DEA
INTELLIGENCE
REPORT

(U) Drug-Caused Deaths in the Los Angeles Field Division (2013-2017)

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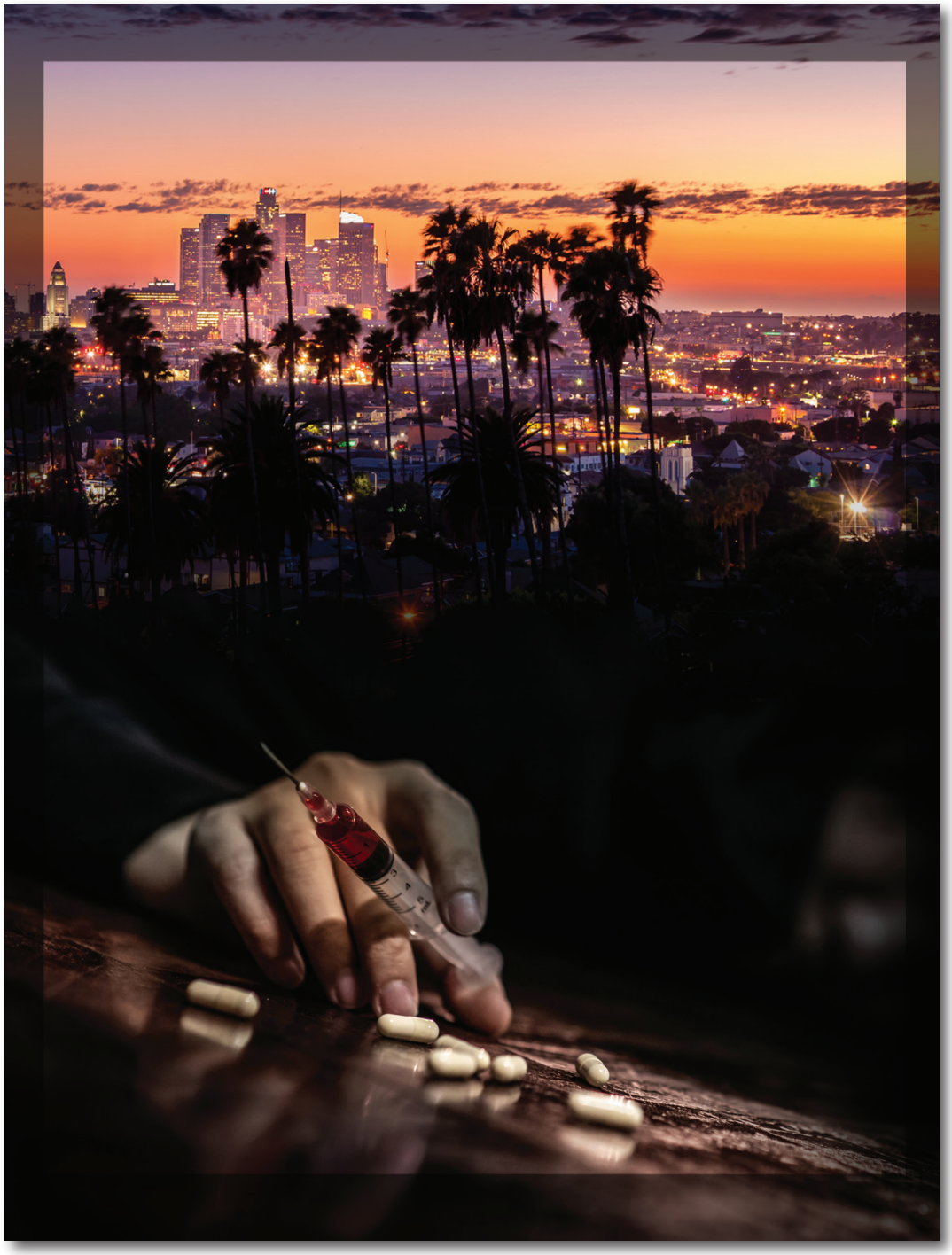
SEPTEMBER 2019



Executive Summary

The phenomenon of drug overdose death has grown steadily worse in the United States during most of the 21st century and has been skyrocketing since 2013 and the introduction of illicitly manufactured fentanyl-related substances into the domestic drug market[1,2,3]. Since 2006, Drug Enforcement Administration (DEA) reporting from the Los Angeles Field Division (LAFD) has explored drug-related mortality in the LAFD Area of Responsibility (AOR). Information from coroner and medical examiner offices plays a vital role in monitoring this evolving threat to the communities the Division is charged with serving. The LAFD has constructed a database from thousands of post-mortem toxicology records from nine offices across its AOR to reflect drug-caused deaths involving various illicit and licit drugs of interest to the DEA. Toxicology records as well as information regarding the specific circumstances surrounding deaths in coroner cases have been collected from offices in the California counties of Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura. Records were also collected from offices in Clark County, Nevada and Honolulu, Hawaii. These data were used to catalog cases in which drug exposure was deemed to be the principal cause of death and identify the substances present in those instances. Some of the conclusions LAFD personnel have drawn from an analysis of the records collected during the five-year period between 2013 and 2017 include:

- The rate of drug-caused deaths per 100,000 in the population in the LAFD AOR has been increasing.

- Clark County, Nevada exhibited the highest rate of drug-caused deaths within the LAFD AOR. In 2017, there were 27.8 drug-caused deaths for every 100,000 in the population in Clark County. This was more than three times the rate of 8.9 in Los Angeles County. Clark County was the only LAFD location with a higher drug-caused death rate in 2017 than the CDC's national average of 21.7 for accidental, drug-overdose deaths per 100,000 in the population.

- The prevalence of methamphetamine and fentanyl-related substances (FRS) within LAFD drug-caused deaths has continued to rise over the five-year span considered. By 2017, there were more than four times as many cases in which a FRS was detected as there were in 2013. The rate of drug-caused deaths per 100,000 in the population in which methamphetamine was detected increased by more than 75 percent.

- The prevalence of certain drug types involved in drug-caused deaths varied across LAFD AOR counties. In Los Angeles and Honolulu counties, a slight majority of drug-caused deaths involved illicit drugs exclusively. In San Luis Obispo and Ventura counties, a clear majority of deaths involved licit drugs exclusively. Licit drugs are the most frequent drugs of choice involved in drug-caused deaths within a large portion of the LAFD AOR.

- Nearly seven out of every 10 cases deemed to be suicides exhibited only licit substances.

- Cases with female decedents were significantly less likely to exhibit illicit drugs only; conversely, cases with male decedents were significantly less likely to exhibit licit drugs only.

- While the prevalence of illicit stimulants (e.g., methamphetamine, cocaine) and some illicit opioids (e.g., fentanyl analogs) has climbed, the prevalence of licit opioids (e.g., hydrocodone, oxycodone) within drug-caused deaths in this region has slightly declined.

DETAILS

Methodology

The Selection of Coroner Records

To compile a database of drug-caused deaths, LAFD personnel obtained coroner toxicology records from seven California counties: Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura. Data were also provided by coroner officials in Honolulu, Hawaii and Clark County, Nevada (which includes the city of Las Vegas)[a]. The LAFD has previously submitted reports providing a detailed account of the methodology employed to construct a dataset using raw records submitted by individual coroner offices[4,5]. The dataset built by the LAFD is not an exhaustive list of every coroner case in which toxicology was performed and controlled substances were detected. All the cases considered for this project met two criteria: a pathologist made an official ruling that the death was primarily caused by repeated or acute exposure to drugs[b], and toxicology screening revealed the presence of one or more specific substances of interest to the LAFD. By and large, these encompass most controlled substances, but records only exhibiting ethanol and tobacco metabolites have been omitted. Cases exhibiting deaths resulting from chemicals such as fluorocarbons, metals, various organic or naturally occurring compounds, or uniformly poisonous substances like strychnine were also excluded. All offices were asked to provide information specifying the pathologists' official conclusions as to the so-called manner or mode of death (e.g., accidental, natural, victim of homicide) and direct causes of death (e.g., opiate toxicity, methamphetamine overdose, or multiple-drug effect). The LAFD also obtained enough toxicology information about each coroner case to determine if any relevant substance was present.

The distinction between a death caused by drug(s) and one in which a drug or multiple drugs merely contributed to other factors is inherently subjective. It is difficult, if not impossible, to establish in many instances whether or not terminal health problems would have occurred if not for a decedent's abuse of drugs. To avoid having LAFD personnel make arbitrary distinctions between drug-caused and drug-related deaths, the application of the "drug-caused" term for these purposes has been restricted to deaths in which a professional pathologist concluded exposure to a drug or drugs was sufficient and necessary to result in a terminal episode (as evidenced by his or her choice of words as to the primary cause of death in official death certificate information – often referred to as Cause A). The records collected by the LAFD also illustrate that pathologists do not use a universal terminology to describe causes of deaths even when the circumstances are essentially identical.[c] Ultimately, the LAFD measure of drug-caused deaths relies on innumerable individual judgments made by those tasked with determining the official cause of death. It is highly probable that a death resulting from "chronic cocaine intake" according to one

[a] Most of the counties which supply information to the LAFD use coroner offices which are headed by an elected official (typically attached to the county sheriff's department). Some of these locations (e.g., Ventura and Honolulu) are headed by a forensic pathologist who has been designated a Medical Examiner by the state.

[b] For the purpose of including a case in the dataset, the term drugs was interpreted very broadly as most all exogenous chemicals which might alter normal bodily function.

[c] An example of this is the way in which records from different offices (or even different examiners within the same office) described deaths resulting from the combination of multiple drugs. Just a few of the official descriptions for such cases included: Acute multiple-drug intoxication, combined effects of multiple drugs, effect of multiple medications, and multiple-drug toxicity.

pathologist could be labeled as "cardiomyopathy" by another[d]. The LAFD dataset will inevitably reflect only a portion of the avoidable fatalities in the LAFD AOR potentially related to the use of controlled substances.

The Incidence of Specific Substances

There are myriad illicit and licit substances being abused by the public at any given time. Restricting the analysis to any particular subset of these substances (just like making distinctions between drug-caused and drug-related deaths) is a process open to interpretation. To again avoid making arbitrary distinctions, this dataset of drug-caused deaths includes all of the licit and illicit controlled or regulated substances detected during toxicology as long as they can fairly be characterized as drugs. One of the goals was to establish the exact frequency with which various substances are detected in drug-caused deaths. This can be problematic when reviewing the raw records produced by coroner offices because many drugs appear in toxicology reports by the name of a substance to which that drug metabolizes after a certain period of time in the body. Essentially, the presence of some drugs must be inferred from the presence of a metabolite. Usually, this is a simple matter; benzoylecgonine, for example, is known to metabolize from cocaine and can always be taken as an indicator the subject ingested cocaine[e]. Trying to identify the presence of heroin (or diacetylmorphine) from toxicology records alone can be difficult, however, because this drug appears in toxicology records as morphine (the substance from which heroin is synthesized) or a combination of morphine and codeine. Obviously, these drugs can be detected whether or not a decedent ingested heroin. In a small number of cases, the presence of heroin could be easily inferred when testing revealed 6-monoacetylmorphine because this is a highly unstable heroin metabolite and a strong indicator that a decedent was rapidly killed by a heroin overdose. More often, heroin is metabolized into morphine and to a lesser extent codeine. When appearing in very low concentrations, even a professional pathologist is hard pressed to determine (with certainty) which of these drugs was actually ingested first. For the purposes of these analyses, any detection of heroin or morphine (or the combination of codeine and morphine) was categorized as the interchangeable "heroin/morphine" and construed as the presence of an illicit drug. The precise incidence of morphine from licit sources was impossible to discern based on the materials available to the LAFD. Consequently, this ensures the LAFD has somewhat overestimated the presence of illicit drugs in these cases.

The drug-caused deaths dataset will also somewhat underestimate the total number of true drug fatalities because of the nature of coroner work. In many of the records reviewed by the LAFD, toxicology screens had been completed and indicated the presence of one or more of the illicit or licit drugs of interest, but the coroner office in question had not officially established a cause of death even after several months. In some instances, coroner personnel concluded this determination could not be made. All such cases have been excluded from the dataset because the distinction between a drug-caused death and one in which drugs were merely present could not be made. Some portion of these undetermined cases undoubtedly consisted of deaths which, given the benefit of more information or time, could have been ruled drug-caused deaths.

[d] Individual pathologists may rely on similar toxicology threshold guidelines established in publications for their trade. The determination by a pathologist that the exact quantity of a drug (or drugs) in a decedent's system is toxic is still contextual, however, and usually takes into consideration factors that vary between cases, such as the likely tolerance of the individual user. A lethal dose of a drug for one person may be completely tolerable for a more frequent or recent user. Such decisions are likely to be approached differently by various experts.

[e] When any substance appeared in the toxicology records alongside a known metabolite for that drug, it was treated as a single detection/substance for the purpose of the analysis. For example, if oxycodone and oxymorphone were both present in a case, only oxycodone was counted as a discrete detection.

It is important to note that coroner toxicology will also rarely encompass the complete spectrum of drugs ingested by all decedents. Coroner personnel sometimes make decisions on a case-by-case basis as to which categories of substances will be detected and confirmed by costly laboratory testing (often ordered from private facilities). Some offices did not routinely request testing involving very recently developed drug screens (such as those for novel psychoactive substances or specific fentanyl analogs) or did not do so until later in the time period considered in this report. Records drawn from the years considered necessarily undercounted the incidence of exotic substances and newly developed, fully synthetic opioids in particular.

Demographics Drawn from Records

The only demographic characteristics considered were decedents' ages and apparent gender. The vast majority of drug-caused death cases reflected in the dataset were accompanied by age (in terms of years) and gender information. Some decedents were younger than one-year old, and coroner offices differed in terms of the exact age information provided in such cases. Some offices specified an age in months or indicated there was a pre-natal fatality[f], while others simply listed the age as zero years. For consistency purposes, the LAFD dataset records all deaths of those less than one-year old as having age zero. While age and gender information are discussed in this report, the ethnic categories reported by coroner offices have not been considered. The ethnicities often listed in coroner records represent post-mortem assessments from coroner personnel and would not necessarily reflect categories that would be self-reported by the decedents. For our purposes, these assessments are problematic at best and have, therefore, been excluded from any analyses using these data.

ANALYSIS

The Incidence of Drug-Caused Deaths in the LAFD

In the five-year period between 2013 and 2017, the nine participating coroner/medical examiner offices reported 12,886 drug-caused deaths which met the LAFD criteria.

Figure 1 displays the number of cases from each county during this span. Data from the U.S. Census Bureau's Population Estimates Program[6] were used to calculate drug-caused death rates for the counties[g], and Figure 2 displays these rates for 2017[h]. Clark County had by far the highest rate of these deaths at 27.8 per 100,000 in the population; this was 11 more deaths per 100,000 compared to Riverside - the next closest participating county - and more than double the rate observed in four of the other counties. The rate of these deaths in Clark County was more than triple that in Los Angeles County in 2017 (8.9 per 100,000). Clark County was also the only location in the LAFD AOR to feature a higher rate of drug-caused deaths in 2017 than the Centers for Disease Control and Prevention (CDC) reports as the national average (21.7)[7] for the rate of accidental, drug-overdose death.

