_OtherMechanismInjury	635	86.9	96	13.1
CME_SelfDefense	635	86.9	96	13.1
CME_TargetShooting	635	86.9	96	13.1

Exhibit 5.13: Ratio of Valid Responses in LE Undetermined or Accidental Firearm Circumstances, 2015–2018 (N = 731)

	Valid		Missing	
	n	%	n	%
Law Enforcement Sources				
LE_CircumstancesKnown	644	88.1	87	11.9
LE_BulletRicochet	636	87.0	95	13.0
LE_CelebratoryFiring	636	87.0	95	13.0
LE_GunCleaning	636	87.0	95	13.0
LE_GunDefectMalfunction	636	87.0	95	13.0
LE_GunDropped	636	87.0	95	13.0
LE_GunFiredHolstering	636	87.0	95	13.0
LE_GunFiredLoadingUnloading	636	87.0	95	13.0
LE_GunFiredOperatingSafetyLock	636	87.0	95	13.0
LE_GunPlaying	636	87.0	95	13.0
LE_GunShowing	636	87.0	95	13.0
LE_GunThoughtSafetyEngaged	636	87.0	95	13.0
LE_GunThoughtToy	636	87.0	95	13.0
LE_GunThoughtUnloadedMagazineDisengaged	636	87.0	95	13.0
LE_GunThoughtUnloadedOther	636	87.0	95	13.0
LE_GunUnintentionallyPulledTrigger	636	87.0	95	13.0
LE_Hunting	636	87.0	95	13.0
LE_OtherContextInjury	636	87.0	95	13.0
LE_OtherMechanismInjury	636	87.0	95	13.0
LE_SelfDefense	636	87.0	95	13.0
LE_TargetShooting	636	87.0	95	13.0

Suspect Dataset

For the years 2015 through 2018, there were 1,894 unique suspect entries contained in the suspect dataset. As is customary with NVDRS recording and reporting standards, some suspects may also be victims in an eligible incident. For example, a person who commits homicide against another and then dies by suicide is both a *suspect* and a *victim* for NVDRS purposes (a suspect in the *homicide* and a victim in the *suicide*). This person will be present in both the victim and suspect datasets.

For the majority of *Suspect*-level variables, however, there was very little missing/invalid data: about 40 cases, or 2.2%. The suspect/victim relationship constitutes an important pair of variables (*Suspect-Victim Relationship 1* and 2) for different analyses of interest to AZ-VDRS and its stakeholders. There was only one missing/invalid case, or 0.1%, for *Suspect-Victim Relationship 1*, and there were 42 (2.2%) for *Suspect-Victim Relationship 2*. The two worst performing variables were *Suspect Ethnicity* (7.0% missing; $N = 132$) and *Suspect Recently Released from an Institution* (e.g., jail, hospital, long-term care facility, etc.; 6.2%; $N = 118$). (See Exhibit 5.14.)

Exhibit 5.14: Ratio of Valid Responses in Suspect Tab, 2015–2018 (N = 1894)

	Valid		Missing	
	n	%	n	%
Suspect Age	1886	99.6	8	0.4
Suspect Sex	1894	100.0	0	0.0
Suspect Race variables				
Black	1855	97.9	39	2.1
White	1861	98.3	33	1.7
American Indian	1851	97.7	43	2.3
Asian	1851	97.7	43	2.3
Pacific Islander	1851	97.7	43	2.3
Unspecified	1851	97.7	43	2.3
Other	1869	98.7	25	1.3
Suspect Ethnicity	1762	93.0	132	7.0
Suspect-Victim Relationship 1	1893	99.9	1	0.1
Suspect-Victim Relationship 2	1852	97.8	42	2.2
Suspect Characteristics				
Attempted Suicide	1853	97.8	41	2.2
Victim in Incident	1852	97.8	42	2.2
History of Abusing Victim	1852	97.8	42	2.2
Caregiver of Victim	1852	97.8	42	2.2
Mentally Ill	1852	97.8	42	2.2
Developmentally Disabled	1847	97.5	47	2.5
Alcohol Use Suspected	1850	97.7	44	2.3
Substance Use Suspected	1853	97.8	41	2.2
Contact With Police	1851	97.7	43	2.3
Suspect Recently Released	1776	93.8	118	6.2

Weapon Dataset

Finally, Exhibit 5.15 displays the results from the weapon dataset. There were 7,914 entries in the weapon dataset for 2015–2018. The nature of the weapon data requires an entry for each decedent and includes responses that may not be considered a weapon in common vernacular. The *Weapon Type* variable includes 16 specific responses (not shown), including, but not limited to, firearm, sharp instrument, blunt instrument, poisoning, fall, drowning, and fire or burns. There are also responses for “other” and “unknown,” such that a blank or missing response cannot be valid. This also explains why the number of weapons exceeds our number of decedents, as any given decedent may have more than one weapon attributed as a cause of death.

