County of San Diego

Department of the Medical Examiner

2016 Annual Report

Dr. Glenn Wagner
Chief Medical Examiner

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EXECUTIVE SUMMARY

Welcome to the 2016 San Diego County Medical Examiner's Department Annual Report. The statistics and scope of activities reflect ever-changing patterns of disease and trauma in public health and safety within our community. The scope of activities of the Medical Examiner's Department is largely based on Government Code 27491 which states that all unnatural deaths including homicides, suicides, accidents, and deaths in custody are, by definition, coroner/medical examiner cases, as well as infectious diseases reaching epidemic proportions, deaths in state or local institutions, and deaths believed to be natural but sudden and unexpected where the decedent has not seen their health care provider in the last 20 days of life. With San Diego County's land area of 4,261 square miles, 86 miles of border, 70 miles of coastline, a diverse geography including deserts, mountains, forests, mesas and coastal areas, and an equally diverse population of some 3.2 million, with between 19,000-21,000 deaths recorded each year, the Medical Examiner's Department investigates some 8,500 cases annually, or approximately 700 cases/month.

Not all of those cases are brought to the department's 45,000 square foot facility at the County's Operations Center in Kearny Mesa. Approximately 5,400 cases reported and investigated by the Medical Examiner's Department each year are ultimately waived as sudden unexpected natural deaths. In these cases, the decedent's healthcare provider signs the death certificate. Another 3,000 cases are brought to the facility each year for further evaluation. This annual breakdown has been relatively consistent. In 2016, the 3,070 cases for which we took jurisdiction included 33 percent natural deaths (heart attacks, cancer, diabetes mellitus, strokes, liver and kidney failure), 47 percent accidents (prescription drug, motor vehicle, industrial/agriculture, home-based), 14 percent suicides, 4.1 percent homicides and 1.7 percent undetermined. These percentages are very similar to those in 2015 and prior years.

Unintentional drug, medication, and alcohol deaths continued to pose an issue in 2016. In general, prescription medications can kill either when taken in excess, or when taken appropriately but in combination with other, similar-acting medications. Two-thirds of unintentional medication-related fatalities were caused by a mixture of more than one medication. Opiates and/or benzodiazepines accounted for 89 percent of deaths related to medications. Opiates made up approximately two-thirds of unintentional overdose deaths caused by a single medication. Notable trends in 2016 included a continued increase in methamphetamine-related deaths  [1] and homicides  . Suicides  ,

[1] Sparklines represent previous 10 years of data (2007-2016). High and low years are marked in red. Each is linked to its corresponding complete graph in the Data section.

unintentional prescription medication-related fatalities  , and motor vehicle deaths  remained relatively unchanged. Pedestrian fatalities increased from 93 to 101  , reaching an all-time high.

Largely based on its geographic position and diverse population, the Medical Examiner's Department investigates the deaths of some 200-300 John and Jane Does. These cases often represent a population composed of immigrants living in the country without legal permission, homeless individuals, and those living under an alias. Some simply died without identification. Using photographs, fingerprints, dental records, general X-ray comparison, personal effects, and DNA testing, the nationally acclaimed John/Jane Doe Center identifies approximately 97 percent of cases sent its way. The Medical Examiner's Bereavement Center, also nationally acclaimed, brings together a large number of community resources to assist the families of decedents.

It is the intent of the Medical Examiner's Department to be more than the "County Morgue," by developing as much information on every case as resources permit and studying those cases in cohorts that reflect or are likely to reflect changing patterns important to public health and safety as well as risk factors for premature deaths. Current case categories or cohorts of study include child fatalities including SIDS, elder abuse, domestic violence, prescription drug abuse, repetitive brain injuries, sudden unexpected death associated with epilepsy, schizophrenia and bipolar disorders, Alzheimer's, dementia, and autism, and suicides.

The Medical Examiner's Department is a popular rotation for medical students, including those studying allopathic (MD) and osteopathic (DO) medical degrees. The rotation provides a strong clinicopathology correlation for their clinical studies. The department also continues to train pathology residents from UC San Diego School of Medicine and Naval Medical Center San Diego (Balboa Hospital), as well as forensic fellows in the Accreditation Council for Graduate Medical Education (ACGME) accredited program.

Research efforts continue to grow with staff-written publications in the toxicology, SIDS and child fatality areas. The Medical Examiner's Department is also currently engaged with Scripps Translational Science Institute in a multi-year study of molecular forensics, in which we are exploring the genetic markers of sudden unexpected cardiovascular deaths.

The dead do have a story to tell – not only of death but of life – and we, the living, have an obligation to listen to that story and perhaps, just perhaps, learn something about ourselves and our community.

Glenn N. Wagner, D.O.

Chief Medical Examiner

OVERVIEW AND INTRODUCTION

This Annual Report is a summary of the activities of the San Diego County Medical Examiner for the calendar year 2016. It is designed to provide an overview of victim characteristics, as well as the frequency, cause and location of deaths in the county using graphs, charts, maps, and tables. In addition, we highlight some of the many activities we participate in to give back to the community and to keep our stakeholders informed. A goal of this report is to describe in detail many aspects of our mandated day-to-day activities in order to shed some light on what is often misunderstood and shrouded in misperception: the functions and responsibilities of the San Diego County Medical Examiner.

The report is divided into three major sections:

1. Introduction and overview,
2. The **activities** of the Medical Examiner Department, and
3. The **data** describing the types of deaths investigated by the Medical Examiner in San Diego County.

DEDICATION, MISSION, AND VISION

DEDICATION

Although this report deals with aggregate numbers and statistics, every case represents an individual's death, mourned by family and loved ones. This report and the work that is summarized are dedicated to those we serve: to the persons, living and deceased, who have passed through our doors, to their families, and to the people of the County of San Diego.

MISSION

Our mission is to promote safe communities by certifying the cause and manner of death for all homicides, suicides, accidents and sudden/unexpected natural deaths in San Diego County. In addition, our mission is to provide related forensic services, assistance and education to families of the deceased, as well as to public and private agencies, in a professional and timely manner.

VISION

We are committed to working as a team to meet the needs and expectations of our customers by fulfilling our mandated mission in a professional, compassionate, ethical, and timely manner.

POPULATION AND GEOGRAPHY OF SAN DIEGO COUNTY

The County of San Diego's population is the fifth largest in the United States and the second largest in California. Our population is greater than 20 of the 50 states. We are home to 1 percent of the nation's population and 8 percent of California's population. The total county population is currently estimated at 3,288,612. Nearly half of our residents live within the city of San Diego, with the remainder in smaller cities and towns, reservations, or unincorporated areas. Most of the urban regions are concentrated along the coast and freeway corridors, while there are many rural areas and large expanses of undeveloped open terrain in the eastern portions of the county.

San Diego County is unique in its geographic diversity. Our 4,261 square miles include 75 miles of coastline and 86 miles of the U.S.-Mexico international border. The county's topography ranges dramatically from forested mountains, to deserts, beaches, bays, wetlands, rivers, lakes, canyons, and mesas. These natural features play an important role in understanding the variety and range of sudden and unexpected deaths in our community.