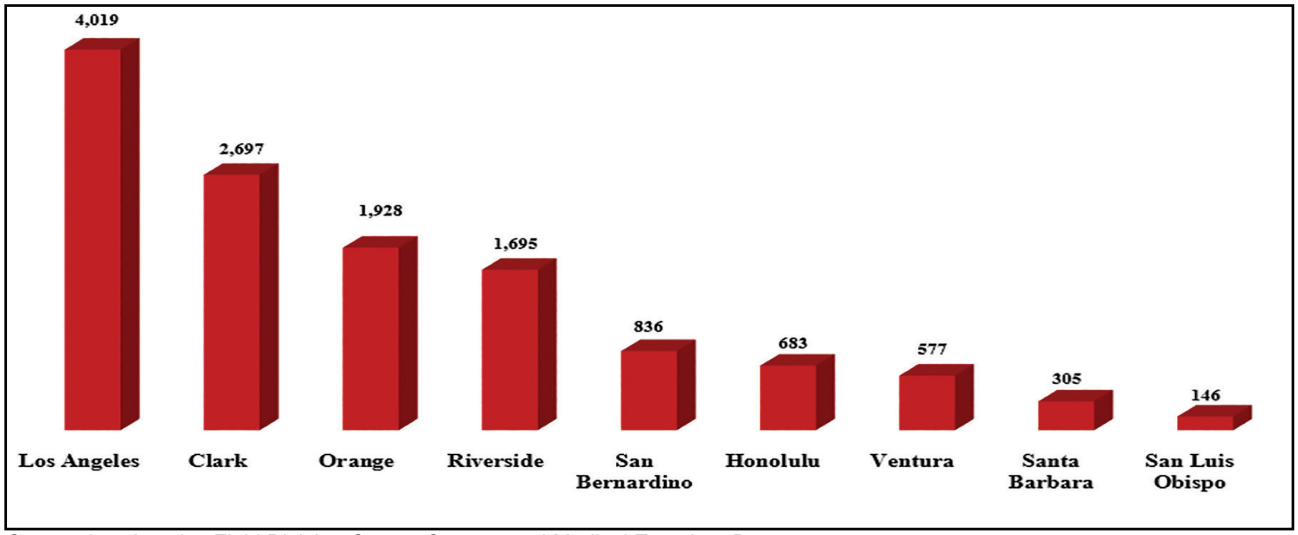
[f] A number of cases involved unborn infants who were killed as the result of maternal drug toxicity.

[g] This rate is the number of drug-related deaths in a county in a given year divided by that year's population estimate and then multiplied by 100,000.

[h] The rate displayed for San Bernardino County actually reflects the 2015 estimate because this was the most recent year for which all records were available.

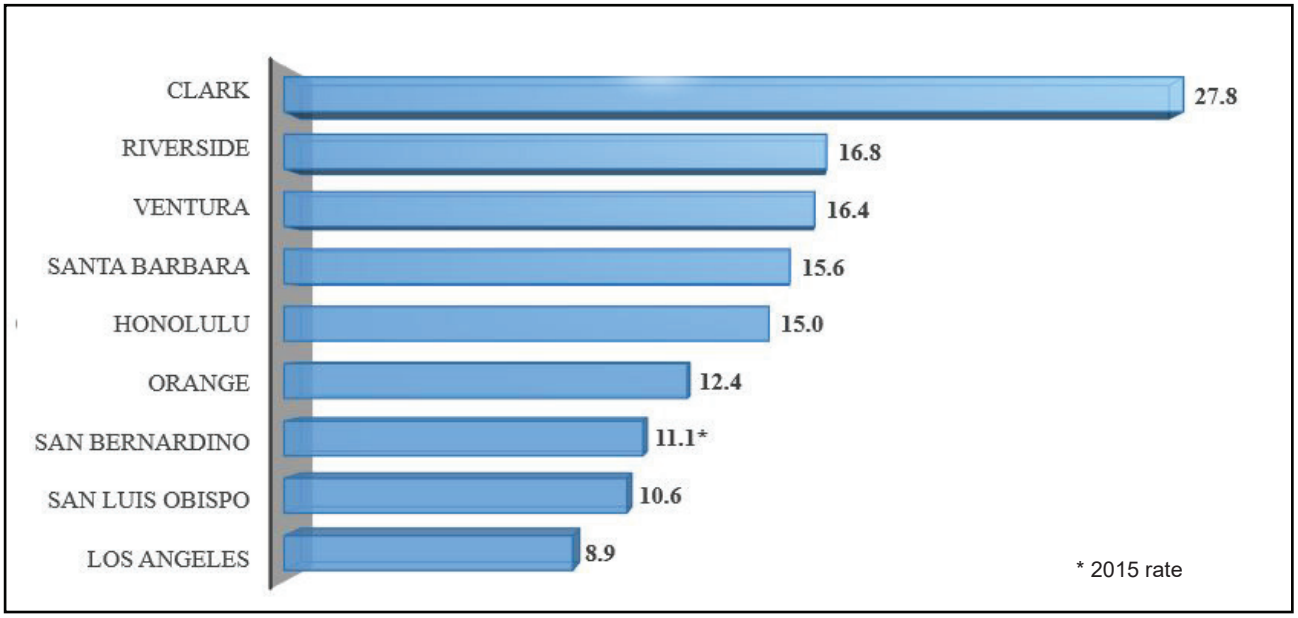
San Bernardino, San Luis Obispo, and Los Angeles Counties featured 2017 drug-caused death rates lower than the 11.7 per 100,000 reported by the CDC as the accidental, drug-overdose death rate for California as a whole. The disparity between the high number of drug-caused deaths but relatively low rate of them (see Figure 1 versus Figure 2) in Los Angeles County illustrates how the raw totals can often obscure a more acute problem in less populous regions of the LAFD AOR.

(U) FIGURE 1. DRUG-CAUSED DEATHS IN LOS ANGELES FIELD DIVISION COUNTIES 2013-2017.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 2. RATE OF DRUG-CAUSED DEATHS PER 100,000 IN THE POPULATION (2017).

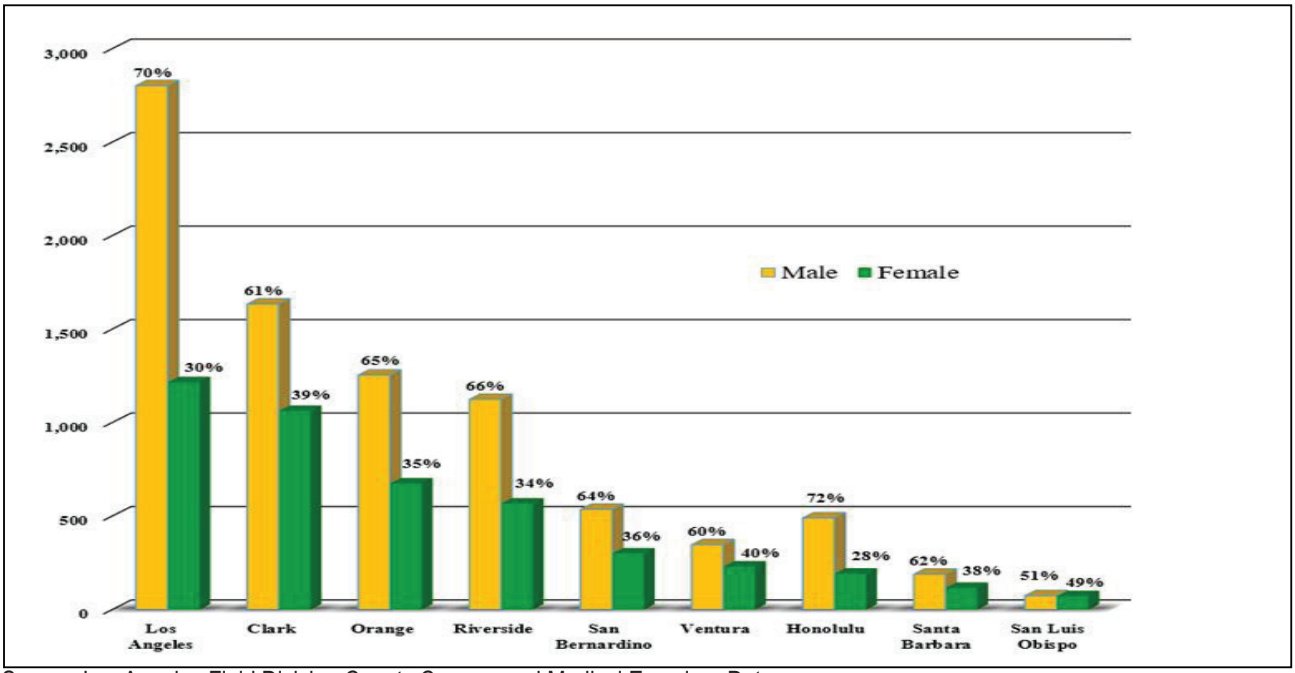


Source: Los Angeles Field Division County Coroner and Medical Examiner Data

Demographics

Across the participating counties, males accounted for nearly two-thirds (65.6 percent) of all the decedents killed by drug toxicity. Figure 3 shows the percentages of these groups within each office. San Luis Obispo County was the only location in which drug-caused deaths were close to evenly distributed between males and females, however, cross tabulation indicated the effect size associated with these county differences was minimal. It is worth noting that San Luis Obispo is much more conspicuous for having an equal number of female decedents because 2017 Census figures suggest it has the highest percentage of male residents (50.7 percent) of the nine counties. The distribution of gender in these counties is consistent with many previous analyses of drug-caused deaths but nevertheless continues to illustrate that the phenomenon of overdose death skews toward males. The ages of decedents ranged from pre-natal to 98 years-old, and the median age was 47. An analysis of variance (ANOVA)[8] suggested there was no meaningful difference between the mean ages of decedents in the nine counties. Decedents were divided into seven age groups based on typical CDC analyses (0-14 years-old, 15-24, 25-34, 35-44, 45-54, 55-64, 65 and older) (see Figure 4). Cross tabulation indicated there was a very modest but statistically significant difference between the age distributions by gender (Pearson Chi-square = 158.8, $p < .001$, Cramer's V = .11)[9]. Decedents in two of the younger age groups (15-24 and 25-34) skewed more male than the sample as a whole; nearly three quarters of decedents in these two age groups were males (approximately 74 percent). Alternatively, less than 58 percent of decedents aged 65 and older were males. Essentially, the gender gap in drug-caused death dissipated slightly as decedents aged. The largest single group within the dataset consisted of males between the ages of 45 and 54 years-old, as these cases constituted more than 16 percent of the entire sample (2,082 cases) (see Figure 5).

(U) FIGURE 3. DRUG-CAUSED DEATHS BY GENDER AND COUNTY.

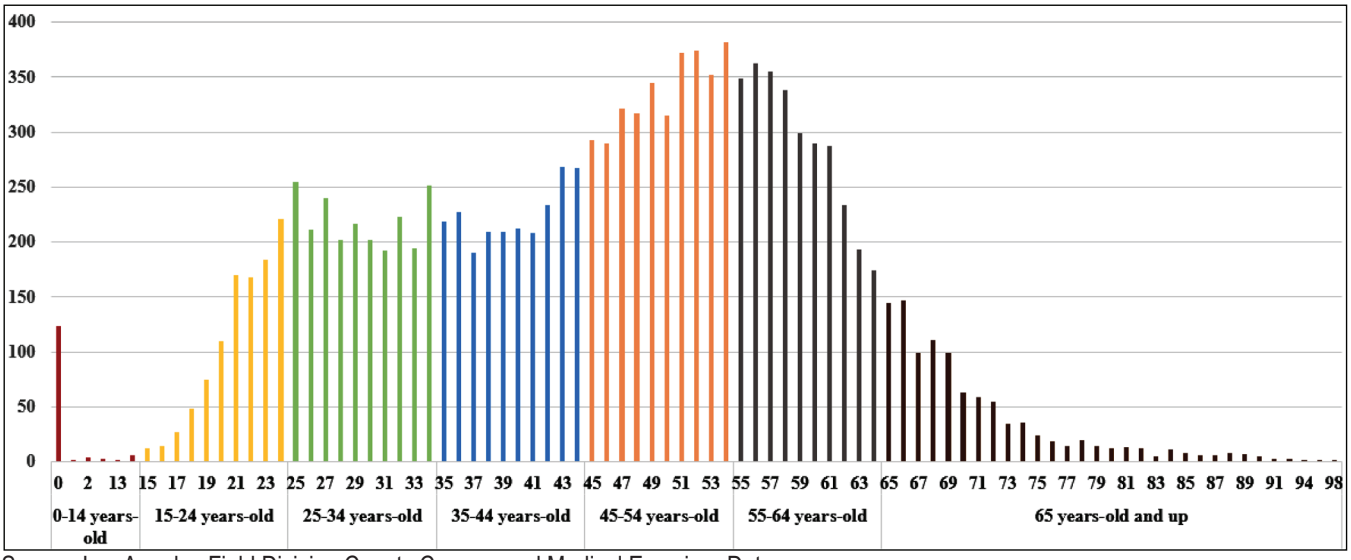


Source: Los Angeles Field Division County Coroner and Medical Examiner Data

Manner of Drug-Caused Death

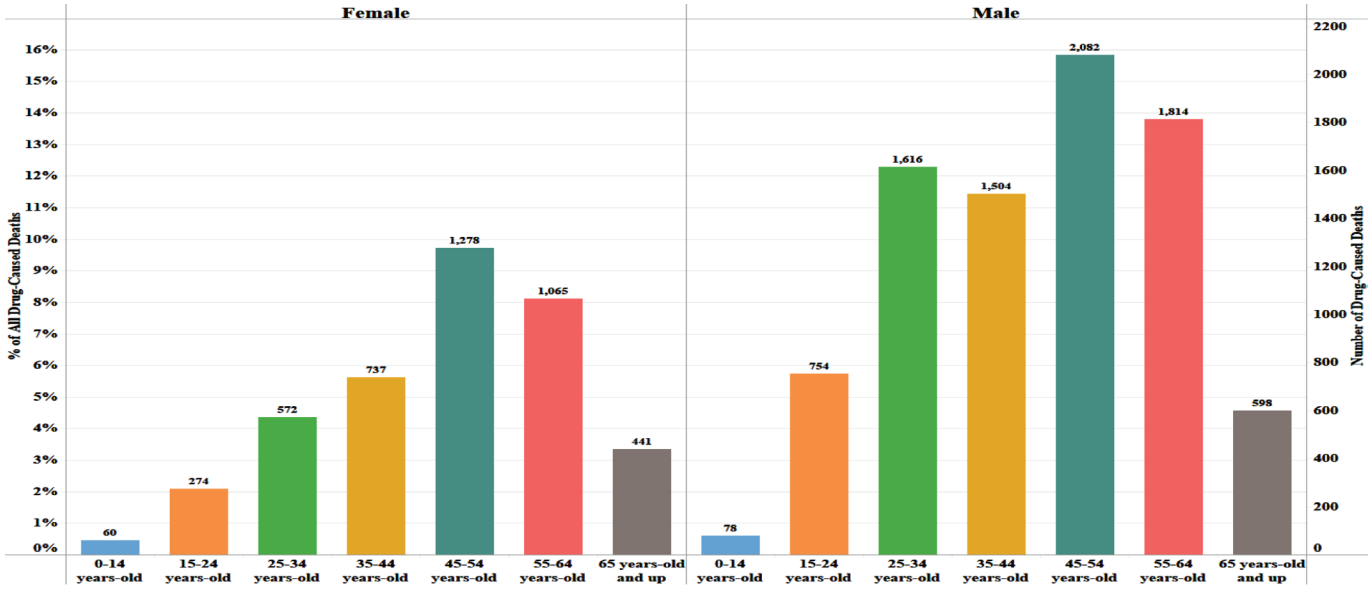
In the majority of coroner/medical examiner cases determined to be drug-caused deaths, pathologists ruled that the manners or modes of death were accidents versus suicides, homicides, or natural deaths. Personnel in the participating counties ruled nearly 82 percent of drug-caused deaths to be accidental between 2013 and 2017 (see Figure 6). Research in this area has demonstrated these assessments are highly subjective and potentially unreliable across raters[10]. Suicides may be systematically underreported in favor of accident designations whenever autopsy and investigative results are inconclusive[11]. With regard to drug-caused deaths, the lines between accidents and so-called natural deaths are also blurred because pathologists sometimes assign the natural category to cases in which the chronic and persistent use of drugs eventually results in a death. The San Bernardino County Coroner, for example, handles manner of death determinations in that fashion routinely and more sparingly uses the accident designation; just under 65 percent of the drug-caused deaths in San Bernardino were designated as natural deaths (See Figure 7).