Generally, the weapon dataset was thoroughly completed, with minimal missing/invalid codes. *Firearm Model* was the worst-performing variable (N = 28; 0.6%), and even it recorded only 1.0% of empty responses for all 4,475 eligible firearms.

Exhibit 5.15: Ratio of Valid Responses in Weapon Dataset, 2015–2018 (N = 7914)

	Valid		Missing	
	<i>n</i>	%	<i>n</i>	%
Weapon Type	7914	100.0	0	0.0
Firearm (N = 4475)				
Firearm Type	4475	100.0	0	0.0
Firearm Caliber	4475	100.0	0	0.0
Firearm Gauge	4472	99.9	3	0.1
Firearm Make	4473	100.0	2	0.0
Firearm Model	4447	99.4	28	0.6
Firearm Access				
Gun Stored Loaded	4470	99.9	5	0.1
Gun Stored Locked	4470	99.9	5	0.1
Gun Ownership	4472	99.9	3	0.1
Gun Stolen	4471	99.9	4	0.1

Conclusion

Overall, these findings indicate that the quality of abstraction for the AZ-VDRS is high. Missing value rates were low across circumstances and sources, and a sizable portion of these missing values appears to be attributable to internal database errors in the CDC’s system rather than to poor quality abstraction. These analyses suggest that abstractor error rates are low and that the data cleaning approach that the AZ-VDRS carries out ahead of each closeout deadline is functioning well to address potential abstractor errors before a dataset is finalized.

While abstraction errors appear to be minimal and/or appropriately addressed by the data cleaning process conducted by the AZ-VDRS before closeout, a zero-percent error rate is the ideal outcome. Additionally, the blank/"missing" values that appear in the datasets and are not the result of abstraction error, but rather seem to be an internal database error, complicate both data cleaning and eventual analysis using the raw datasets. Finally, it is important to acknowledge that this approach to reviewing the quality of the data coded in the CDC portal and, crucially, the quality of the data abstraction has limitations. Specifically, while it analyzes the issue of fields being left blank entirely, it cannot capture whether, for example, an abstractor missed evidence of a circumstance provided in a report. In this sense, such an analysis can only touch on abstraction quality, and more qualitative approaches to ensuring accuracy are required in addition. We have identified three major challenges in regard to these abstraction quality issues. Below, we summarize these challenges, note potential strategies to address them, and indicate who is responsible for addressing each challenge.

Challenge	Activity	Responsible party
<p>A small number of errors exist in the dataset that are likely abstractor errors in which an abstractor left blank a field that should be filled in, even if only as “Unknown.”</p>	<p>Train abstractors to check carefully for blank fields while abstracting as well as after they have completed an abstraction; conduct re-abstractions to help catch blank fields and help solidify in abstractors’ minds the importance of ensuring no field is left blank; continue to conduct data cleaning, which should catch any legitimately blank fields, and ensure the errors are addressed in the CDC portal ahead of closeout.</p>	<p>AZ-VDRS leadership AZ-VDRS program management AZ-VDRS abstractors</p>
<p>Blank or missing values that appear to be artifacts of some type of internal database error (i.e., that cannot possibly reflect an abstractor error or that are shown not to be an abstractor error when the incident in question is reviewed in full in the portal)</p>	<p>Discuss issue with other states’ PIs to investigate the breadth of the issue; discuss potential remedies with the CDC science officer, the CDC project officer, and potentially the CDC’s IT team.</p>	<p>AZ-VDRS leadership CDC</p>
<p>Some elements of abstraction quality cannot be easily captured by the analytical approach taken in this report.</p>	<p>Prioritize re-abstraction more heavily as the primary means by which to catch inaccurate coding to ensure that the coding represented in the CDC portal and in the dataset accurately reflects what was provided in a source report; continue careful data cleaning to catch common errors, and ensure that revisions are adequately made in the CDC portal when errors appear.</p>	<p>AZ-VDRS program management AZ-VDRS abstractors</p>