The county is also home to numerous microclimates. Overall, we have an average annual high temperature of 70°F, and average daily temperature of 64°F. While coastal areas experience some of the mildest climates in the continental United States, inland areas experience more variety: in the summer, some areas see temperatures above 100°F, and in the winter, temperatures may fall well below freezing.

The San Diego County Medical Examiner deals with many deaths of the types expected in any jurisdiction with a large urban and rural population, such deaths due to motor vehicle accidents, natural causes, alcohol or drug-related causes, or homicidal violence. In addition, the

great variety of terrain, microclimates, and geography result in an even wider range of cases seen at our office, including deaths from exposure to hot and cold environmental conditions. San Diego County also has a large homeless population; the deaths of these individuals are often linked to drug or alcohol use violence, or untreated natural disease. Deaths of homeless individuals represent a significant portion of the cases seen by this office.

Temperature extremes, in combination with the rugged terrain of many inland areas, are strongly tied to the deaths of undocumented persons crossing the U.S.-Mexico Border. Elevated temperatures may lead to dehydration or hyperthermia; low temperatures may lead to hypothermia; and in any season, the terrain may lead to exhaustion, getting lost, or death from the exacerbation of existing natural disease. Proximity to the international border also increases the volume of case investigations as people injured or ill in Mexico are sometimes transferred to hospitals in the U.S. where they nevertheless die.

Drownings can occur in our oceans, lakes, rivers or swimming pools. In addition to swimmers, drownings may involve scuba divers, people trapped in flooding waters, or those involved in boating accidents. Because of our thriving seaport, the Medical Examiner may also have jurisdiction on deaths occurring on a boat or ship at sea stopping in San Diego. Deaths involving attacks by marine life do occur (i.e. sharks), but are extremely rare, averaging less than one every 20 years.

Deaths due to falls most commonly occur from injuries in the home, but may occur in urban areas from buildings, in the workplace, from our local bridges, or from mountain and beach cliffs. Cliff collapses have contributed to deaths as well.

The variety presented by our unique environment is ever-growing and always challenging. The size of our jurisdiction, and its numerous remote areas, can be an obstacle for responding to a death scene and retrieving remains, much less providing a thorough death investigation. Nonetheless, your San Diego Medical Examiner's Office rises to that challenge.

DEATHS WE INVESTIGATE

Under California law, the Medical Examiner is both required and empowered to determine the cause and circumstance (manner) of certain deaths. For additional details, see Government Code Section 27491 and the Health and Safety Code 102850. In general, deaths of a sudden and unexpected nature and those related to any type of injury or intoxication must be reported to the Medical Examiner and investigated by our office. These include deaths that are obviously due to trauma (such as motor vehicle-related fatalities) and deaths known or suspected to be due to drug or alcohol intoxication. In addition, if an injury or intoxication is known to *contribute* to the death - even in a small way - or is even merely suspected to have contributed to death, the death falls under our jurisdiction. This applies when an individual dies of complications of a prior injury, even if that injury occurred many years prior to the death.

Each death is assigned a Medical Examiner Investigator, who will generally go to the location of the death, interview family and friends, and obtain medical records. The investigator then provides a synopsis of the circumstances surrounding the death. In the majority of cases, a postmortem examination (autopsy) is conducted by a Medical Examiner's physician specializing in forensic pathology in order to determine the cause of death. A California State death certificate is also completed. This examination normally occurs within three days of our receipt of the decedent's body, but usually the next day. Our forensic pathologist staff will assess whether an autopsy and/or laboratory tests are required as part of the examination. Autopsies are required in approximately 75 percent of the cases we examine. In the others, an examination of only the external surfaces of the body is performed and the death can be certified based upon investigation and review of the medical history. If we do not require an autopsy for our official purposes, the legal next-of-kin may request that we perform one at his/her expense.

We constantly try to accommodate all the wishes of family members and the decedent, but occasionally the circumstances of the death necessitate that an autopsy be performed despite the oppositions of the family or the decedent. Common reasons include the involvement of a law enforcement agency, mandates specified by California Law, and our legal obligation to investigate deaths under our jurisdiction.

HISTORY

The San Diego County Medical Examiner's Office was established as the County Coroner with the creation of the County in 1850. San Diego's first coroner was John Brown. Over the years, a total of 27 different coroners led the department, until the County converted to a Medical Examiner system in 1990. One major difference between the two systems is that a Medical Examiner must be a physician, and specifically a forensic pathologist, while a coroner can be a layperson and is traditionally elected. In California, most Counties operate under Sheriff-Coroner systems. Despite being a stand-alone department within the County, we are an active partner with all of the law enforcement agencies serving the San Diego community, including the District Attorney, Public Defender, San Diego Sheriff's Department, San Diego Police Department, and each of the other local law enforcement agencies.

For the first 100 years of our existence, we performed the administrative aspects of the department in what was then the County courthouse and various offices downtown (including the Spreckels Building and the Land Title Building, which is now where the NBC Building stands). We performed examinations at various local mortuaries. Then on April 1, 1957, all functions consolidated under one roof at a no longer standing facility at 3322 Congress Street in Old Town, close to the current Old Town Transit station. Our first toxicology laboratory became operational the following year.