(U) FIGURE 4. DRUG-CAUSED DEATHS BY AGE GROUP.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

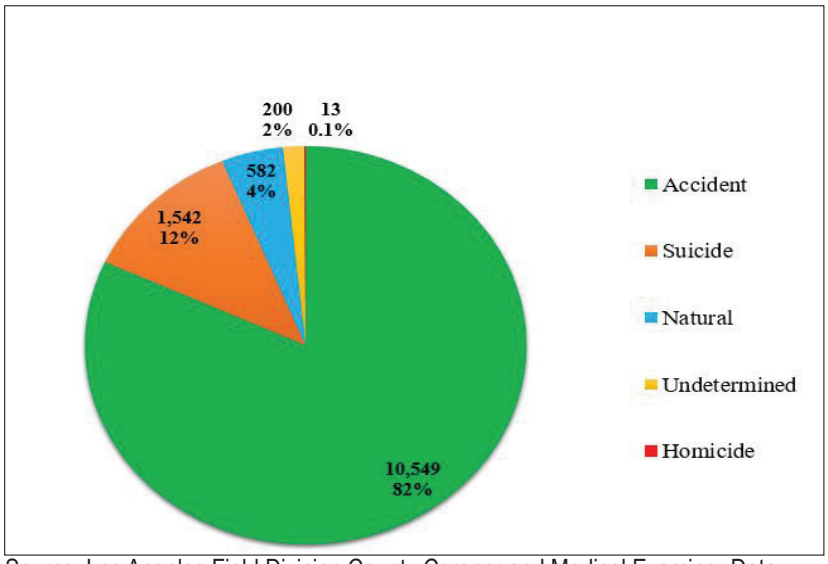
(U) FIGURE 5. DRUG-CAUSED DEATHS BY GENDER AND AGE GROUP.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

In recent years, pathologists have even begun to utilize the homicide designation for deaths in which the underlying cause is drug toxicity versus some form of violence because there is a public interest in holding drug retailers responsible for certain overdoses[12]. In 200 cases from the participating offices, pathologists simply acknowledged the mode of death could not be ascertained with any certainty (referred to as undetermined). The coroner/medical examiner records reviewed by the LAFD suggest these manner of death distinctions are sufficiently indeterminate to justify the inclusion of cases reflecting all manners of death in these analyses to consider the full scope of drug-caused death. It follows that the antecedents of drug-caused suicides will vary from those of other manners of death, but the choice of drugs typically used in such cases are still of interest to the DEA.

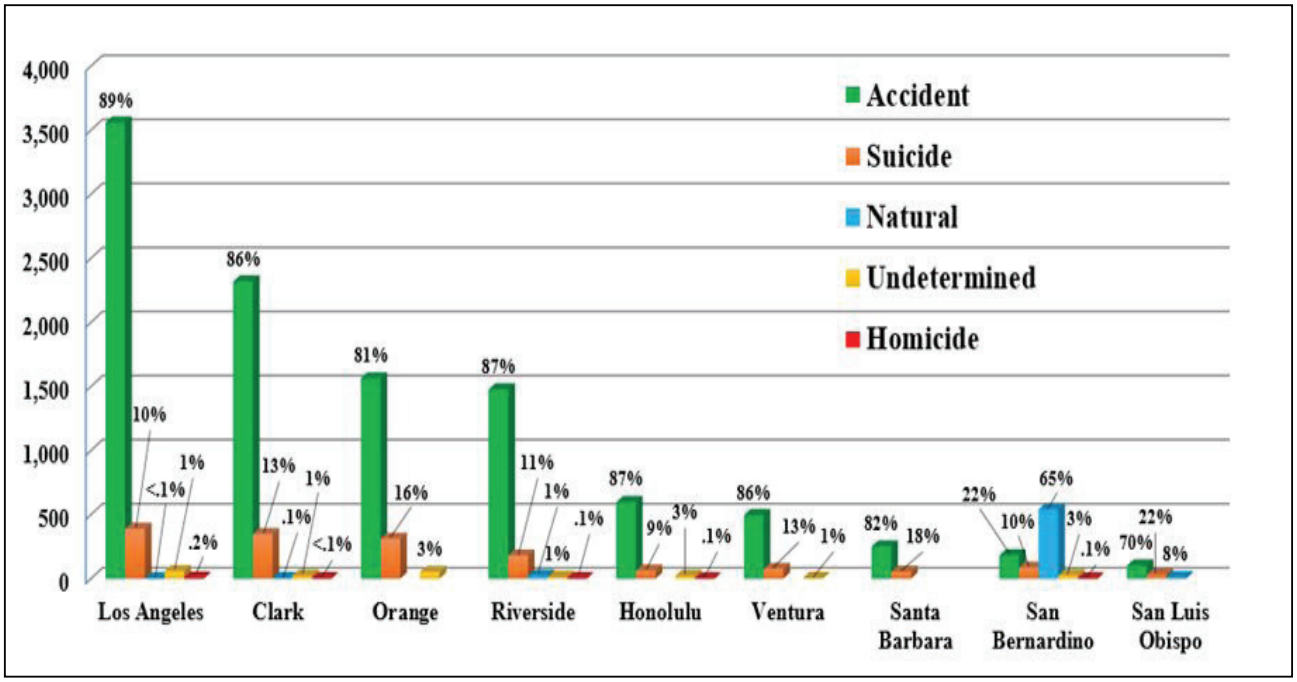
(U) FIGURE 6. DRUG-CAUSED DEATHS BY MANNER OF DEATH.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

Approximately 12 percent of the drug-caused deaths reported by the participating counties were ruled to be suicides (see Figure 6). The San Luis Obispo County Coroner produced the highest proportion of drug-caused deaths ruled to be suicides with nearly 22 percent of cases receiving this designation. Honolulu County produced the lowest with only 9.4 percent (see Figure 7).

(U) FIGURE 7. MANNER OF DRUG-CAUSED DEATHS BY COUNTY.



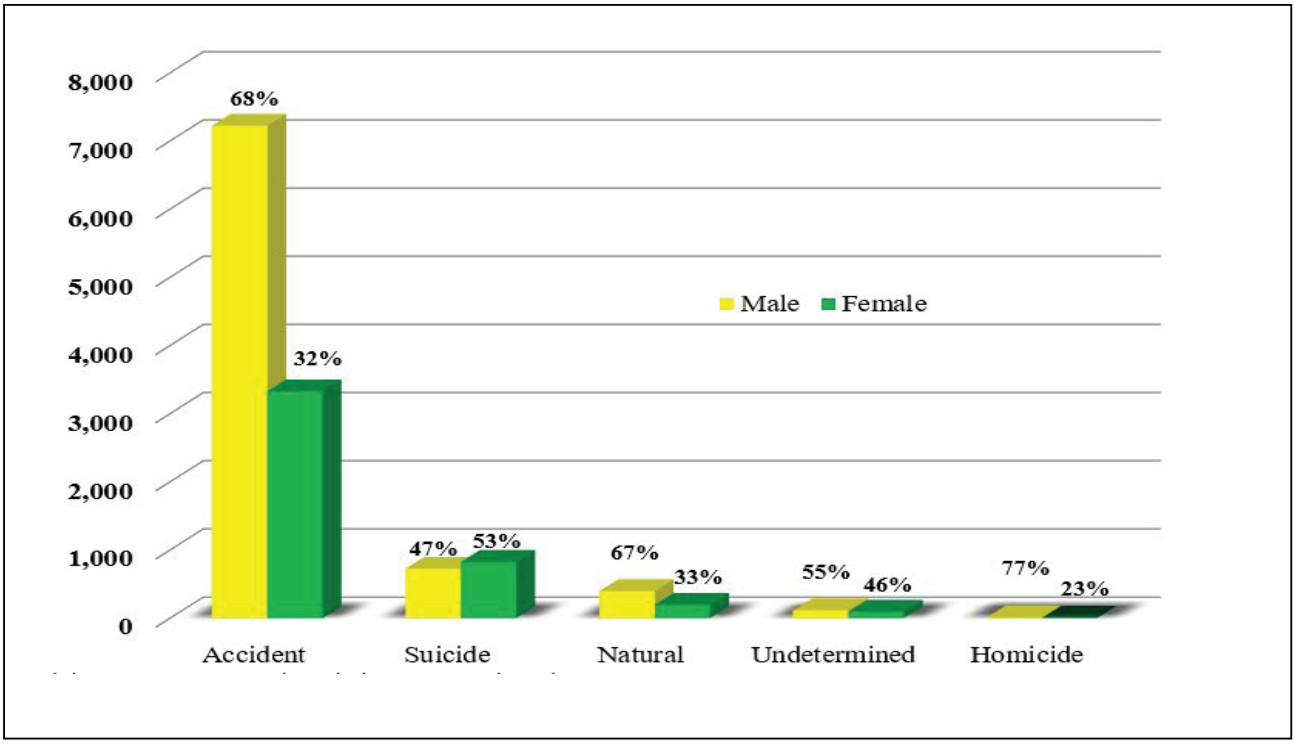
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

A cross tabulation was performed to compare the nine counties in terms of the prevalence of suicides, and while there was a statistically significant association between the location and the manner of death (suicides versus all other types), the small effect size suggested most of the effect stemmed from the large sample size. Cross tabulation indicated there was a modest but statistically significant difference between the genders with regard to manner of death (Pearson Chi-square = 293.7, p < .001, Cramer's V = .15). More than 53 percent of cases ruled to be suicides were females, whereas the proportion of males and females among cases involving all other manners of death was similar to the distribution in the sample as a whole (see Figure 8). Female decedents continue to be underrepresented in drug-caused death cases but overrepresented among the subset deemed suicides. Cross tabulation indicated there was also a modest but statistically significant difference between the age groups with regard to manner of death (Pearson Chi-square = 446, p < .001, Cramer's V = .19). Specifically, the likelihood a case would be ruled a suicide was higher for decedents aged 65 years and older; almost one third of drug-caused deaths in that age group, 31.4 percent, were designated as suicides (see Figure 9).

Toxicology

Toxicology reporting from the nine participating offices revealed the presence of 266 substances which met the LAFD criteria, and there were 39,302 discrete detections of these drugs during this five-year period. In a substantial majority of cases, toxicology revealed multiple drugs in a decedent's system at the time of death, and the median number of drugs detected was two. Two or more relevant substances were detected in almost three quarters of cases (72.5 percent); three or more relevant substances were detected in almost half of all cases (48.6 percent); more than one out of five cases featured five or more substances (21.1 percent); more than one percent of cases featured 10 or more substances, and the maximum number of drugs detected was 19 (see Figure 10). Nearly three quarters of all cases

(U) FIGURE 8. DRUG-CAUSED DEATHS BY MANNER AND GENDER.

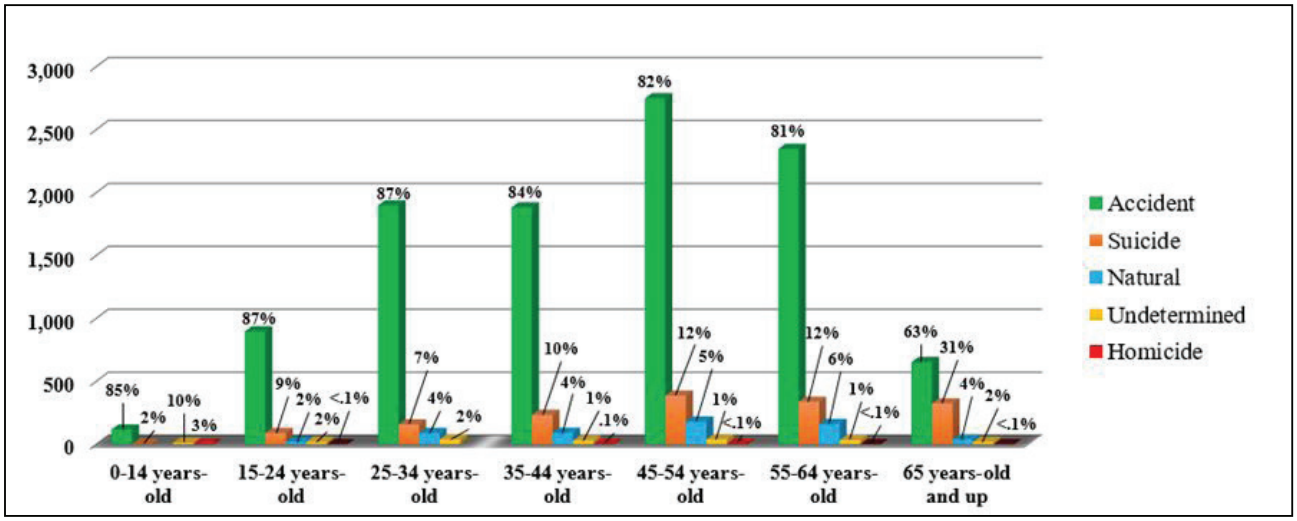


Source: Los Angeles Field Division County Coroner and Medical Examiner Data

exhibited at least one illicit drug (73.5 percent) (see Figure 11), while just less than two thirds of all cases (63.1 percent) exhibited at least one licit drug (see Figure 12). Although any given case had a slightly greater likelihood of featuring an illicit drug, it was more common for a case to feature multiple licit drugs if any were present. Among the 9,472 cases in which an illicit drug was detected, the median number of illicit drugs found was only one, and just more than one third of these cases featured multiple, illicit drugs (36.9 percent); the maximum number of illicit drugs detected was six. Decedents with at least one licit drug in their systems were more likely to have multiple licit drugs present than a single substance; the median number of licit drugs present in these 8,129 cases was three, and more than seven out of every 10 cases featuring a licit drug exhibited two or more of these substances. More than eight percent of cases featuring a licit drug exhibited seven or more of them. The maximum number of licit drugs detected in a single case was 17 (see Figure 12).