Section 6: Data Quality Improvements and Conclusion

Section Six, *Data Quality Improvements* is the concluding section of this report, summarizing and highlighting the key areas in which the AZ-VDRS can improve its data quality and the representativeness of its findings. Collectively, there are three important areas that would significantly improve AZ-VDRS data: (a) gaining active participation from key missing data providers, (b) improving the quality of reports actually received, and (c) understanding and resolving errors generated by the SAMS web-based portal data management system.

Improving the participation of key LE data providers is the first and foremost area in need of improvement. Fundamentally, nonparticipation represents the absence of LE data for those cases and not simply shortfalls in the quality and accuracy.

The second area for improvement, improving the quality of reports actually received, is important, in part, because of the effort involved in acquiring and abstracting these data. Section Four, *Data Quality*, offered a detailed examination of the reports received by the AZ-VDRS. Our assessment of the quality of the reports received depended on the abstraction of circumstance data. The abstraction of circumstance data, in turn, was dependent on detailed narratives from ME and LE data providers. Generally, report quality was good, with almost 93% of ME reports and almost 94% of LE reports having sufficient information to abstract at least one circumstance. Despite this, there is room for improvement.

Finally, the third area for improving data quality is understanding and resolving errors generated by the SAMS web-based portal data management system.

Data Provider Participation

Recruiting stakeholders, or data providers, who are currently not AZ-VDRS partners is the most critical component of improving AZ-VDRS data. Nonparticipation among ME data providers is minimal. Throughout 2015–2018, the AZ-VDRS did not receive an ME report for only 4.1% of violent deaths statewide. The majority of these missing reports are likely attributed to the Navajo Nation, which often has tribal criminal investigators certify jurisdictional deaths. Instead, closing the participation gap among data providers is focused more on the missing law enforcement agencies. At the end of Section 2, we briefly discussed nonparticipating law enforcement agencies (see Exhibit 2.9).

Exhibit 6.1 reanalyzes the nonparticipating LE data providers from our analysis period, 2015–2018, and presents the list of agencies with at least 10 qualifying violent deaths in their jurisdiction. The table further breaks down the total into the number of missing homicides, suicides, and undetermined deaths. The last column shows the percentage of the total decedents missing due to that LE agency not providing data to the AZ-VDRS. These agencies are highlighted due to their particular importance and the conspicuous absence in the data. Each highlighted entity is critically important, not just for improving AZ-VDRS data quality but to sufficiently and accurately understand how suicides and homicides differentially impact the communities these missing stakeholders represent.

First and foremost among all nonparticipating agencies is the Maricopa County Sheriff's Office. As the largest county agency in Arizona, the impact of their nonparticipation is substantial. This agency alone accounts for 28.9% ($n = 446$) of all missing cases due to nonparticipation, including 72 homicides and 329 suicides. Numerous attempts to resolve their nonparticipation have been made over the past several years with two different sheriffs' administrations. Every obstacle clearly articulated by the agency (e.g., confidentiality of data, demands on departmental resources, etc.) has been responded to, including documented successes with other Arizona LE agencies, by the AZ-VDRS without resolution. This continues to be a priority for the AZ-VDRS and its efforts to improve its data quality and representativeness.

While lagging far behind the Maricopa County Sheriff's Office in the number of violent deaths in their jurisdiction, the Navajo Nation is more important given both the geographic region and special population they represent. With a total of 88 missing violent deaths, including 21 homicides, 61 suicides,

and 6 undetermined deaths, the Navajo Nation represents 5.7% of all nonparticipating missing reports ($N = 1,542$). The Navajo Nation is the largest Native American community in the United States, covering more than 27,000 square miles spanning areas of three Arizona counties in the northeastern corner of the state and extending into Utah and New Mexico. The Nation has an estimated population of more than 170,000 people. In the simplest of terms, the large, rural expanse of the Nation makes its participation important simply for its geographic representation. More importantly, the participation of the Navajo Nation is crucial to understanding the impact that specific characteristics of suicides and homicides have on Native Americans in Arizona generally and on the Navajo in particular. The Navajo Nation is also unique in that it certifies many of its own deaths rather than sending decedents to outside ME service providers. Because of this, not only does the AZ-VDRS not have access to LE reports for these deaths, but it also does not have access to any form of ME record.