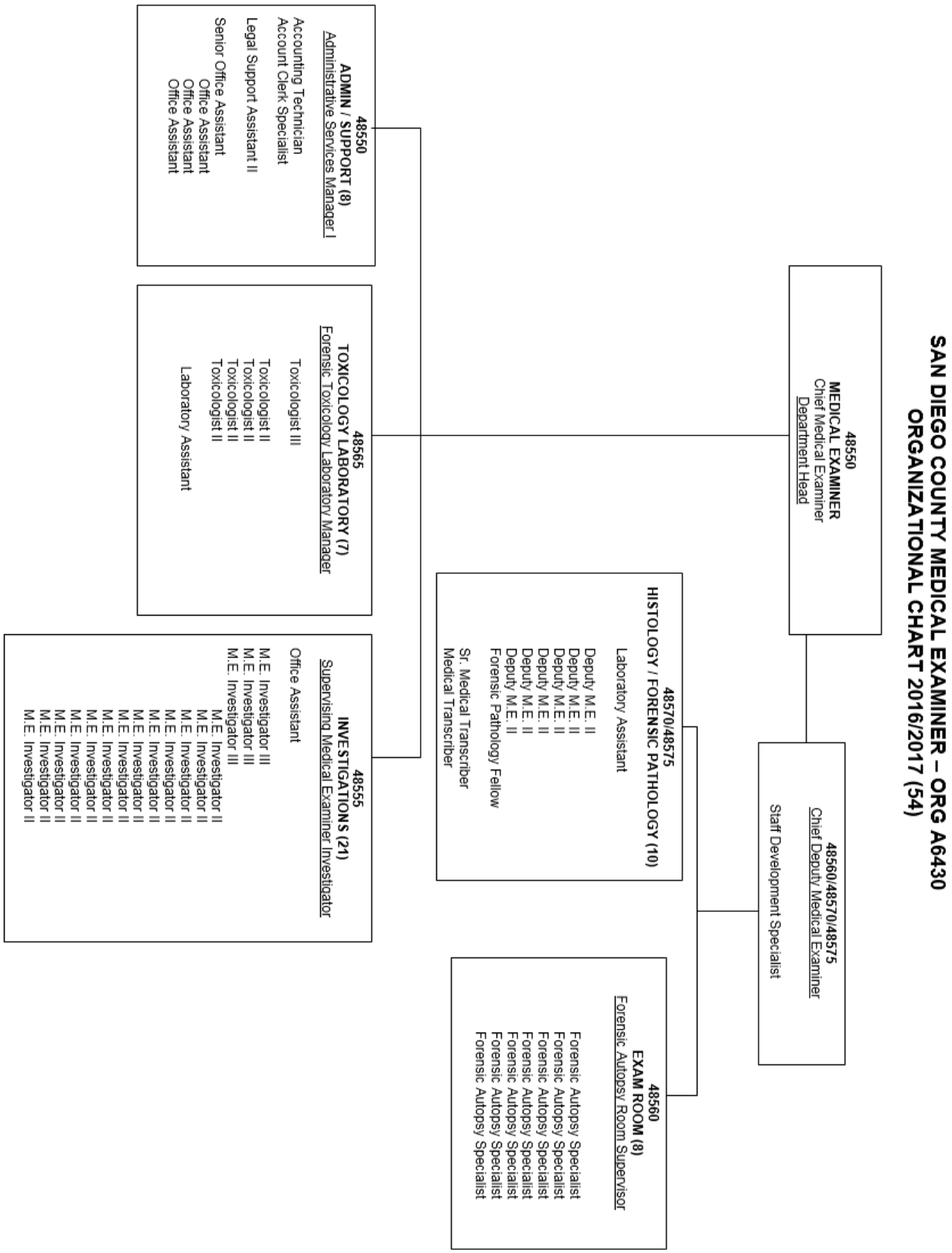
1963

2009

In October 1963, we moved into Building 14 at the current County Operations Center (COC) in Kearny Mesa. We remained there for the next 46 years, undergoing several expansions.

In December 2009, we moved into our state-of-the-art facility at the COC, more than tripling our space and capacity for future growth.

ORGANIZATIONAL CHART

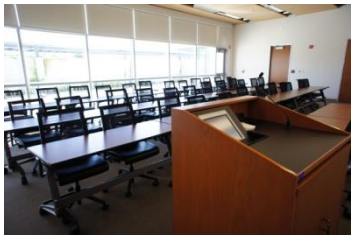


MEDICAL EXAMINER FACILITY

In December of 2009, we moved into our facility at 5570 Overland Avenue, Suite 101, in Kearny Mesa. It is the third building that has housed the operations of the Medical Examiner's Department since 1957. The building was part of first phase of a larger project to redesign and update the entire County Operations Center. It is a two-story building encompassing 83,000 square feet, tripling our office space and storage capacity, and giving us the capability to handle certain types of mass casualty incidents on-site. Although we are the largest tenant of the building, we share the building with the Department of Environmental Health.

We proudly achieved a LEED (Leadership in Energy and Environmental Design) Silver certification. This rating is based on an evaluation of the environmental performance of the building over its life cycle and emphasizes the County's commitment to the environment. Among the building's features are its extensive natural light, most notably in the examination areas where a bright, naturally lit area is essential to detailed forensic procedures.

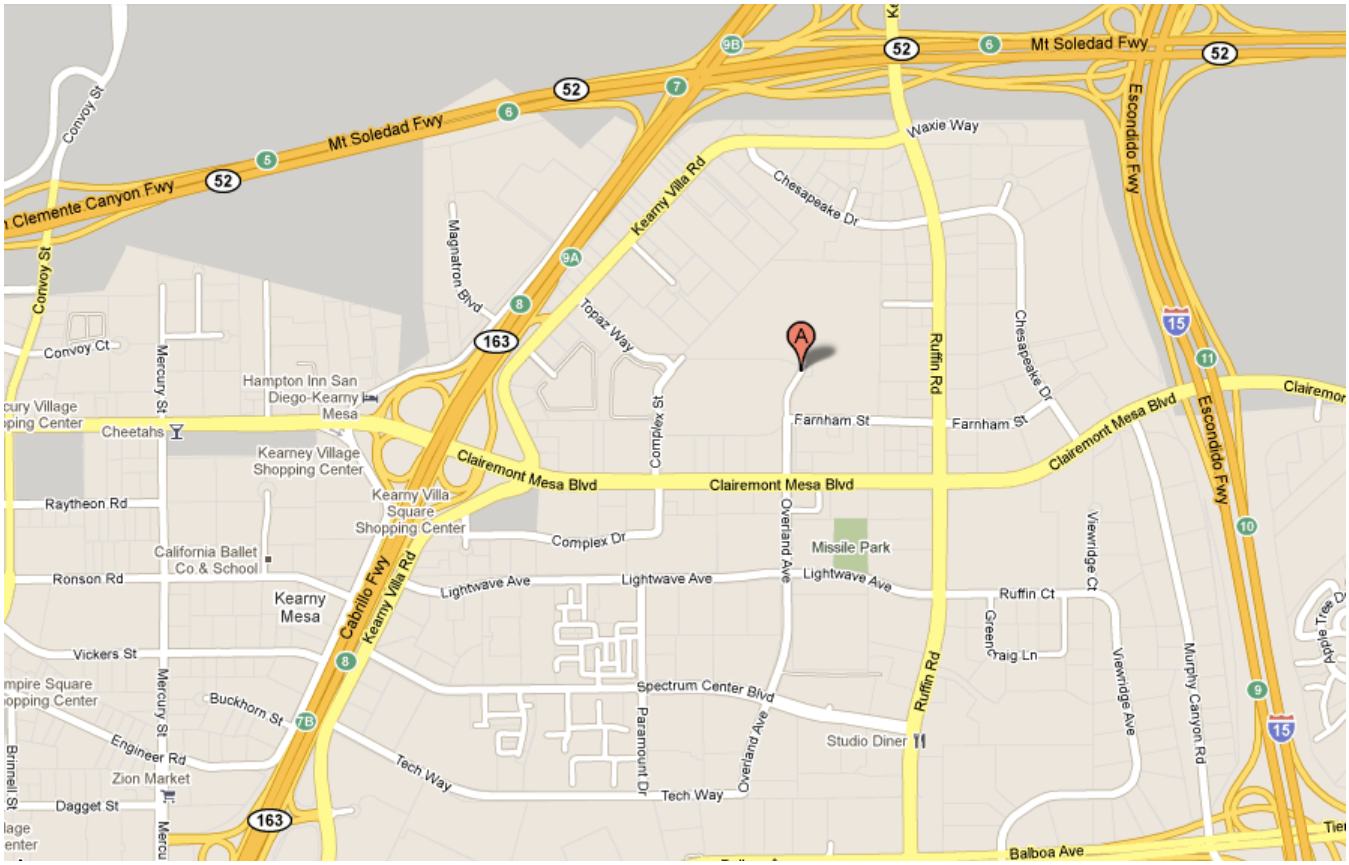
In addition to an upgraded work environment, our facility includes several shared conference rooms equipped with the latest audio-visual technology, advanced instrumentation in the toxicology laboratory allowing for additional methodologies, and a combination fluoroscope and digital X-ray system with 3-dimensional reconstruction and vascular imaging capability. These advances, among others, are part of the overall strategy to develop a viable regional forensic science complex with the capabilities to address the anticipated county needs for the next several decades.