Methamphetamine was the most commonly detected substance—present in 38.6 percent of cases—followed by heroin/morphine (found in 34.5 percent of cases). Alprazolam was the most commonly detected licit substance (15.9 percent of cases), followed by hydrocodone (15.1 percent) and oxycodone (14.2 percent) (see Figure 13 for the incidence of the ten most frequently detected substances in the dataset). Although methamphetamine and alprazolam were the single most commonly detected drugs in the illicit and licit categories respectively, the most commonly occurring category of drugs in these cases was opioids of some variety. 65.3 percent of cases featured at least one opioid, whereas only 49.9 percent of cases featured at least one stimulant (illicit or licit). The most commonly detected category of licit drugs was opioids followed by benzodiazepines and antidepressants[i]. Figure 14 displays the drug categories which encompassed the various illicit and licit substances actually detected at some point during this five-year period as well as the rate at which one or more substances in these groups was found among all cases. See Appendix A for a complete list of the substances detected during toxicological analyses and the corresponding drug category. Appendix B displays the five most-commonly-detected illicit and licit drugs within drug-caused deaths in each participating county.

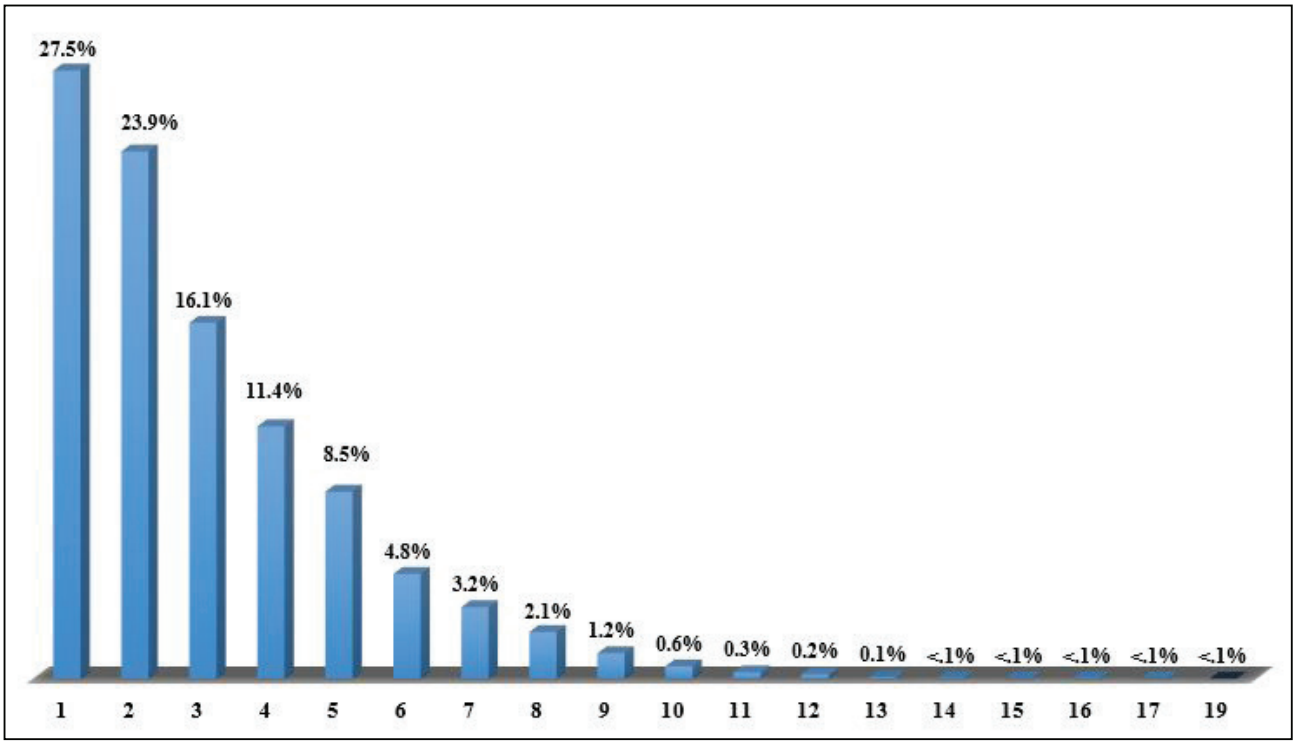
(U) FIGURE 9. MANNER OF DRUG-CAUSED DEATHS BY AGE GROUP.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

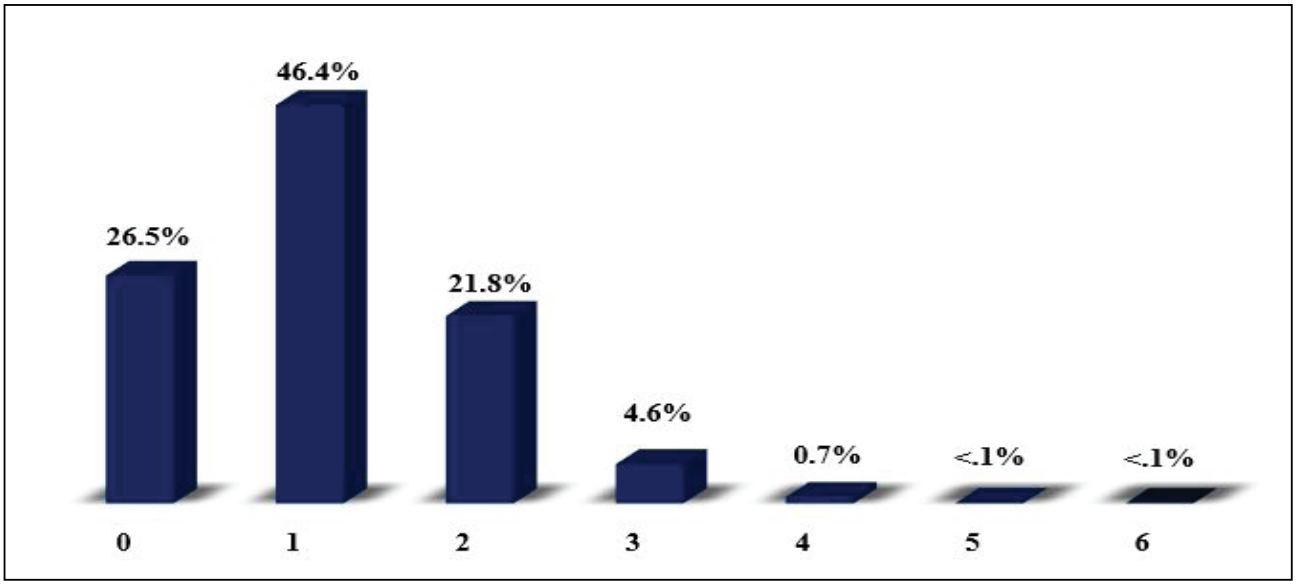
[i] Figure 14 includes a catch-all category referring to a wide variety of other, detected licit substances which fell into drug categories besides the most commonly detected five: licit opioids, benzodiazepines, antidepressants, antihistamines, and non-opioid analgesics. The myriad other, licit categories included antipsychotics, licit stimulants, muscle relaxants, opioid antagonists, barbiturates, and steroids just to name a few.

(U) FIGURE 10. PROPORTION OF DRUG-CAUSED DEATHS BY NUMBER OF DRUGS DETECTED.



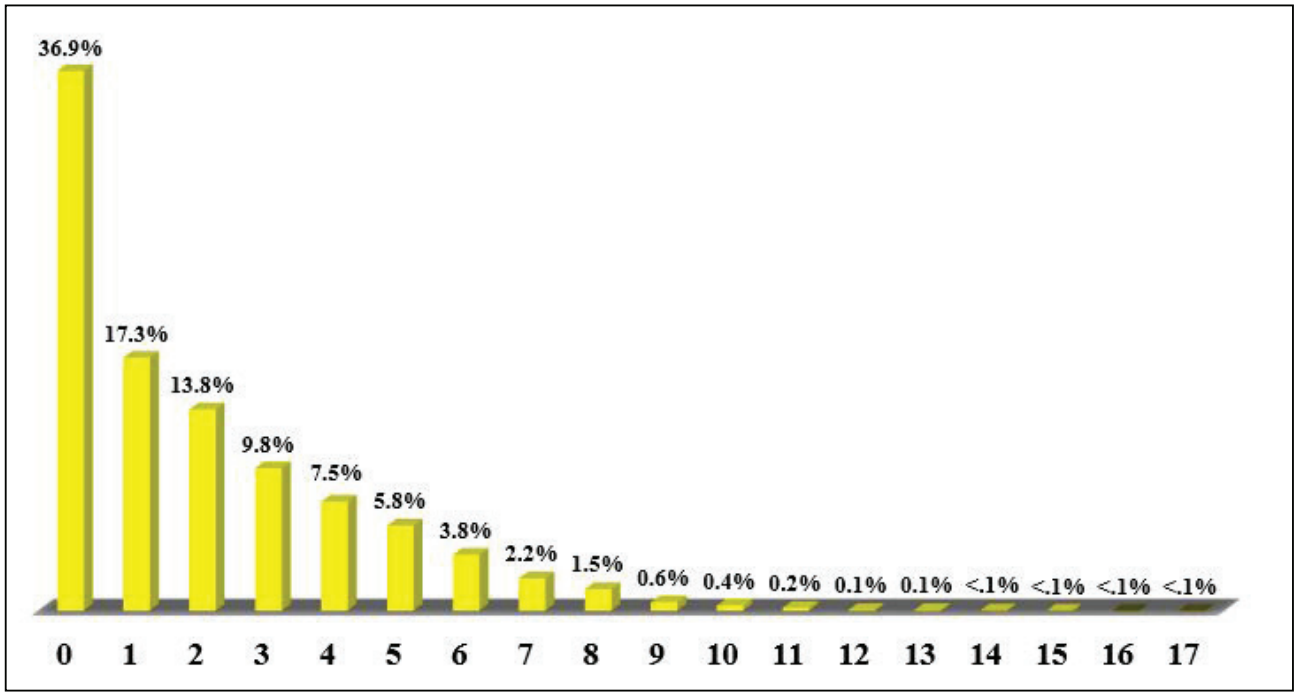
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 11. PROPORTION OF DRUG-CAUSED DEATHS BY NUMBER OF ILLICIT DRUGS DETECTED.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 12. PROPORTION OF DRUG-CAUSED DEATHS BY NUMBER OF LICIT DRUGS DETECTED.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

Cross tabulation indicated there was a modest but statistically significant difference between the counties with regard to the drug variety in the cases (whether cases featured only illicit drugs, only licit drugs, or some combination) (Pearson Chi-square = 833.8, p < .001, Cramer's V = .18). For example, just more than half of all cases in Los Angeles and Honolulu Counties respectively exhibited only illicit drugs (see Figure 15). Alternatively, around one quarter or fewer of cases in counties including San Luis Obispo County, Santa Barbara County, Orange County, and Clark County exhibited only illicit drugs. Almost four out of every five cases in San Luis Obispo County exhibited only licit drugs (39 percent), and more than one third of Ventura County cases featured licit drugs exclusively (34.5 percent). Cross tabulation revealed an even stronger association between location and the proportion of drug-caused deaths featuring a licit drug at all (Pearson Chi-square = 755.4, p < .001, Cramer's V = .24). In multiple counties, such as Clark, Orange, San Luis Obispo, and Santa Barbara, nearly three quarters or more of cases featured a licit drug, while this proportion was just under half in Los Angeles and Honolulu.

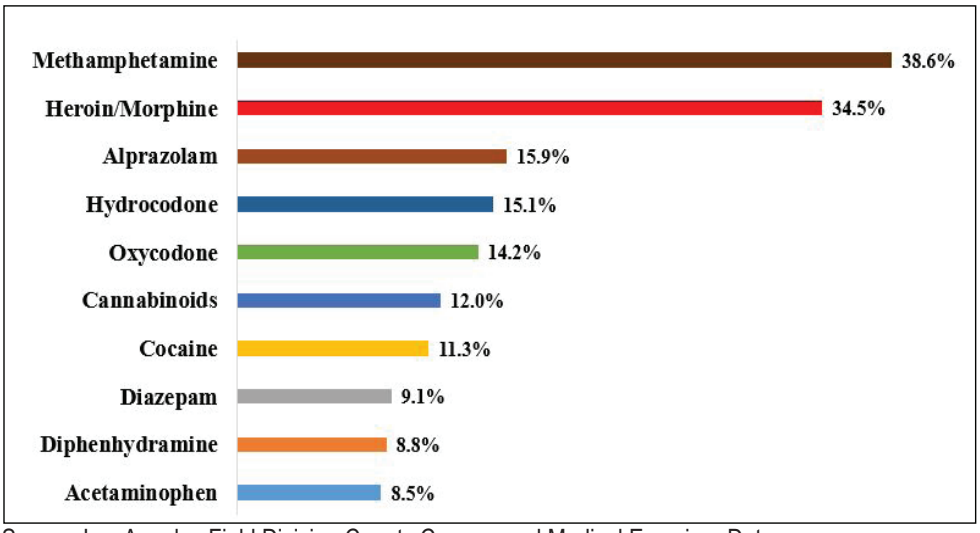
There was a moderately strong, statistically significant difference between the genders with regard to drug variety (Pearson Chi-square = 925.6, p < .001, Cramer's V = .27). Female decedents were significantly less likely to exhibit illicit drugs only, and conversely, male decedents were significantly less likely to exhibit licit drugs only (see Figure 16). Cross tabulation indicated there was a modest but statistically significant difference between the age groups with regard to the drug variety in the cases (Pearson Chi-square = 524.3, p < .001, Cramer's V = .14). Unsurprisingly, a higher proportion of decedents in older age groups exhibited exclusively licit drugs, while a higher proportion of decedents in younger age groups exhibited exclusively illicit drugs (see Figure 17). A logistic regression[13] predicting the presence of licit drugs while controlling for both age and gender simultaneously indicated both of those predictors

remained significantly associated with the odds a licit drug would be present[j]. There was a very strong, statistically significant difference between the drug variety present in suicides versus cases involving other manners of death (Pearson Chi-square = 1,761.2, p < .001, Cramer's V = .37). Almost seven out of 10 cases determined to be suicides exhibited only licit drugs (68.9 percent), whereas just more than two out of every 10 cases determined to be one of the other manners of death exhibited only licit drugs. Along these same lines, less than four percent of suicides exhibited exclusively illicit drugs (see Figure 18). Coroner/medical examiner personnel are loathe to categorize any case featuring only illicit drugs as a suicide.

Trends over Time

With the exception of San Bernardino County, where all 2016 and 2017 records were not yet available, the remaining participating counties all exhibited an increase in the rate of drug-caused deaths per 100,000 in the population between 2013 and 2017 (see Figure 19). The largest drug-caused death rate increase occurred in Santa Barbara County, where there were five more deaths per 100,000 people by 2017. The increase in the rate of drug-caused death over this period has been accompanied by a modest but statistically significant increase in the proportion of cases exhibiting illicit stimulants (methamphetamine in particular) (Pearson Chi-square = 172.1, p < .001, Cramer's V = .12) and a decline in the proportion of cases exhibiting licit opioids (Pearson Chi-square = 141.3, p < .001, Cramer's V = .11)[k]. Across eight of the counties, methamphetamine was detected at a rate of 3.3 drug-caused deaths per 100,000 in the population in 2013 but a rate of 5.7 in 2017 – a more than 75 percent increase over this span. Figure 20 illustrates how illicit stimulants have become more prevalent in drug-caused deaths in the LAFD while licit opioids have become slightly less so. There were also modest declines in the proportion of cases exhibiting benzodiazepines and antidepressants. The presence of illicit opioids within these cases has been stable as the very slight decline in the proportion exhibiting heroin/morphine has been offset by the modest but statistically significant increase in the proportion of cases exhibiting a fentanyl-related substance (FRS) (Pearson Chi-square = 245.2, p < .001, Cramer's V = .14) (see Figure 20).