Other sovereign Native American communities are also important to add as data provider partners in AZ-VDRS. While individually each one accounts for substantially fewer cases than the Navajo Nation, collectively they account for a substantial gap in the data. Looking at Exhibit 6.1, we see specifically that the Gila River Tribal PD ($n = 49$; 3.2%), Salt River PD ($n = 19$; 1.2%), and Tohono O'Odham PD ($n = 19$; 1.2%) account for a sizable number of decedents. Including cases attributed to Unspecified Tribal Police ($n = 41$; 2.7%), the tribal agencies account for a total of 128 (8.3%) deaths (not shown). Further, all or most of the cases attributed to the Bureau of Indian Affairs ($n = 36$; 2.3%) and the FBI ($n = 37$; 2.4%) involve victims on tribal lands. Together these data suggest that about 18.7% ($n = 289$; not shown) of our missing cases are associated with nonparticipating agencies that are responsible for policing tribal lands. Prioritizing the inclusion of the FBI, BIA, and these individual sovereign tribal communities is important for AZ-VDRS data quality as a whole, but also for these Native American communities in particular.

The Arizona Department of Corrections and Rehabilitation (AZ DOC) accounts for another 3.8% ($n = 58$) of missing data among nonparticipating LE data providers. This is a substantial amount for a single agency and is made more important by the nature of the special population. Deaths occurring in DOC custody fall into a special population group that deserves particular attention and cannot be sufficiently understood or explained by using only the deaths of nonincarcerated victims. Given the recent addition of the AZ DPS (e.g., the state police for Arizona; $n = 29$, 1.9%) as an AZ-VDRS partner, it may become easier to gain DOC as a data provider, as well.

It should be noted that there are several agencies listed in Exhibit 6.1 that were nonparticipating during the period 2015 to 2018, but that signed agreements to become AZ-VDRS data provider partners in 2019, 2020, or 2021. These agencies demonstrate the ongoing recruitment activities to improve data participation and quality. The 10 new partners are denoted in the table with the “+” symbol.

Exhibit 6.1: Missing Law Enforcement Reports by Nonparticipating LE Agency and Manner of Death, 2015–2018 (N = 1542)

LE Agency	County	Total Missing Homicides	Total Missing Suicides	Total Missing Undetermined / Other	Total Missing Violent Deaths	% of All Missing
Maricopa Sheriff	Maricopa	72	329	42	446	28.9
Navajo Nation PD	Multiple ++	21	61	6	88	5.7
AZ DOC	Statewide	23	29	6	58	3.8
Gila Sheriff †	Gila	3	39	13	55	3.6
Gila River Tribal PD	Maricopa & Pinal	24	22	3	49	3.2
Unspecified Tribal Police	Statewide	9	31	1	41	2.7
FBI	Statewide	20	5	12	37	2.4
Bureau of Indian Affairs	Statewide	11	20	5	36	2.3
AZ Dept. of Public Safety †	Statewide	2	13	14	29	1.9
La Paz Sheriff †	La Paz	5	20	3	28	1.8
Goodyear PD †	Maricopa	2	18	2	22	1.4
Santa Cruz Sheriff †	Santa Cruz	2	16	2	20	1.3
Salt River PD	Maricopa	3	14	2	19	1.2
Tohono O'Odham PD	Multiple +++	4	11	4	19	1.2
National Park Service	Statewide	0	10	8	18	1.2
Camp Verde Marshal †	Yavapai	2	14	1	17	1.1
Graham Sheriff †	Graham	1	15	1	17	1.1
Payson PD †	Gila	1	12	1	14	0.9
Globe PD †	Gila	4	5	3	12	0.8
Florence PD	Pinal	0	10	1	11	0.7
Wickenburg PD †	Yavapai	0	10	1	11	0.7
Cottonwood PD †	Yavapai	0	6	4	10	0.6
Others w/ <10 deaths	Statewide	25	136	32	193	12.5
Not Applicable	Statewide	1	31	14	46	3.0
Unknown/Unidentified	Statewide	29	161	56	246	16.0
Total		264	1038	237	1542	100.0

† While nonparticipating during the data period 2015-2018, this agency is now an LE data provider partner.