HOURS AND LOCATION

The Medical Examiner Department is located at the County Operations Center in the Kearny Mesa neighborhood of San Diego at:

5570 Overland Ave.
Suite 101
San Diego, CA 92123



We conduct operations year-round, 24-hours a day, and are open to the public on weekdays 8 a.m. to 5 p.m.. Our main telephone number is 858-694-2895 and website is sandiegocounty.gov/content/sdc/me.html.

ACTIVITIES OF THE MEDICAL EXAMINER

In the “Activities” section of the report, we discuss the general process of death investigation. This begins with the examination of the death scene, continues with the certification of death, and can include other non-mandated activities in which the Medical Examiner is involved.

In addition to death investigations, the Medical Examiner conducts or participates in numerous activities that support our own mission as well as those of other local, state, and federal agencies and institutions. This work includes distributing reports, sharing data, teaching various groups, providing training, working to identify unknown deceased individuals, providing legal testimony, participating in research, and providing court testimony, among others. This section will discuss each of these activities and more to show the impressive span of work our office covers, especially for such a small department.

INVESTIGATIONS

Medico-legal investigations are completed in a professional, ethical and timely manner and are geared to assist in the determination of the cause and manner of death. This is accomplished through continuous cooperation with law enforcement agencies, health care professionals and the public.

The initial phase of an investigation typically starts with a report of death. In 2016, Investigators processed 8,419 reports of death. In 5,349 (66 percent) of these cases, after undergoing a methodical and structured process of review to ensure they did not fall under the criteria of California Government Code 27491 requiring further investigation, we waived jurisdiction to the treating physician so he or she could attest the death certificate. Medical Examiner's Jurisdiction was invoked in the other 3,070 (34 percent) of those reports.

Investigators physically respond to the majority of the death scenes falling into the Medical Examiner Jurisdiction. In 2016, we responded to 2,096 scenes (68 percent). An initial body and scene assessment is completed at the place of death, which can be virtually anywhere in the 4,261 square miles of San Diego County. Photographs are taken and relevant evidence is collected in order to assist in the investigation. The evidence may include weapons, biological specimens, medications, drugs and drug paraphernalia. All investigations are completed using a methodical and systematic approach and all findings are documented in a comprehensive investigative report.

Medical Examiner's investigators next have the difficult task of notifying the next of kin of the death. This process starts with the identification of the decedent – arguably one of the most important duties of our office. Methods for identification include fingerprint and dental comparison, unique skeletal features, DNA analysis, visual comparison and even serial numbers on implanted medical devices. This is a multidisciplinary approach which involves other county agencies. The process continues with a diligent search of the decedent's family, with which the Medical Examiner's Office has a high rate of success. (see John/Jane Doe Center for more information)

Those who die suddenly or unexpectedly often die with valuables – both monetary and sentimental – in their possession. It is extremely important that we ensure that these items make their way to the next of kin. Often, the retention of the decedent's personal property is of the utmost importance to the family. We take this responsibility seriously, accurately tracking and recording the chain of custody until the property is returned to the family.

When a death occurs at home, the person who died may leave behind many medications, many of which are often controlled substances. As part of our investigation, we collect and inventory all of the decedent's prescription medications at the scene. This task serves three functions. First, by inventorying the remaining medications, including dosage and dates, we can gain an understanding as to whether medication overuse or non-compliance occurred. Second, medications can offer clues to an individual's medical or social history, and provide names of prescribing physicians who may know critical information about the person's history. Lastly, we remove medications from the home, eliminating the possibility of inappropriate use by other members of the household (especially children), or the possibility that the medications will become part of illegal trafficking. Medication disposal occurs at regular intervals after a period of secure storage at our offices.

Medical Examiner Investigators also discuss the circumstances of the death with the decedent's family; conduct interviews at the scene; and obtain additional statements from witnesses, the treating physician and responding emergency personnel. They also offer the family free support through our Bereavement Center. Follow-up investigation is required in many cases, and may involve reviewing medical records, police reports and traffic accident reports.

Medical Examiner Investigators are the front line for our office. They are the eyes and ears of the Medical Examiner. Their caring attitudes, compassion, professionalism and objectivity allow our office to conduct thorough, balanced and accurate death investigations while at the same time helping ease the difficulties that families experience during their time of grief.

AUTOPSIES

Nearly 2,000 autopsies are performed each year by the Medical Examiner's pathologists, serving as a critical component used by the Medical Examiner to determine a decedent's cause and manner of death. An autopsy consists of both external and internal examinations of the body. Externally, the condition of the body, evidence of medical intervention, scars, tattoos, injuries, and any other external marks are noted. Internally – through surgical incisions across the chest and abdomen and across the top of the head – the organs of the head, torso, and any other necessary aspects of the body are thoroughly examined, removed, and sectioned, and small tissue samples collected for microscopic examination. During the examination, specimens are collected for toxicological testing. These may include blood, urine, liver, vitreous (eye) fluid, stomach contents, and other tissues or fluids. Sometimes it is necessary to save a whole organ for further examination by a sub-specialist like a neuropathologist or cardiac pathologist. Digital photographs are commonly taken at various points to document certain findings, or, in some cases, a pertinent lack of findings.

A common misconception is that an autopsy will render a body unsuitable for viewing in a funeral after the procedure. This is far from true. In fact, changes made during an autopsy are easily hidden by a mortuary so that the individual can be viewed by loved ones.

In 2016, the Medical Examiner's Department performed autopsies on 1,876 of the 3,070 individuals examined. Of those 1,876 autopsies, 183 were performed by pathology residents, generally from the University of California San Diego Medical Center, or the US Naval Medical Center, San Diego, under the direct supervision of a board-certified pathologist. The remaining 1,193 individuals who were not autopsied had sufficient accompanying medical history and known circumstances to allow certification of death without an autopsy, based on the investigation, external examination of the body, and sometimes review of medical records.

Decedents who do not fall under the Medical Examiner Department's jurisdiction, or for whom an autopsy is not necessary to determine the cause of death, may have an autopsy requested and paid for by the decedent's next of kin. Local hospitals may also request that we perform an autopsy in cases that would not normally require us to take jurisdiction. In 2016, the San Diego County Medical Examiner performed six family-requested autopsies.