(U) FIGURE 13. PROPORTION OF DRUG-CAUSED DEATHS INVOLVING 10 MOST FREQUENTLY DETECTED DRUGS.

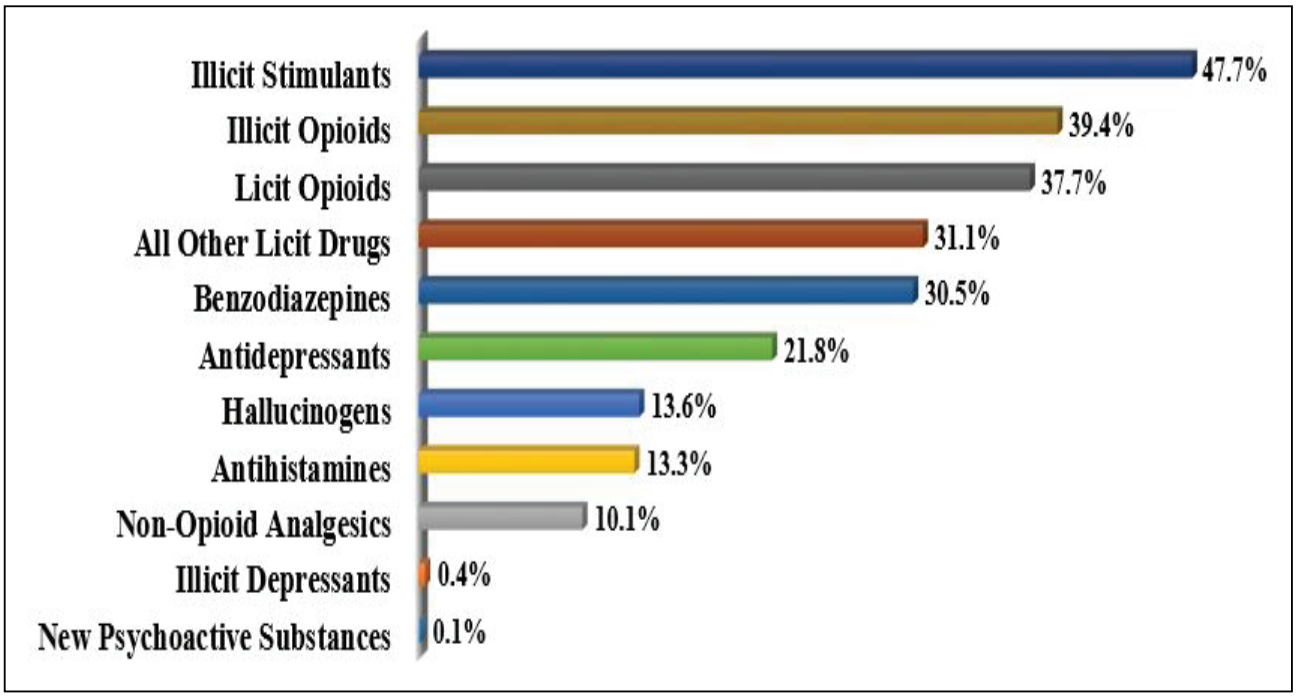


Source: Los Angeles Field Division County Coroner and Medical Examiner Data

[j] The odds ratios for the logistic regression suggested increasing age (in years) was positively correlated with the presence of licit drugs (OR=1.013, p < .001) while being male (female = 1 and male = 2) was negatively correlated (OR = .33, p < .001).

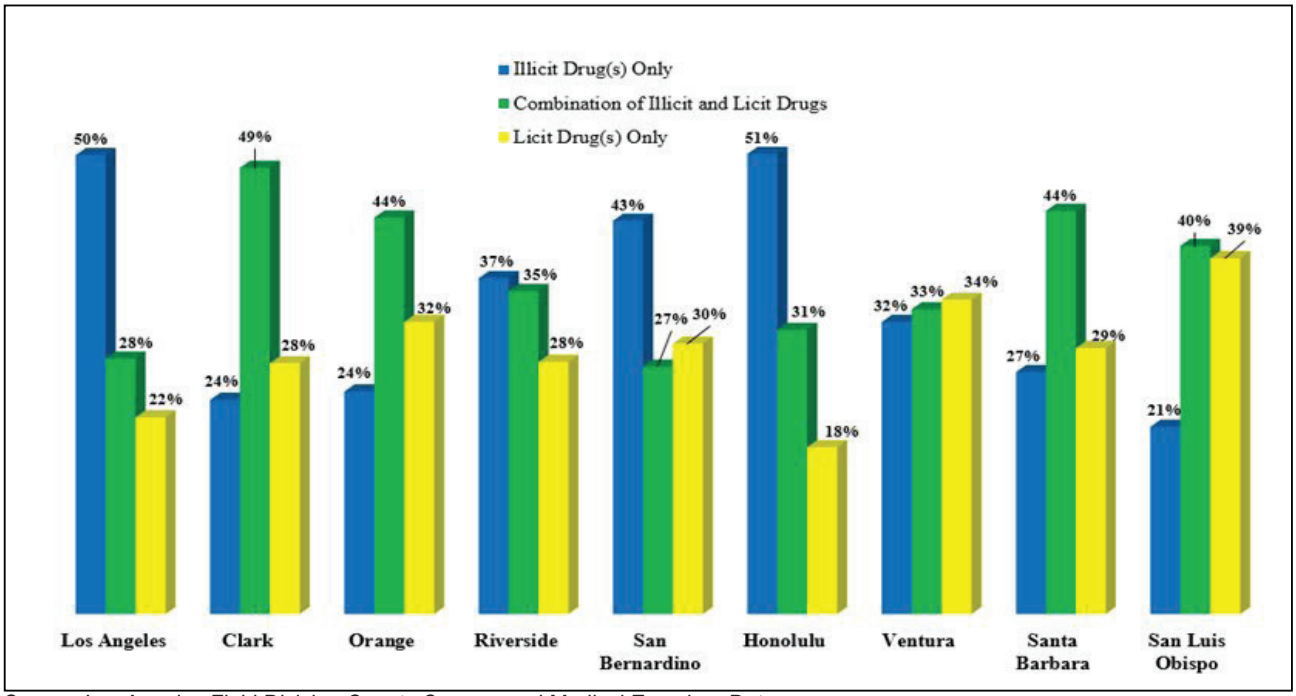
[k] Not all records from 2016 and 2017 were yet available from San Bernardino County at the time of this report. As a result, San Bernardino records have been excluded from the analyses reported here which consider changes over the entire five-year period.

(U) FIGURE 14. PROPORTION OF DRUG-CAUSED DEATHS INVOLVING ILLICIT AND LICIT DRUG CATEGORIES.



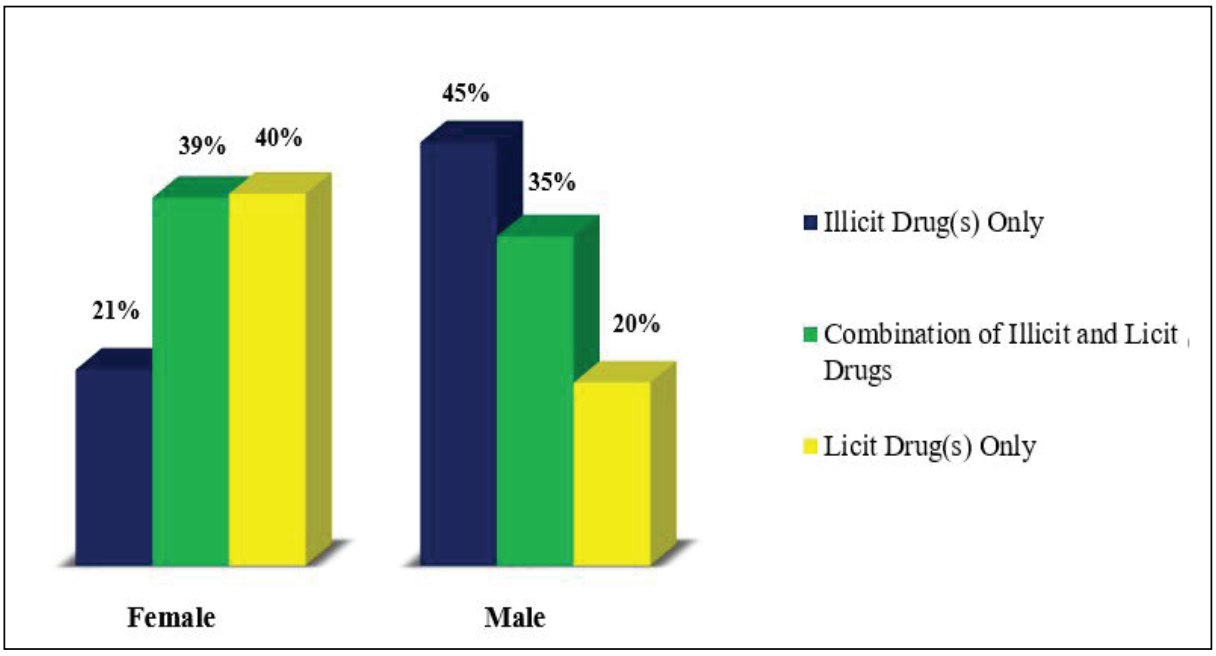
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 15. DRUG VARIETY DETECTED BY COUNTY.



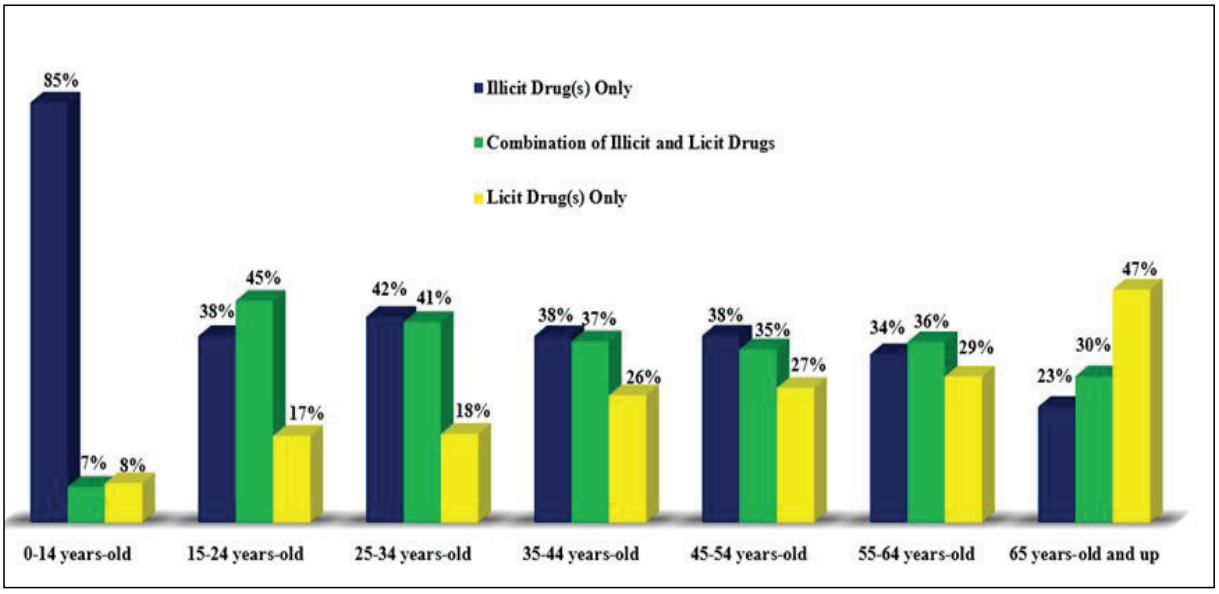
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 16. DRUG VARIETY DETECTED BY GENDER.



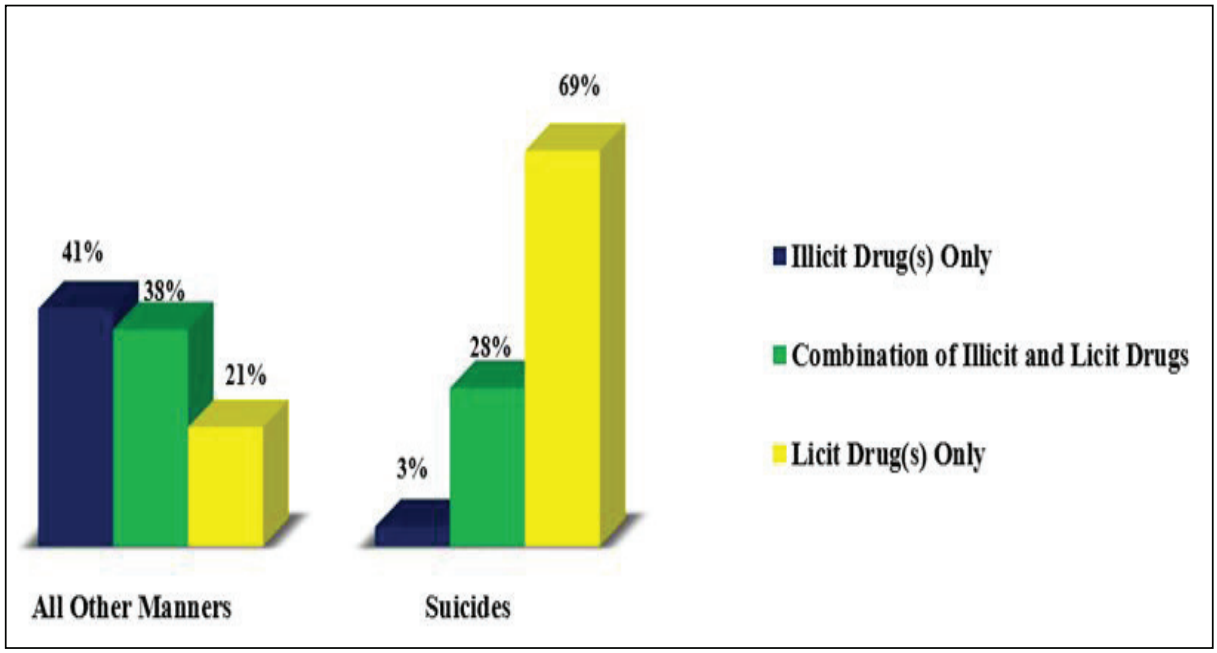
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 17. DRUG VARIETY DETECTED BY AGE GROUP.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