++ Includes parts of Apache, Coconino, and Navajo counties.

+++ Includes parts of Pima, Maricopa, and Pinal counties.

Improving Data Provided

As detailed above, generally, the ME and LE data received was good, with about 93% and 94%, respectively, of provided reports having at least one circumstance coded. Looking at this from the other side, we see that this simultaneously means that between 6–7% of data received does not provide information sufficient to endorse at least one of the more than four dozen circumstances. This is important because the circumstance data is one the most valuable aspects of the NVDRS program.

Independent of one another, each of the three primary data sources (DC, ME, and LE) offers a wealth of information about violent deaths. The standardized information is invaluable, including, but not limited to, victim demographics, details of the injuries inflicted, injury location, cause of death and weapons used, and toxicology results. However, the unique value of the AZ-VDRS is the combining of these sources into a single, usable data system. Nowhere is this more important than in the process of abstracted information from the unredacted narratives of death scene and police investigations. The details provided in the open text narratives of these investigative reports allow the AZ-VDRS to abstract and incorporate issues surrounding substance abuse, mental health, domestic and intimate partner violence, and other complicated issues.

While solving the issue of the quality of received reports must be multifaceted, one opportunity we propose is sponsored training. The AZ-VDRS will begin planning a series of training symposiums for professionals at the creation point of the data used for the AZ-VDRS. For example, in Exhibit 4.6 above, we presented a list of death certifiers who were responsible for a disproportionate number of missing ME data problems. While a death certifier is not necessarily, or even likely, to be the person conducting the scene investigation on behalf of the ME data provider, they are an agent of responsibility for the jurisdiction. Holding (a series of) trainings for death scene investigators would be an effective approach toward improving the quality of data collected and reported by ME data providers.

We propose a symposium, or a series of such, relying on experienced, exceptional scene investigators to deliver a training program for both experienced and new death scene investigators. We plan to identify the death certifiers with the “best” records, as identified through our analysis, and present them with an award. We hope that these awardees will serve as our trainers. Teaching these professionals about the importance of the data they collect and record for downstream users and purposes (e.g., the AZ-VDRS, prevention providers, and the like) and giving them concrete guidelines or standard operating procedures for reporting would have a tremendous impact. These trainings would certainly be useful for the AZ-VDRS but would also be likely to contribute to the improvement of the specified purpose and utility of such professionals.

Similar trainings and resources could be made available for police personnel, as well. The AZ-VDRS, in following examples from other states, developed a pocket card for AZ-VDRS data collection. A deliberate distribution strategy, accompanied by training, could impart the importance of gathering and reporting key pieces of information useful to the AZ-VDRS. It has been previously noted in AZ-VDRS findings that we sometimes receive reports with sparse narratives. Emphasizing the importance of reporting the details of every violent death and educating police on the key variables of interest may improve data quality from LE providers. A concerted effort to educate and train police personnel by AZ-VDRS staff and selected experts will be developed.

SAMS Web-Based Portal

As noted in Section Five: *Web-Based Portal Abstraction Data Quality*, there seems to be some measure of error generated within the SAMS web portal system. Given that the circumstance data should only ever have two valid response options—“true” when the checkbox is endorsed by an abstractor and “false” when it is not—missing or blank values in those variables should not be possible. Understanding and resolving errors generated by the SAMS web-based portal data management system is important. Whether these errors are generated at the point of abstraction in the system or at some later stage of the data being exported from the web system into the comma-separated values file format for downloading remains to be learned.

Overcoming this particular data quality obstacle is dependent on the CDC and its NVDRS management team addressing the issue. A review of the web-based portal system, as well as the data export and download functions, would need to be conducted. At this point, the AZ-VDRS does not know whether the errors are being generated systematically or randomly, or even if other states are seeing similar concerns. The AZ-VDRS advocates that this effort be given priority, as the potential impact across the entire system, its 52 sites, and the downflow of NVDRS data into other reporting systems has far-reaching implications.