It has been said that the body is the only unbiased witness in a death. It is our department's responsibility to hear what that body is saying, so that loved ones can feel a sense of finality,

light is shed on a criminal investigation, and accurate vital statistics can be provided to the community at large.

EXAMINATION ROOM

The examination room at the Medical Examiner's Department is a modern, clean, safe, state-of-the-art facility used to conduct postmortem examinations. The examination room area is where bodies are received, property and evidence are collected, postmortem examinations take place, and bodies are released to mortuaries. It is staffed by seven Forensic Autopsy Specialists and one supervisor, all of whom are licensed embalmers.

A variety of important procedures take place in this area, including forensic photographic documentation, fingerprinting, and all the procedures associated with the examination itself. The Medical Examiner has an X-ray room housing a C-arm digital X-ray unit which also performs fluoroscopy, angiography, and three-dimensional digital reconstructions. We can rotate and slice these 3D images to view aspects of the body that are typically difficult to view during an autopsy. The images are an important supplemental tool for postmortem examination, and can also be a valuable resource for courtroom demonstrations. The larger X-ray unit is supplemented by a portable unit as well. The Medical Examiner also has an ultrasound machine – a unique piece of equipment in the postmortem setting – and is exploring its applications. Barcode systems are used throughout the area to ensure accurate body tracking, specimen tracking and evidence management.

The exam room area is actually made up of several rooms. The largest is a main room, which contains 11 autopsy stations and space for expansion. The room has ample natural and fluorescent lighting and high air flow. Other spaces include an autopsy room that can be dedicated to homicides, a room with two stations used for teaching, and a room currently used as a space for forensic anthropological and forensic dental examinations.

Finally, there is an isolation room attached to a dedicated refrigerator for examination of known or suspected infectious cases. There are also detectors at the entrance to the facility to detect radiation coming from bodies brought to the Medical Examiner.

All of these features allow for safe, thorough, and state-of-the-art postmortem examinations with the ultimate goals of identification and cause and manner of death in mind.

PATHOLOGY

The Pathology Division is composed of eight pathologists that include the Chief Medical Examiner (CME), Chief Deputy Medical Examiner (CDME), six Deputy Medical Examiners (DMEs), two forensic pathology physician trainees (fellows), two Medical Transcriptionists, and a forensic photographer. Each of the pathologists holds a medical degree, and is trained in anatomic pathology and subsequently trained in the medical subspecialty of forensic pathology. Some have also received training in clinical pathology, and one also has training in forensic neuropathology and cardiac pathology. All of the pathologists have been certified by the American Board of Pathology (ABP) in their respective specialties, meaning that they have been deemed to be appropriately trained and have passed the corresponding nationally-administered examinations.

Training and education are an integral part of the pathology division, including the instruction of medical students and pathology residents in autopsy pathology. The pathologists have faculty appointments with the Department of Pathology at the University of California, San Diego (UCSD) School of Medicine. Residents from both the UCSD School of Medicine and Naval Medical Center Balboa rotate with and are trained by pathologists at the Medical Examiner's Office, and the pathologists deliver lectures to pathology residents at the UCSD Medical Center. In addition, medical students from UCSD and several osteopathic schools rotate through the pathology division each month.

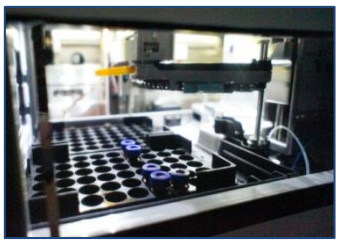
Lastly, the Pathology division trains two forensic pathology fellows per year. The fellows are pathologists who have completed training in anatomic or anatomic and clinical pathology, and wish to subspecialize in forensic pathology. Following the fellowship training, fellows are expected to take the annual American Board of Pathology-administered forensic pathology examination, along with other fellows from around the country. The importance of having one of the 38 training programs in the U.S. accredited by the Accreditation Council for Graduate Medication Education (ACGME) cannot be understated, since only around 45-50 forensic pathology fellows complete their training each year in this country, and this program contributes two of them.

TOXICOLOGY LABORATORY REVIEW

Forensic toxicology provides a comprehensive drug testing service in medico-legal death investigations. The laboratory offers routine testing of alcohol and simple volatile compounds, drugs of abuse (cocaine, amphetamines, opioids, benzodiazepines, fentanyl, cannabinoids, buprenorphine, carisoprodol, oxycodone, zolpidem, methadone, phencyclidine-PCP, and many of the novel psychoactive substances like bath salts or fentanyl analogues), as well as many therapeutic agents and poisons. This case work translates into about 35,000 tests annually. Currently, the laboratory is staffed by a laboratory manager, five toxicologists, and a laboratory assistant.

MAJOR ACHIEVEMENTS

The laboratory has been endorsed by the National Association of Medical Examiners (NAME), and fully accredited by the American Board of Forensic Toxicology (ABFT) since 2005. Laboratory manager Dr. Iain M. McIntyre, Ph.D. has participated in the inspection and review of a number of forensic toxicology laboratories around the nation on behalf of the ABFT. These inspections and reviews ensure that the San Diego Medical Examiner's forensic toxicology laboratory maintains an equivalent standard of performance to those nationally recognized facilities according to the ABFT, the American Academy of Forensic Sciences (AAFS), and the Society of Forensic Toxicologists (SOFT) Forensic Laboratory guidelines and standards.

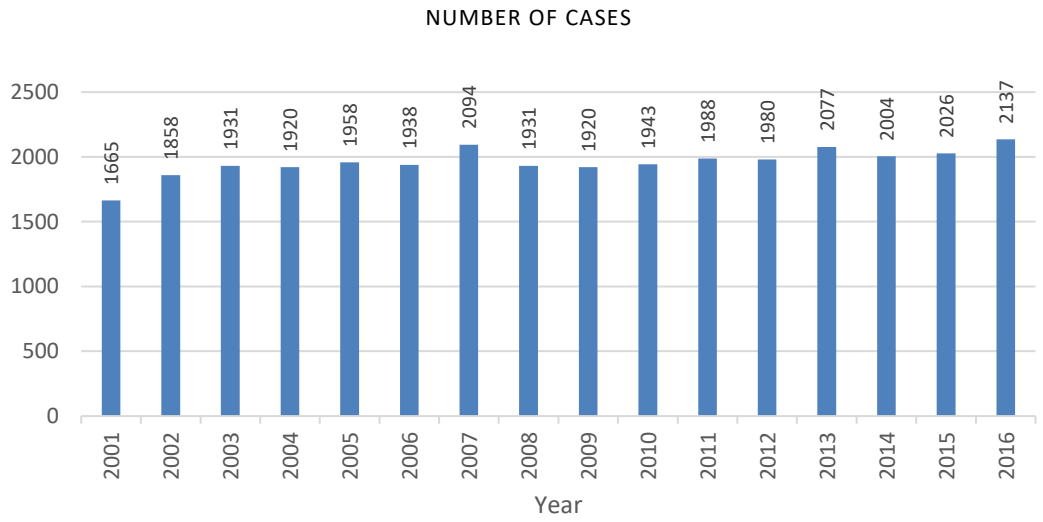


Due to the increasing use of both therapeutic and illicit drugs, forensic toxicology is constantly developing and re-developing its analytical procedures. In 2016, the laboratory identified a number of new synthetic drugs. These included opioid compounds such as fentanyl analogues, cathinone analogues and hallucinogens. The importance of developing both screening tests and confirmation analyses for these newer drugs of abuse is essential. As a result of these developments, the San Diego County Medical Examiner's Department continues to assist law enforcement agencies (both local and national) in monitoring trends for drugs currently circulating, and being abused, in the local community.