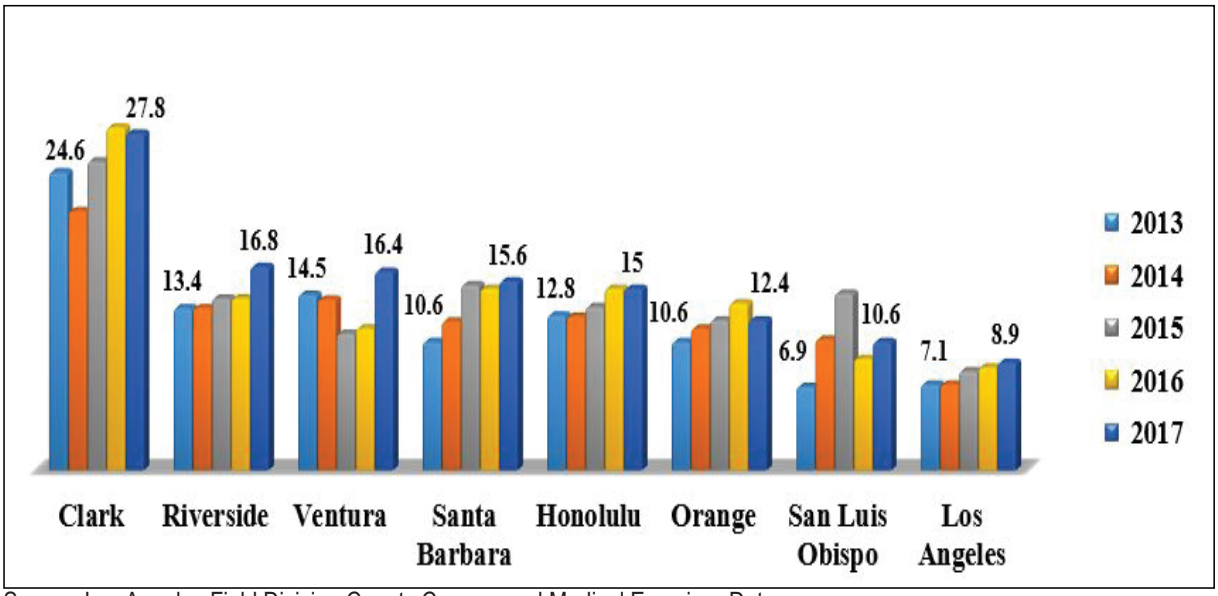
(U) FIGURE 18. DRUG VARIETY DETECTED IN SUICIDES VERSUS OTHER MANNERS OF DEATH.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

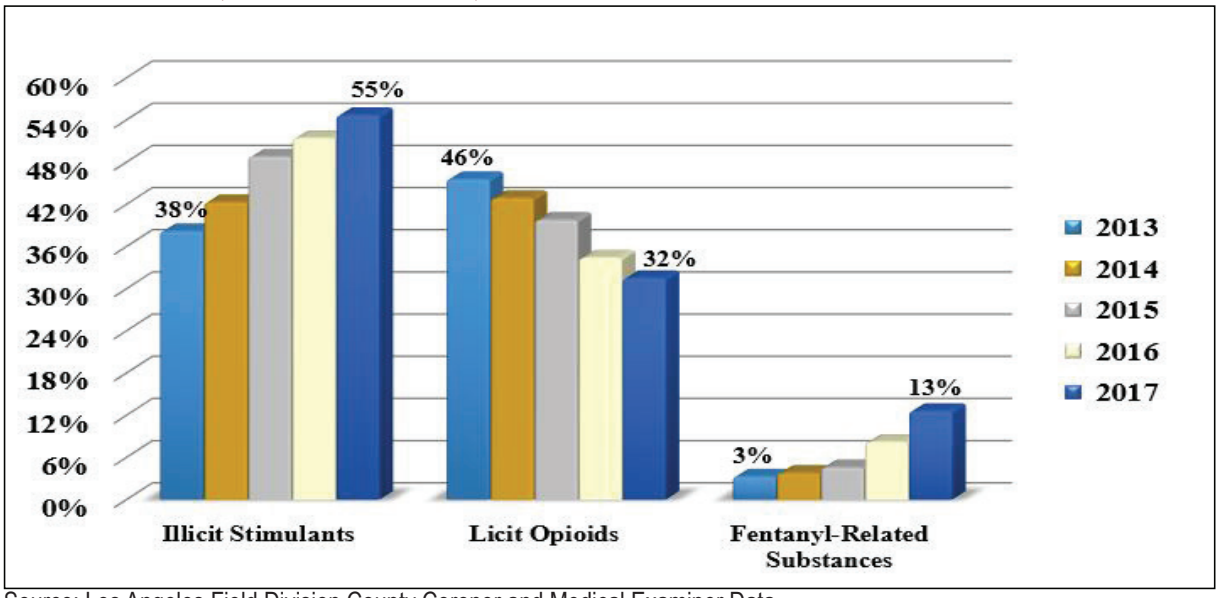
Some of the increase in the death rate in Santa Barbara County may be attributable to the statistically significant increase in the proportion of cases from that location exhibiting fentanyl analogs (Pearson Chi-square = 10.6, $p < .05$, Cramer's V = .19), but the absolute number of these cases is still relatively small (with 14 such cases as of 2017) (see Figure 21). Figure 22 displays the incidence of specific FRS detected in the nine counties during this five-year period.

(U) FIGURE 19. THE INCIDENCE OF FENTANYL-RELATED SUBSTANCE ANALOGS IN DRUG-CAUSED DEATHS.



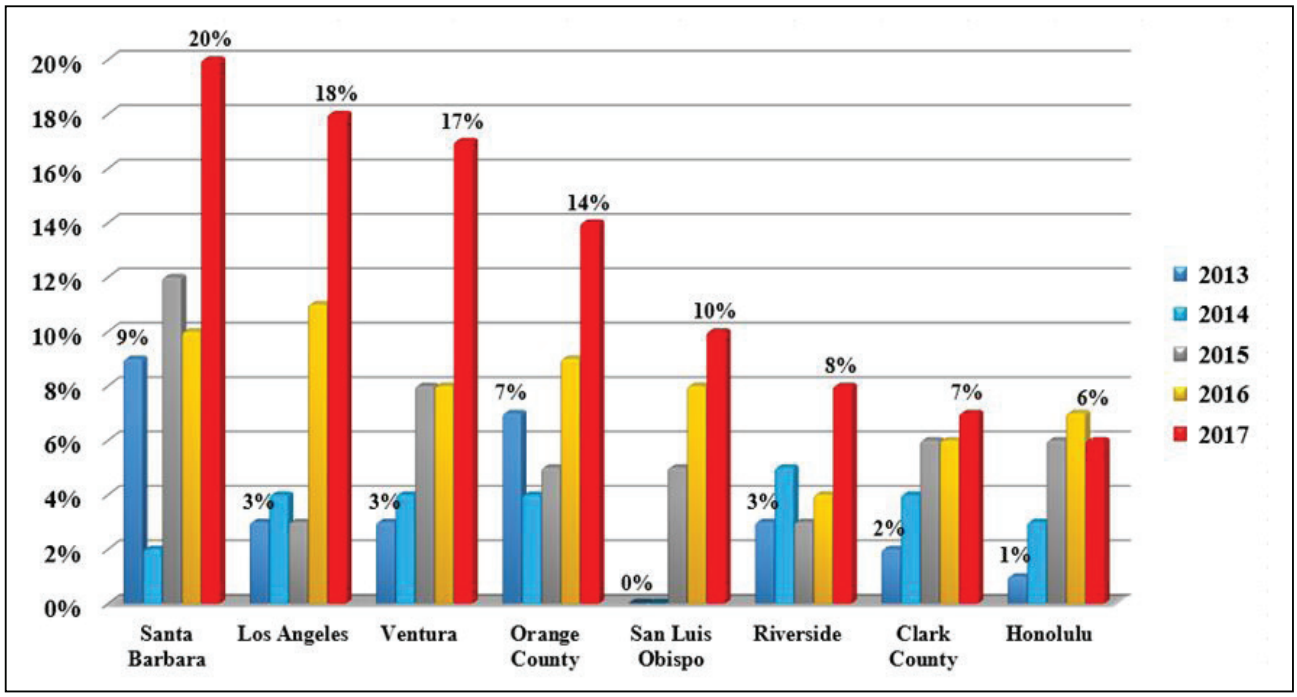
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 20. PROPORTION OF DRUG-CAUSED DEATHS INVOLVING ILLICIT STIMULANTS, LICIT OPIOIDS, AND FRS.



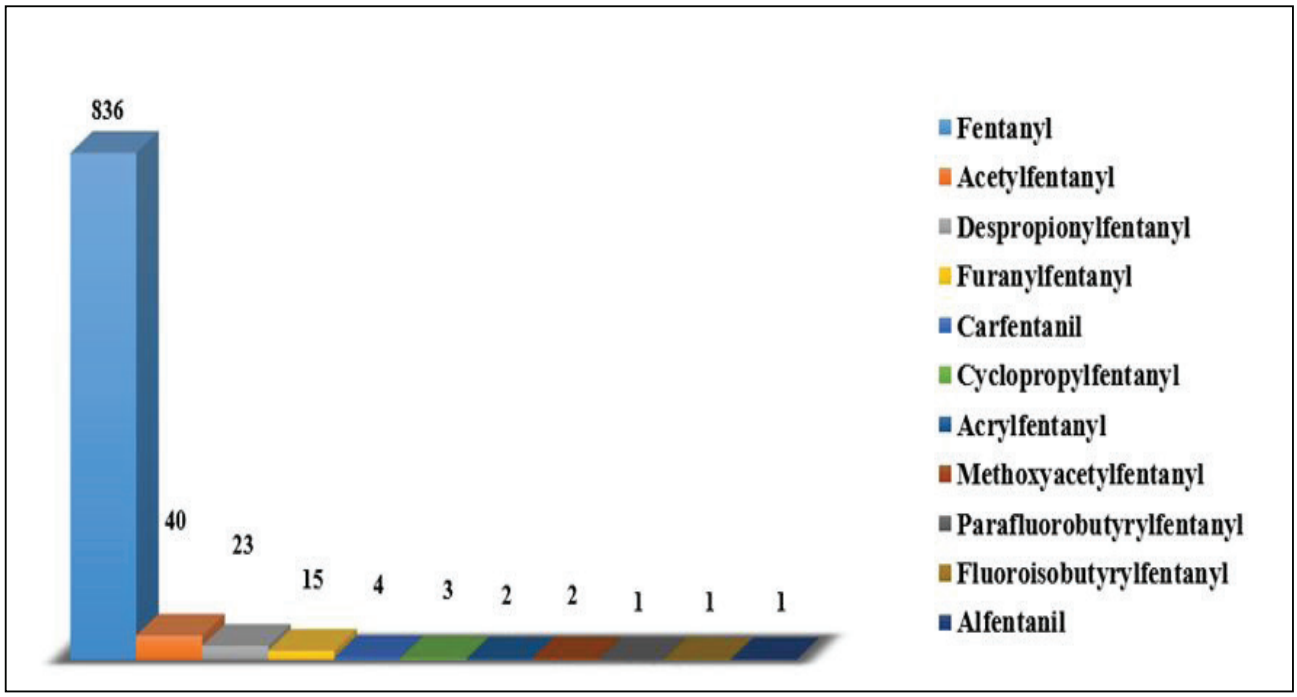
Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 21. PROPORTION OF DRUG-CAUSED DEATHS INVOLVING ANY FENTANYL-RELATED SUBSTANCES BY COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

(U) FIGURE 22. THE INCIDENCE OF FENTANYL-RELATED SUBSTANCES ANALOGS IN DRUG CAUSED DEATHS.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

OUTLOOK

These analyses have served to reinforce how firmly entrenched methamphetamine has become as an abusive drug of choice in the Western United States. The rate of methamphetamine abuse in the greater Los Angeles area and California's Inland Empire represents an unfortunate resurgence of the drug in this market to levels observed during the previous decade. Stimulants such as methamphetamine and cocaine continue to play an outsized role in the abuse pattern within the corridor. The plentiful supply of methamphetamine in the Southern California trafficking hub and attendant markets, such as the Hawaiian Islands, no doubt plays a role in these levels. CDC data has also suggested for many years that users in the nation's Western areas have a different relationship to both illicit and licit opioids than those in the Midwest and Northeast. Even if drug-caused death rates in the AOR remain far below those East of the Mississippi, the increase in the prevalence of fentanyl-related substances within these cases is alarming. It remains likely rates will worsen in the near term as Mexican transnational criminal organizations emphasize the integration of fentanyl into the counterfeit and diverted pharmaceutical market. Counties with relatively low rates of drug-caused deaths historically, such as Santa Barbara, have already exhibited vulnerability to the ongoing threat posed by illicitly manufactured synthetics.

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[1] DEA Intelligence Brief: Fentanyl remains the most significant synthetic opioid threat and poses the greatest threat to the opioid user market in the Unites States. DEA-DCT-DIB-003-18

[2] DEA Intelligence Brief: National Fentanyl Crisis Intensifies as Mexico-based TCOs Exploit Southern CA Trafficking Hub. DEA-DCT-DIB-001-19

[3] Scholl L., Seth P., Kariisa M., Wilson N., Baldwin G. Drug and Opioid-Involved Overdose Deaths – United States, 2013-2017. *Morbidity and Mortality Weekly Report 2019*; 67:1,419–1,427. DOI: http://dx.doi.org/10.15585/mmwr.mm675152e1

[4] DEA Intelligence Report: Drug-Caused Deaths in the Los Angeles Field Division Area of Responsibility (2005-2010). DEA-DCT-DIR-010-13.

[5] DEA Intelligence Report: Drug-Related Deaths in the Los Angeles Field Division Area of Responsibility (2005-2006). DEA-08024

[6] https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

[7] https://www.cdc./drugoverdose/data/statedeaths.html

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[12] Robinson, R. County Coroners and Their Role in the Heart of the Opioid Epidemic. *Academic Forensic Pathology.* 2017; 7(1): 80-86. DOI: https://doi.org/10.23907/2017.009

[13] Morgan, S. P, & Teachman, J.D. (1988). Logistic regression: Description, examples, and comparisons. Journal of Marriage and the Family; 50: 929-936.