Conclusion

Overall, the AZ-VDRS boasts a high level of cooperation with relevant entities across the state. It has an agreement in place with the AZ DHS for provision of all relevant death certificates for inclusion in the program. Additionally, it has agreements with all of the county ME entities in the state, and its participation coverage extends to all 15 of Arizona’s counties and covers around 96% of all AZ-VDRS decedents. With regard to LE participation, the AZ-VDRS has continued to make good progress in recruiting new LE agencies for data provision and presently has agreements in place with over six dozen municipal, county, and state LE entities covering approximately 80–85% of decedents. Participating agencies of both source types provide a high percentage of the reports requested, and the reports are of high quality overall, particularly in the case of suicides. Additionally, the AZ-VDRS dataset shows evidence of overall very high quality abstraction with low rates of blank or missing values, much of which appears to be attributable to system errors rather than abstraction errors.

While the AZ-VDRS enjoys strong cooperation from ME entities around the state, a sizable gap in data access remains in regard to deaths for which death certification and basic medical examiner services are handled by the Navajo Nation’s law enforcement. Gaining access to these data would address the majority of the remaining issues in regard to the ME portion of AZ-VDRS data.

The AZ-VDRS continues to increase the rate of participation of LE entities around the state. The three years following the data period examined in this report have seen a nearly 50% increase in the number of LE agencies with whom the AZ-VDRS has data-sharing agreements. However, several large agencies thus far remain in nonparticipation status, including the aforementioned Navajo Nation tribal law enforcement as well as the Maricopa County Sheriff’s Office. Efforts to recruit the two, which rank first and second for number of AZ-VDRS decedents among nonparticipating LE agencies, have thus far proven unsuccessful. Moreover, in addition to the lack of participation of the Navajo Nation, the AZ-VDRS does not currently have agreements with any tribal entities in the state, meaning that decedents of indigenous ethnicity are overall poorly represented in the AZ-VDRS data, particularly those residing on

tribal land, and their unique characteristics, risks, and needs are thus not being properly considered or addressed. Further, this means that sizable geographic portions of the state are poorly represented, and certain counties with large areas of tribal land are weakly covered in terms of data accessibility.

Moreover, while the provision of reports by participating agencies and the quality of data found in those reports are high for suicide, they are lower for homicide. Both medical examiner and law enforcement entities are more likely to withhold, either temporarily or permanently, reports for homicide deaths. Additionally, ME reports often do not include follow-up information as a homicide investigation progresses, while LE reports may be focused more on potential suspects than on the victim- and incident-centered circumstances that are the focus of the NVDRS approach. These issues can lead to a lack of endorsable circumstances in homicide reports from both sources.

Finally, while the AZ-VDRS shows very low rates of missing values for variables in the finalized dataset, these numbers would ideally be zero. Improved data cleaning and re-abstraction procedures in the data years following those reviewed in this report have helped address the issue, but these must continue to be strengthened. Additionally, apparent system/database errors leading to a sizable percentage of seemingly erroneous missing values makes evaluating this issue more challenging and complicates analysis efforts. Furthermore, while reviewing for missing or blank variables is a valuable aspect of the process of evaluating the quality of AZ-VDRS abstraction, the procedure is far from capable of capturing a complete picture of abstraction quality, and the incorporation of other, more qualitative methods, such as re-abstraction and data cleaning procedures, into the methodology is critical for ensuring the highest quality data possible. The four main domains of challenges discussed in this report are identified below, along with activities and the parties responsible for implementing them.

Challenge Domains	Activity	Responsible Parties
ME nonparticipation	Recruit Navajo Nation.	AZ-VDRS leadership Lead abstractor
LE nonparticipation	Recruit Maricopa County Sheriff's Office, Navajo Nation, and smaller tribes; continue to recruit smaller municipal and sheriff's offices; discuss approaches to accessing the data of federal agencies with the CDC.	AZ-VDRS leadership Lead Abstractor CDC
Provision and quality of reports from participating entities	Continue to develop on-site or over-the-phone/Zoom abstraction arrangements with agencies with open cases as needed, including ad hoc arrangements with smaller agencies; print and distribute checklists and pocket cards for death investigators and LE officers; arrange and hold training sessions.	AZ-VDRS leadership Agency leadership
Abstraction quality	Continue to increase the prioritization of re-abstraction, adding manpower if needed; continue to improve data cleaning and ensure changes to address errors are made and saved appropriately; address apparent system/database errors with appropriate entities at the CDC, escalating as necessary.	AZ-VDRS leadership Lead abstractor CDC