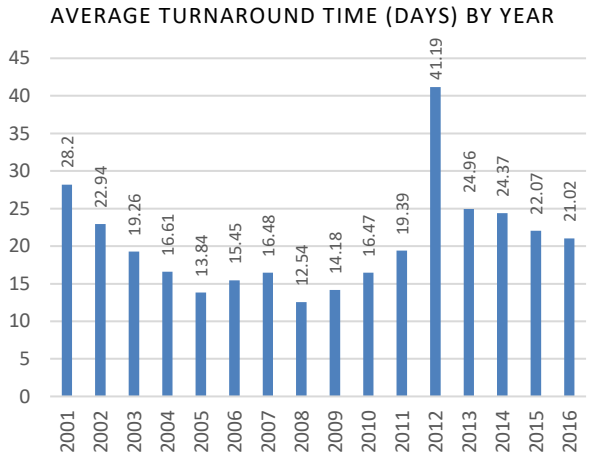
The laboratory has also continued collaborative efforts with the California Poison Control System, the University of California - San Diego Department of Pathology and the Center for Advanced Laboratory Medicine. By taking on these teaching opportunities and conducting ongoing research, the laboratory and its staff are able to keep up-to-date with advances in the field of forensic toxicology, and the newest technological innovations.

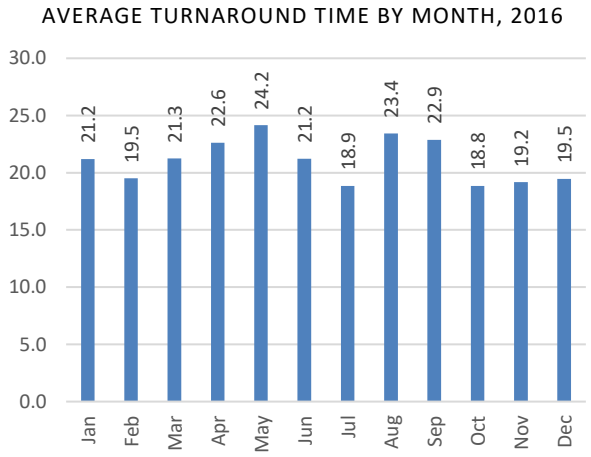
WORKLOAD DATA FOR 2016 IN COMPARISON TO PREVIOUS YEARS

The forensic toxicology laboratory performs testing for the San Diego county Medical Examiner. As the data illustrates below, the number of cases the lab examined increased over previous years. The office handled a total of about 2,100 cases.



The laboratory is challenged by the increasing complexities of drug testing, routine monitoring of therapeutic drugs, vitreous biochemistries and screening for volatile compounds. Despite this, however, the average turnaround time for the completion of cases dropped to about 21 days in 2016 from 22 the previous year.





PUBLICATIONS

McIntyre, I.M., Mallett, P., Stolberg, S., Hass, E.A. and Mena, O. "Striking Increases in Postmortem Compared to Antemortem Drug Concentrations in a Suicidal Overdose: A Case Report" **Australian Journal of Forensic Sciences** 48 (1) 37-41, 2016. http://dx.doi.org/10.1080/00450618.2015.1025839

McIntyre, I.M., Trochta, A., Gary, R.D., Wright, J. and Mena, O. "An Acute Butyr-Fentanyl Fatality: A Case Report with Postmortem Concentrations" **Journal of Analytical Toxicology** 40 (2) 162-166, 2016. doi: 10.1093/jat/bkv138.

Labay, L.M., Caruso, J.L., Gilson, T.B., Jufer-Phipps, R., Knight, L.D., Lemos, N., McIntyre, I.M., Stoppacher, R., Weins, A., Williams, E., Zumwalt, R. and Logan, B.K. "Synthetic Cannabinoid Drug Use as a Cause or Contributory Cause of Death" **Forensic Science International** 260 31-39, 2016. DOI: http://dx.doi.org/10.1016/j.forsciint.2015.12.046

Metushi, I.G., Fitzgerald, R.L. and McIntyre, I.M. "Assessment and Comparison of Vitreous Humor as an Alternative Matrix for Forensic Toxicology Screening by GC-MS" **Journal of Analytical Toxicology** 40 (4) 243-247, 2016. doi: 10.1093/jat/bkw009

Hamm, C.E., Gary, R.D. and McIntyre, I.M. "Gabapentin Concentrations and Postmortem Distribution" **Forensic Science International** 262 201-203, 2016. http://dx.doi.org/10.1016/j.forsciint.2016.03.028

McIntyre, I.M. "Analytical Data in Support of the Liver and Peripheral Blood Concentration (L/P) Ratio as a Marker of Postmortem Redistribution." **European Journal of Forensic Sciences** 3 (4) 2016. Online First: 22 Jun, 2016. Web. 16 Nov 2016 doi: 10.5455/ejfs.224357

McIntyre, I.M., Valdez, J.E. and Lucas, J.R. "An Acute Fatality and Postmortem Concentration Distribution Reveals a Low Potential for Naproxen Redistribution" **Canadian Society of Forensic Science Journal** 49 (4) 203-210, 2016. http://dx.doi.org/10.1080/00085030.2016.1215040

Cantrell, F.L., Mallett, P., Aldridge, L., Verilhac, K. and McIntyre, I.M. "A Tapentadol Related Fatality: Case Report with Postmortem Concentrations" **Forensic Science International** 266 e1-e3, 2016. http://dx.doi.org/10.1016/j.forsciint.2016.08.020

McIntyre, I. M. "Analytical Data Supporting the "Theoretical" Postmortem Redistribution Factor (F_t): A New Model to Evaluate Postmortem Redistribution" **Forensic Sciences Research**, 1 (1) 33-37, 2016. http://dx.doi.org/10.1080/20961790.2016.1253255