APPENDIX A

Drug	Drug Category	% of Cases in which category detected
Cathinone Cocaine mCPP Methamphetamine	Illicit Stimulant	47.7%
Acetylfentanyl Acrylfentanyl Alfentanil Carfentanil Cyclopropylfentanyl Despropionylfentanyl Fentanyl Fluoroisobutyrylfentanyl Furanylfentanyl Heroin/Morphine Methoxyacetylfentanyl Parafluorobutyrylfentanyl U-47700 U-49900	Illicit Opioid	39.4%
Codeine Dihydrocodeine Hydrocodone Hydromorphone Levorphanol Meperidine Methadone Oxycodone Oxymorphone Pentazocine Propoxyphene Tapentadol Thebaine Tramadol	Licit Opioid	37.7%

APPENDIX A (CONTINUED)

Drug	Drug Category	% of Cases in which category detected
Albuterol Amantadine Amiodarone Amlodipine Amphetamine Aripiprazole Asenapine Atenolol Atomoxetine Atracurium Atropine Azithromycin Baclofen Benztropine Bupivacaine Buprenorphine Buspirone Butabarbital Butalbital Caffeine Carbamazepine Carisoprodol Chloroquine Chlorpromazine Chlorzoxazone Clobazam Clonidine Clozapine Cyclobenzaprine Dextromethorphan Dicyclomine Digoxin Diltiazem Donepezil Drostanolone Ephedrine Eszopiclone Etizolam Etodolac Etomidate	Other Drugs Outside the 5 Most Commonly Detected Licit Categories	31.1%

APPENDIX A (CONTINUED)

Drug	Drug Category	% of Cases in which category detected
Ezetimibe Flecainide Fluconazole Fluphenazine Fluticasone Furosemide Gabapentin Gemfibrozil Glipizide Guaifenesin Haloperidol Hydralazine Hydrochlorothiazide Iloperidone Isoflurane Ketorolac Lacosamide Lamotrigine Levamisole Levetiracetam Lidocaine Lisinopril Lithium Loperamide Loxapine Lurasidone Meloxicam Memantine Mepivacaine Mesoridazine Metaxalone Metformin Methocarbamol Methylphenidate Metoclopramide Metoprolol Metronidazole Modafinil Mycophenolic Acid	Other Drugs Outside the 5 Most Commonly Detected Licit Categories	31.1%

APPENDIX A (CONTINUED)

Drug	Drug Category	% of Cases in which category detected
Naloxone Naltrexone Nandrolone Naproxen Nevirapine Nicardipine Nifedipine Olanzapine Omeprazole Ondansetron Orphenadrine Oxcarbazepine Oxybutynin Paliperidone Papaverine Pentobarbital Pentoxifylline Phendimetrazine Phenethylamine Phenmetrazine Phenobarbital Phentermine Phenylephrine Phenylpropanolamine Phenytoin Piperazine Pramoxine Prazosin Prednisone Pregabalin Primidone Procaine Prochlorperazine Propofol Propranolol	Other Drugs Outside the 5 Most Commonly Detected Licit Categories	31.1%

APPENDIX A (CONTINUED)

Drug	Drug Category	% of Cases in which category detected
Pseudoephedrine Pyrovalerone Quetiapine Quinidine Quinine Risperidone Ropinirole Secobarbital Sevoflurane Sildenafil Stanozolol Sulfamethoxazole-Trimethoprim Sumatriptan Tacrolimus Tadalafil Tamoxifen Terazosin Testosterone Theophylline Thioridazine Thiothixene Ticlopidine Tizanidine Topiramate Trihexyphenidyl Trimethobenzamide Trimethoprim Valproic Acid Valsartan Vecuronium Verapamil Warfarin Zaleplon Ziprasidone Zolpidem Zonisamide Zopiclone	Other Drugs Outside the 5 Most Commonly Detected Licit Categories	31.1%

APPENDIX A (CONTINUED)

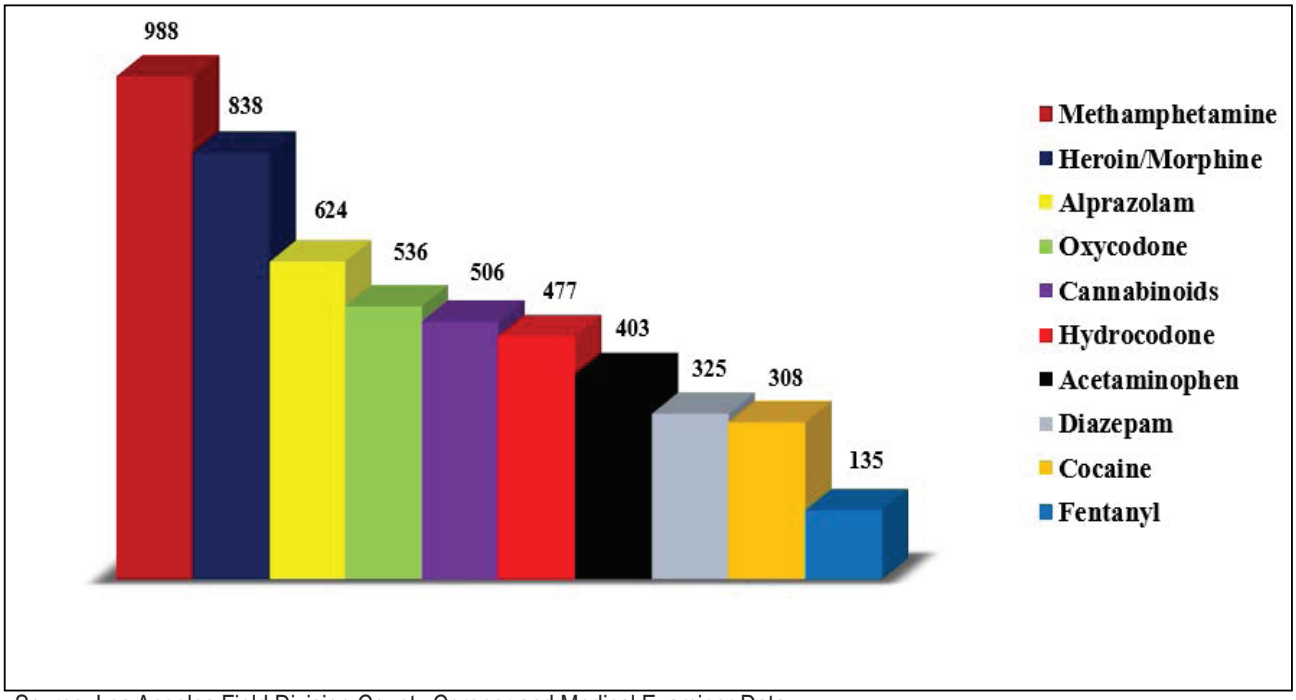
Drug	Drug Category	% of Cases in which category detected
Alprazolam Bromazepam Chlordiazepoxide Clonazepam Cloxazolam Delorazepam Demoxepam Diazepam Diclazepam Estazolam Flubromazepam Flunitrazepam Flurazepam Lorazepam Midazolam Oxazepam Phenazepam Temazepam Triazolam	Benzodiazepine	30.5%
Amitriptyline Amoxapine Bupropion Citalopram Clomipramine Desipramine Dothiepin Doxepin Duloxetine Fluoxetine Fluvoxamine Imipramine Milnacipran Mirtazapine Nortriptyline Paroxetine Protriptyline Selegiline Sertraline Trazodone Venlafaxine Vilazodone Vortioxetine	Antidepressant	21.8%

APPENDIX A (CONTINUED)

Drug	Drug Category	% of Cases in which category detected
Cannabinoids Dimethyltryptamine Ketamine MDMA Mitragynine Phencyclidine Tenocyclidine	Hallucinogen	13.6%
Brompheniramine Buclizine Cetirizine Chlorcyclizine Chlorpheniramine Cimetidine Clemastine Cyproheptadine Diphenhydramine Doxylamine Hydroxyzine Loratadine Meclizine Pheniramine Promethazine Pyrilamine Triprolidine	Antihistamine	13.3%
Acetaminophen Ibuprofen Metamizole Salicylate Salicylic Acid	Non-Opioid Analgesic	10.1%
GHB Methaqualone	Illicit Depressant	0.4%
25C-NBOMe 25-NBOMe 5F-ADB 5-MeO-DALT AB-CHMINACA AB-PINACA Alpha-PVP AM-2201 Ethylone TFMPP UR-144 XLR-11	New Psychoactive Substance	0.1%

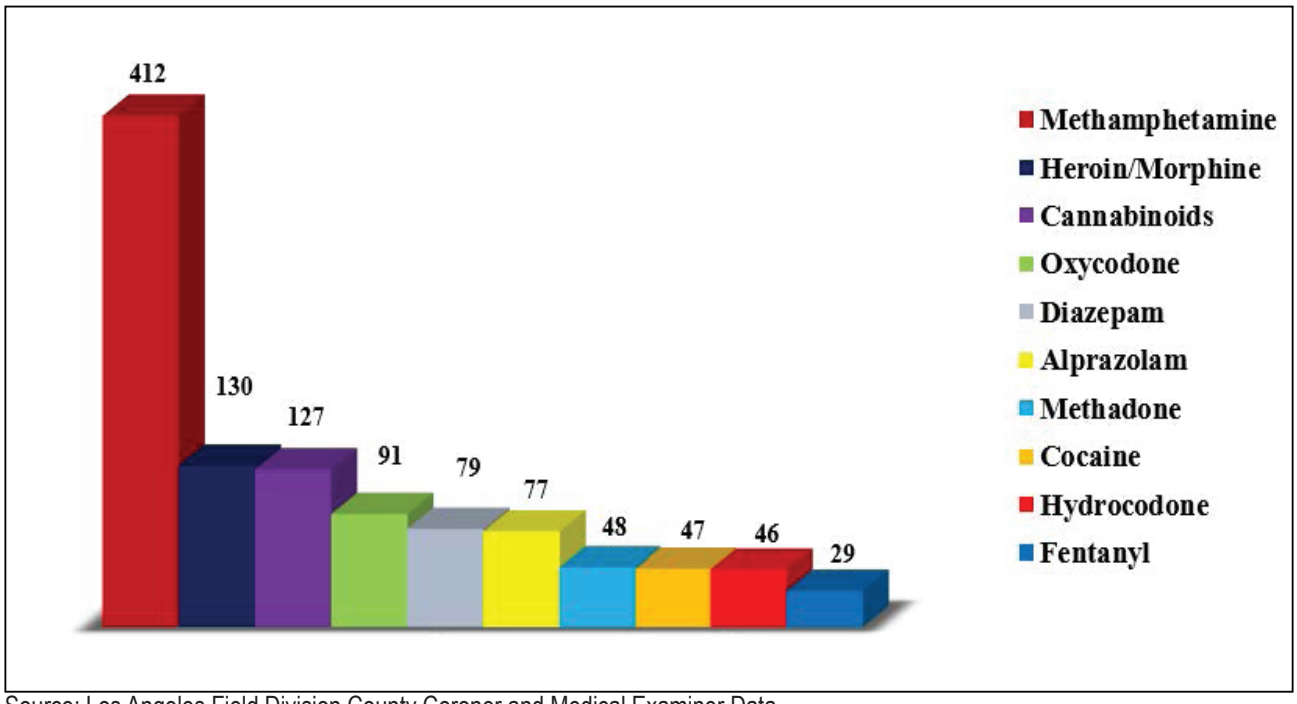
APPENDIX B

(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN CLARK COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

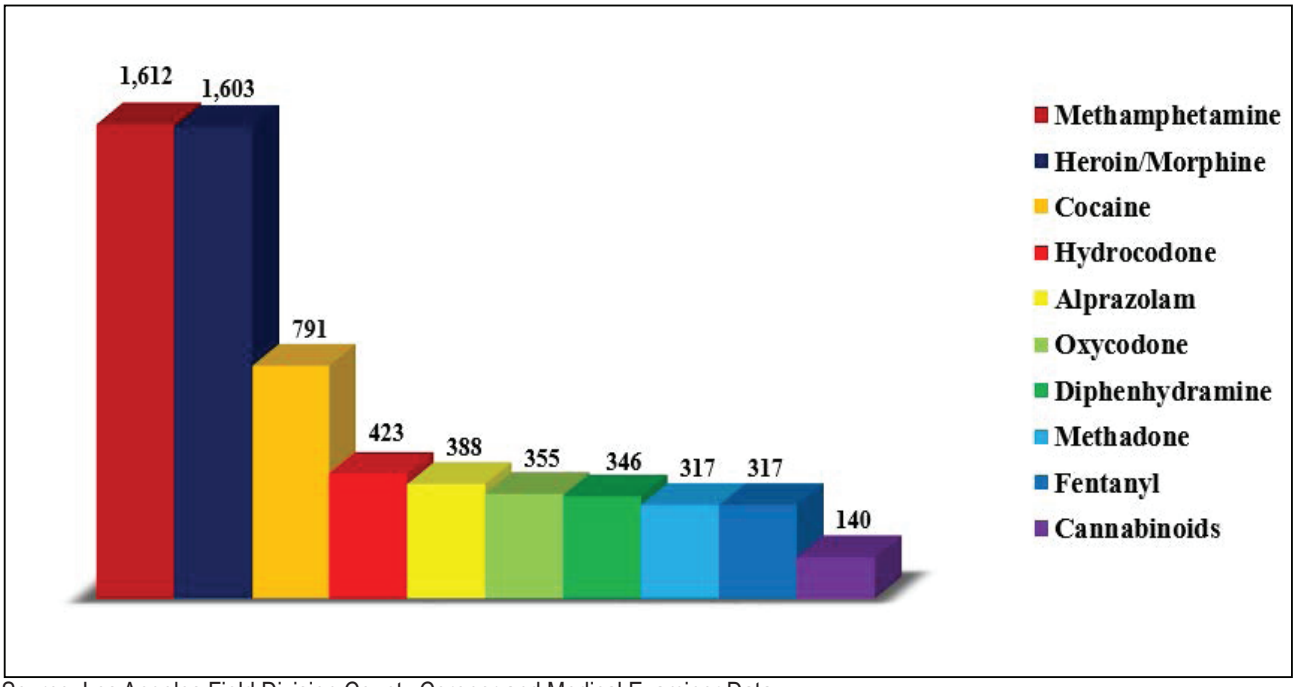
(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN HONOLULU COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

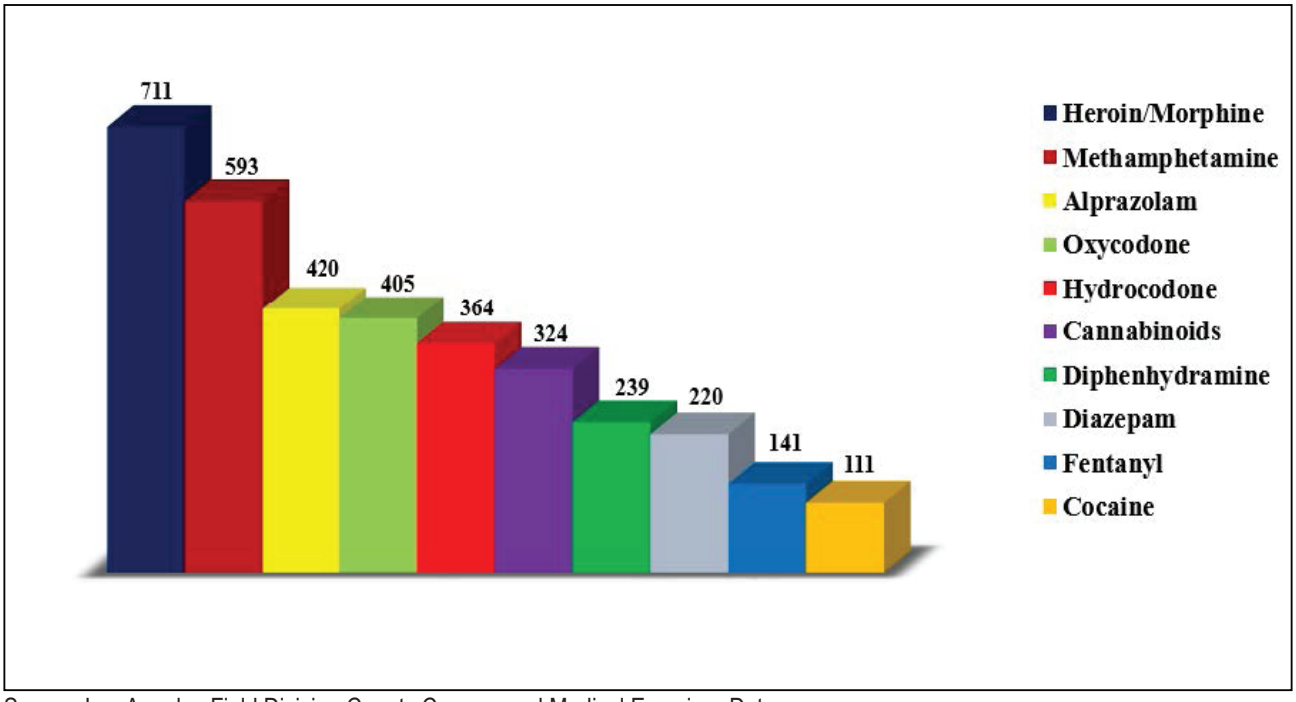
APPENDIX B (CONTINUED)