DEATH CERTIFICATION

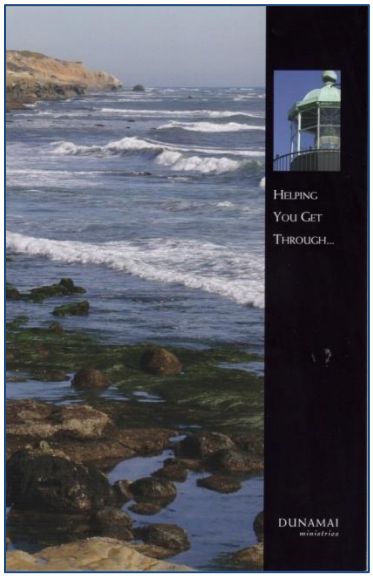
Death certification consists of determining a cause of death and manner of death for those cases that fall under jurisdiction of the Medical Examiner's Office and completing portions of a California Death Certificate for the individual. The *cause* of death can be summarized as the disease or injury that initiates the sequence of events that ultimately results in the person's death. The *manner* of death is essentially a single word that classifies the circumstances as one of the following five categories: natural, accident, suicide, homicide or undetermined. Once a determination is made following an examination and investigation, the cause and manner of death are entered into the office's internal electronic data system, followed by entry into the California Electronic Death Registration System (EDRS). The death is then attested with an electronic signature.

The Medical Examiner is able to issue a cause and manner of death shortly after the initial examination in approximately two-thirds of all deaths. However, many deaths require additional investigation and/or testing to determine or confirm the cause and/or manner of death. In these cases, the cause of death is temporarily listed as "Pending" on the death certificate. The certificate is then amended following further investigation or examination. In a very small percentage of cases, a cause and/or manner of death might not be determined even after completion of the autopsy, further investigation, and/or extensive toxicological testing.

BEREAVEMENT CENTER

The San Diego County Medical Examiner's Bereavement Center offers a host of services to those who are going through the grieving process following the sudden, traumatic and unexpected loss of a loved one. Started in July 2007, the Bereavement Center offers grief counseling, personal assistance and volunteer chaplains from an array of religions to those who have lost a loved one. This is the only program in the United States providing counseling services to *all* affected by the sudden and traumatic loss of a loved one. The Center is run by a volunteer chaplain who facilitates counseling services for thousands of clients each year.

The 3,000 deaths investigated by the Medical Examiner each year are often sudden, unexpected and traumatic. Families are in a period of high vulnerability. It has been documented that death from unnatural causes directly influences the nature and course of bereavement. For individuals bereaved through unnatural causes, the suddenness and lack of anticipation adversely influences their internal world and coping abilities, thus constituting trauma. There is also evidence that unnatural dying presents a greater incidence of symptoms of posttraumatic stress, victimization, and intrusive thoughts than in populations surviving death by a natural cause. Additionally, increased alcohol consumption, smoking and use of tranquilizers and other medicines are well-documented among the bereaved, especially among people who had used these substances prior to the loss. Thus, it is apparent that the bereavement state can adversely affect health and exacerbate and precipitate health-compromising behaviors.



Prior to the inception of the Bereavement Center, families enduring the bereavement process represented an unserved population. Given the mental and physical challenges that grieving can lead to, the Medical Examiner's Office recognized the need to establish a set of much-needed services. As a result, the Bereavement Center was established to fill this gap in services and help mitigate the adverse effects that an untimely death can pose**.** As steward of the Bereavement Center, the chaplain provides an array of services to families who recently lost a loved one, including counseling services, cremation assistance and a 27-page grief resource booklet titled "Helping You Get Through…" Families who encounter the loss of a loved one are plagued with many questions. "What should I expect

next?" "What resources are available?" "How do I deal with insurance companies?" These are some of the typical questions raised by families going through the grieving process.

At every death notification, the booklet is provided to each next of kin by a Medical Examiner Investigator, along with the contact numbers for multiple organizations providing grief counseling and resources. The booklet contains information on an array of subjects, including available support groups, how to help children during a time of loss, the first steps after death (a five-page checklist), a funeral checklist and much more.

The Bereavement Center also offers a support group for mothers who have lost a son or daughter through Umbrella Ministries. More than 297 mothers have benefited so far. The Bereavement Center and DUNAMAI Ministries also partner to provide cremation assistance for qualified families. DUNAMAI Ministries receives private donations to help families in need with cremation costs.

. Most of the successes of the Bereavement Center's work are not quantifiable, though the degree to which the center provides comfort to grieving families is immeasurable. However, a few measures of success are quantifiable. Through December 2016, more than 28,000 grief resource booklets had been provided at no cost to grieving families. Every person affected by a Medical Examiner case has the option to receive service from among eight free grief counselors. Through December 2016, the center covered the costs of 294 cremations. The center also offers clergy support for funeral arrangements. And perhaps the most touching, the Bereavement Center's chaplain follows-up on every local case with a phone call to the family to offer condolences and answer any questions they may have.

As a new addition to the Bereavement Center, we now offer a program called, "Beyond the Caution Tape." It is open to any juvenile or adult using or influenced by drugs, hanging out with the "wrong crowd" or exhibiting any "at risk" behavior. This program provides the ultimate opportunity for a "wakeup call" to those who may need a change of direction by showing the real and actual consequences others have suffered. Through December 2016, 2,248 juveniles and adults had taken advantage of this program.

CASE REPORT REQUESTS AND DATA SHARING

We investigate deaths throughout the county, and it is critical that we communicate with those in need of the details of our investigations, our findings, and our conclusions as to cause and manner of death. Our most important documents are the autopsy, toxicology, and investigative reports that we generate, and it is essential that we distribute these reports in a timely fashion to those who request them after the completion of our investigations.

According to California Law, the reports we generate are public record. We receive between 4,500-5,000 requests each year for copies of these reports from a wide variety of people and agencies, including family members, friends, hospitals, law firms, insurance companies, media and government agencies. Our administrative division completes this task in a timely fashion, while also processing court orders and subpoenas, handling phone calls and emails, and performing innumerable other duties. With the exception of the first request from the next-of-kin which is provided at no cost, we charge $1.60 per page for hard copies of the reports. There is no charge for emailed copies. Historically, we have filled 95 percent of these requests in seven days or less. In 2016, we completed 98 percent (4,930 of 5,047) of the requests for case reports in seven days or less.

In addition to examining individual deaths, we also examine each death as part of a larger group over months or years to identify trends, patterns and specific details that can shed light on emerging public health concerns. We receive queries from media, government and private agencies, federal and local law enforcement agencies, and the general public on a regular basis regarding a variety of subjects. Threading our information with other agencies and law enforcement can produce a more comprehensive understanding of public health issues and potentially lead to intervention or policy changes to address them.

DEATH REVIEW TEAMS

As part of its greater role in promoting safe and livable communities, employees of the San Diego County Medical Examiner (primarily Deputy Medical Examiners and Medical Examiner Investigators) are members of various multidisciplinary death review committees. Staff also participate in county-wide trauma review meetings and sit on various local task forces. We are valuable participants in these activities and contribute to the greater goal of reducing fatalities in the children and elderly; reducing deaths related to domestic violence, prescription drugs, or methamphetamine; and improving the trauma system.