(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN LOS ANGELES COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

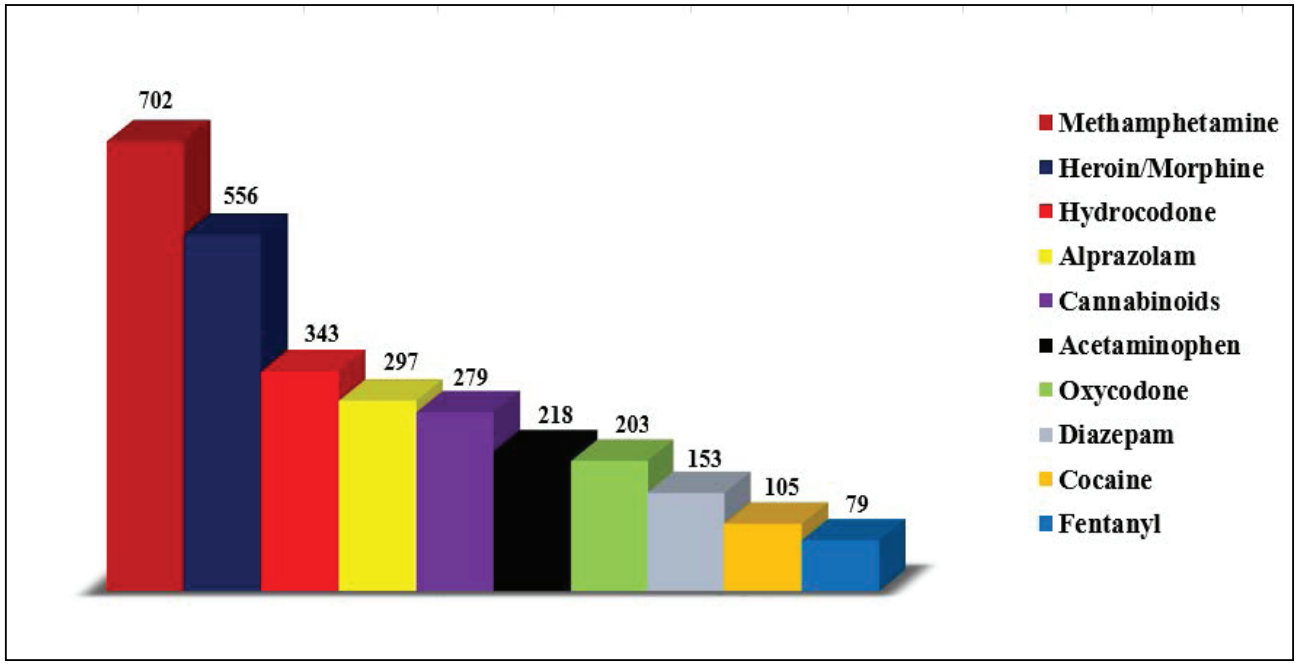
(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN ORANGE COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

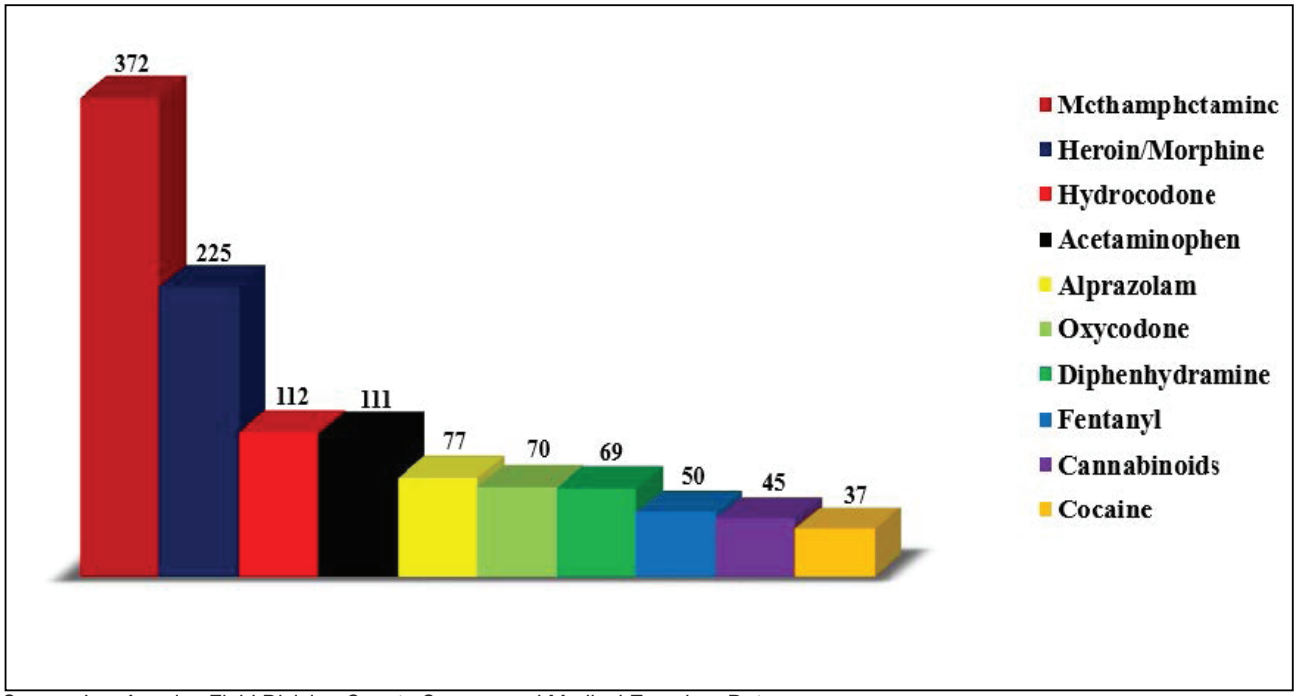
APPENDIX B (CONTINUED)

(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN RIVERSIDE COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

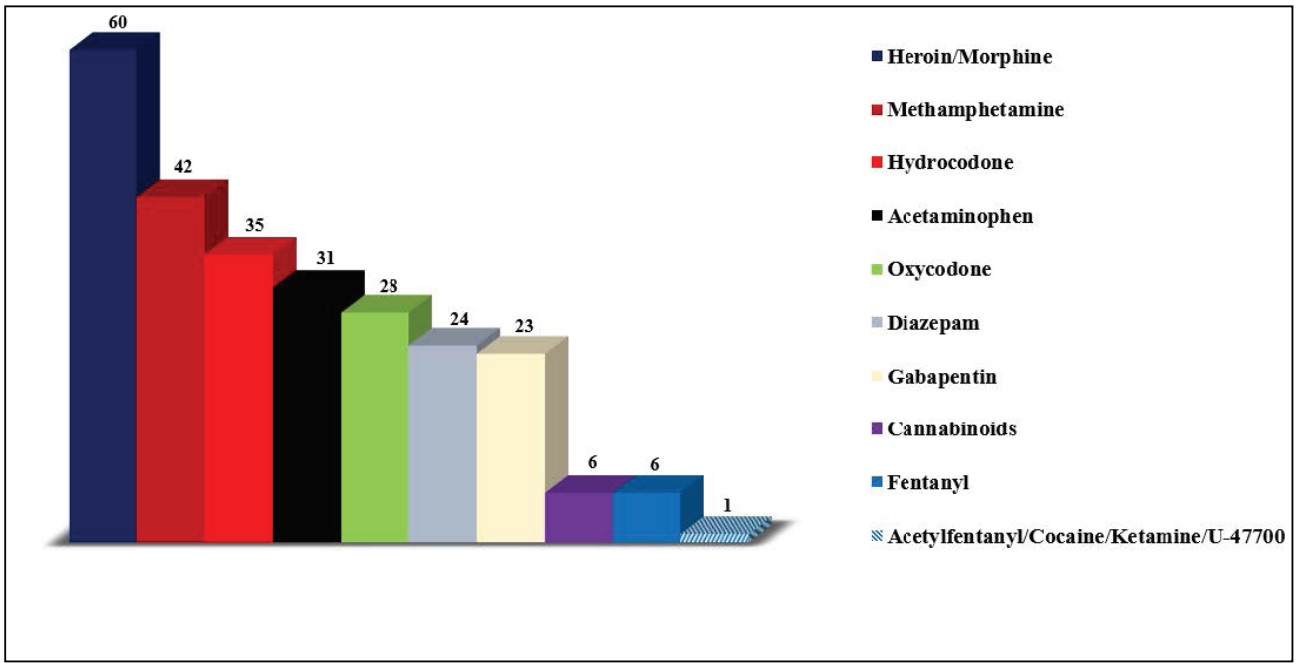
(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN SAN BERNARDINO COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

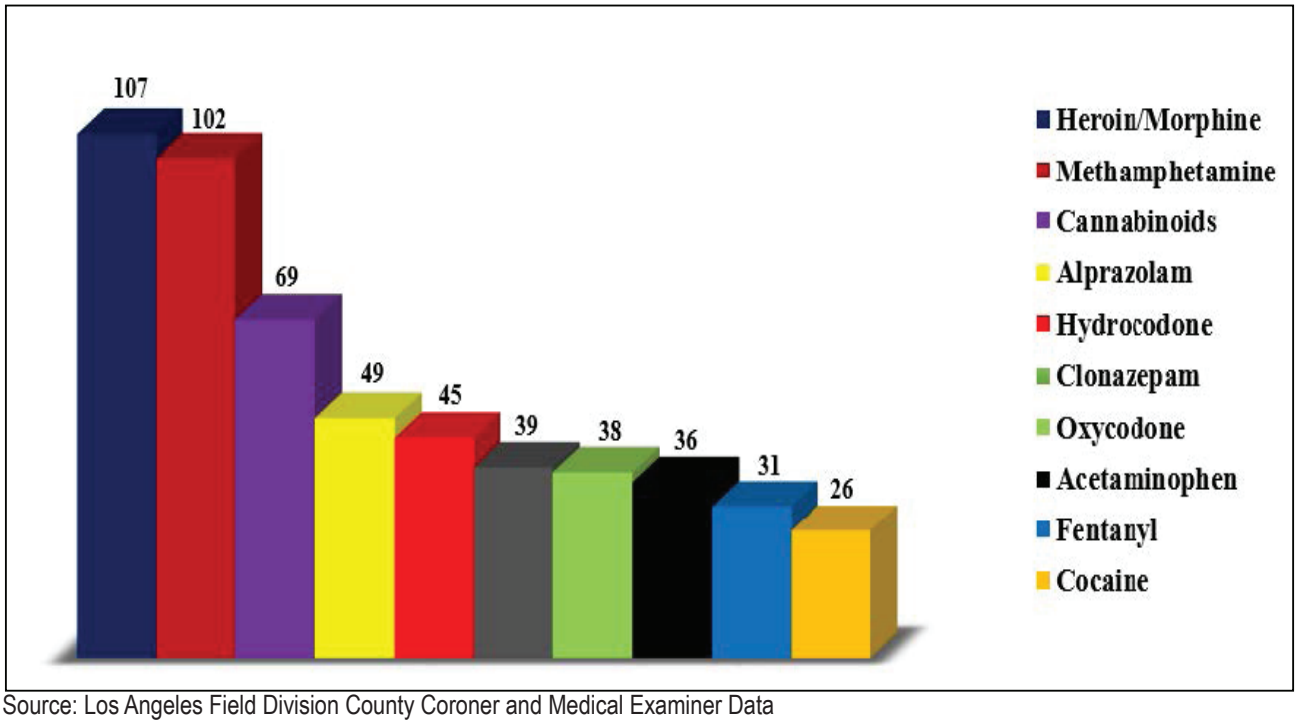
APPENDIX B (CONTINUED)

(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN SAN LUIS OBISPO COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

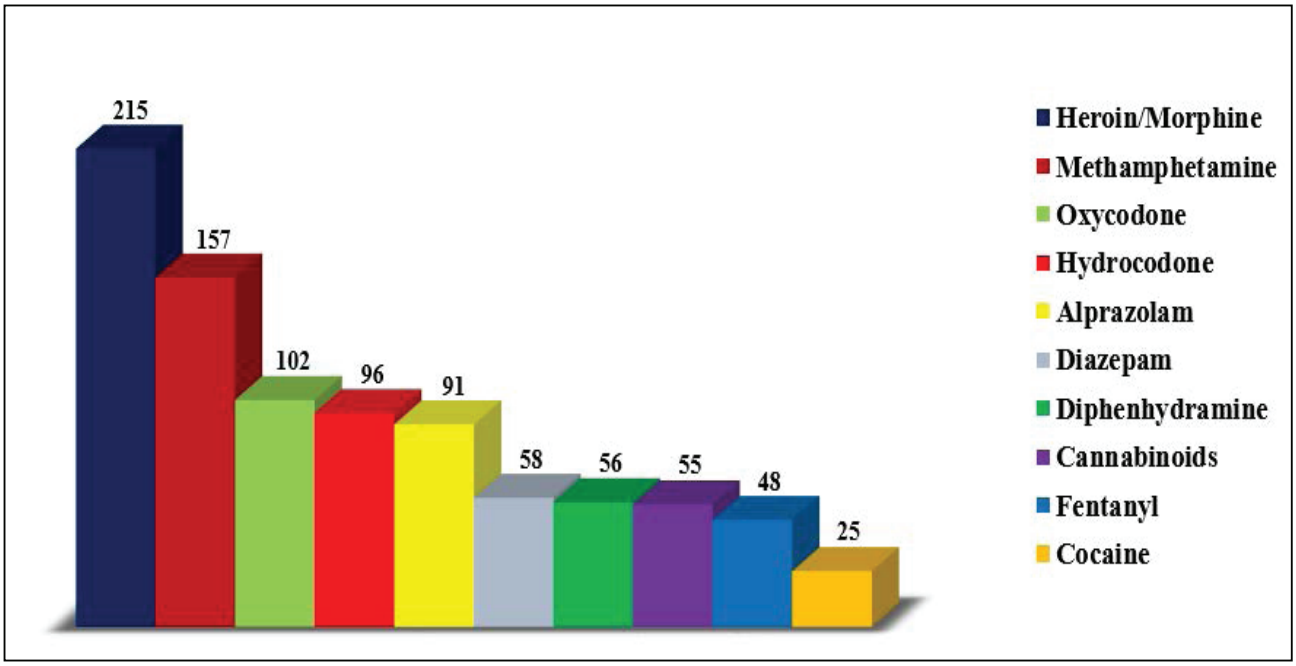
(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN SANTA BARBARA COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

APPENDIX B (CONTINUED)

(U) THE FIVE MOST FREQUENTLY DETECTED LICIT AND ILLICIT DRUGS IN VENTURA COUNTY.



Source: Los Angeles Field Division County Coroner and Medical Examiner Data

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