CHILD ABUSE PREVENTION COORDINATING COUNCIL (CAPCC) FATALITY REVIEW COMMITTEE

This review team is comprised of representatives from the Medical Examiner's Department, clinical medical community, Child Welfare Services, law enforcement, District Attorney, emergency medical personnel, Consumer Product Safety Commission, SDSU Academy for Professional Excellence, Probation and County Counsel. The committee meets monthly to review all sudden unexpected deaths of children that fall under the jurisdiction of the Medical Examiner to identify factors and circumstances contributing to child deaths. The goal is to prevent future occurrences and make recommendations, as well as to improve the coordination and effectiveness of child protection, investigation and legal processes. When it was established in 1982, the CAPCC Fatality Review Committee was only the second child fatality committee in the country. During its first 15 years, this committee reviewed the deaths of children newborn through age 6. In 1998, the scope of the committee's work expanded to children through age 12. And then in 2005, the scope grew again to include children up through age 17.

DOMESTIC VIOLENCE FATALITY REVIEW TEAM

The County of San Diego Board of Supervisors established the Domestic Violence Fatality Review Team (DVFRT) in 1996. The DVFRT is a confidential multidisciplinary team that conducts in-depth retrospective case reviews of intimate partner-related fatalities that have occurred in San Diego County. The team is made up of dedicated representatives from more than 30 public and non-profit organizations, such as the Medical Examiner, the District Attorney's Office and other law enforcement agencies, the Health and Human Services Agency, domestic violence

service agencies and local healthcare organizations. The team has convened for 20 years, over which time it has reviewed 208 deaths.

The DVFRT seeks to identify system-based opportunities to improve violence prevention and intervention policies, procedures and coordinated strategies, make recommendations for system change and raise public awareness about intimate partner violence.

In addition to conducting case reviews, the DVFRT also tracks the intimate partner violence-related deaths (homicides and suicides) that occur in San Diego County. The Medical Examiner continues to be a key partner is this process, as the DVFRT is dependent upon representatives from the Medical Examiner, law enforcement, and the District Attorney's Office to identify and track these cases to ensure accurate reporting.

For more information, visit the team's website.

ELDER AND DEPENDENT ADULT DEATH REVIEW TEAM

The San Diego County Elder and Dependent Adult Death Review Team is a county-wide group with a core membership from the District Attorney's Office, Medical Examiner's Department, the Sheriff's Department, San Diego Police Department, and Department of Aging and Independence Services. The team is designed to facilitate communication among the agencies involved in the identification, investigation or prosecution of elder/dependent adult abuse or deaths. Its task is to review elder and dependent adult deaths in San Diego County with the goal of reducing the number of deaths related to physical abuse, neglect or self-neglect. The County's Elder Death Review Team was established in 2003, in accordance with Senate Bill 333, Chapter 301, of 2001, which authorized counties in California to establish such committees. The team expanded to include dependent adults in 2011. The San Diego County team was one of the first elder death review teams in the country and continues to act as a model for other jurisdictions trying to establish similar review committees.

The team promotes policy changes in government and private agencies, retrospectively identifies gaps and barriers to service that existed for victims prior to death, increases public awareness and aims to improve the safety and health of San Diego County residents by promoting change. The team also participates in a number of other projects, such as an annual review of elder suicides, research studies and more importantly, daily, real-time cross-reference efforts between the Medical Examiner and Adult Protective Services databases to help identify cases of abuse that might otherwise be missed.

DIVER DEATH REVIEW COMMITTEE

With miles of coastline, beautiful kelp beds and a number of shipwrecks, San Diego is a haven for scuba divers. In order to improve the safety of San Diego's scuba divers and ensure thorough investigation of all diving-related deaths, a multidisciplinary diver death review committee was formed in 2009. The committee includes members from the San Diego Lifeguards, San Diego Police Department, UCSD's Undersea and Hyperbaric Medicine section, Scripps Institute of Oceanography, the United States Coast Guard, the local dive community and a Deputy Medical Examiner with expertise in scuba diving and diving medicine. Each diving-related death is thoroughly reviewed and discussed by the committee. This review guides certification in causes and manners of death and contributes to recommendations for diver safety in the county. In 2014, two such deaths occurred; one has been reviewed by the committee already and as of June 2015, one is pending discussion at the next diver death review committee meeting.

OTHER PARTICIPATION

Our office also participates in several local Trauma meetings as well as a County wide trauma monitoring system, including:

Rady Children's Hospital Trauma Mortality and Morbidity (M&M) Conference
Sharp Memorial Hospital Trauma M&M Conference
MAC (Medical Audit Committee) meeting of Trauma Centers (County-wide)

We also are part of the San Diego County Methamphetamine Strike Force, the Prescription Drug Task Force and the California SIDS Advisory Council.

FORENSIC PATHOLOGY FELLOWSHIP

A fellowship is a period of subspecialty training for physicians, undertaken after completion of a specialty residency. The San Diego County Medical Examiner is one of only 38 sites in the U.S. that provide a one-year accredited training program in the medical subspecialty of forensic pathology. We have trained 22 fellows over the last 25 years.

Our program has been fully and continuously accredited by the Accreditation Council for Graduate Medical Education (ACGME) and we currently offer two fellowship positions. These two are among the approximately 45-50 forensic pathology fellows trained each year in the United States. Our positions are filled through June of 2018.

San Diego County is uniquely positioned to provide a forensic pathology fellow exposure to sudden, unexpected deaths in a variety of manners not encountered in many, more populous jurisdictions. Reasons for this include our large population, our proximity to an international border, the ocean and waterways, our blend of well-developed modern urban areas and remote unpopulated urban areas and our remarkable variety of inland geography. The Medical Examiner's team of fully board-certified forensic pathologists comes from diverse training backgrounds, providing the fellow with a wide breadth of knowledge, experience and perspective from which to learn. In addition, we require our fellows to participate in death scene response and to provide court testimony. Combine all of this with the fact that we have one of the highest faculty-to-fellow ratios in the country, and it is clear that the San Diego Medical Examiner is well-positioned to successfully train fellows to become proficient in the field of forensic pathology and instill the confidence, skills and knowledge they need to practice in any setting.

TEACHING AND RESEARCH

TEACHING

Pathology Residents: In addition to the formal instruction offered to Forensic Pathology Fellows, the Medical Examiner Department provides critical teaching rotations for Pathology Residents from both the UCSD School of Medicine and Naval Medical Center Balboa. Residents receive in-depth training in forensic and autopsy pathology under the direct supervision of Medical Examiner Department pathologists. This training is required for them to be eligible for Pathology board examinations. In 2016, nine residents spent rotations ranging from two to six weeks at the Medical Examiner Department, handling a total of 183 cases under direct supervision. This work provided them with invaluable learning opportunities.

Additional instruction for Pathology Residents included around a dozen formal lectures given by our Deputy Medical Examiners (forensic pathologists) at UCSD Hillcrest's Department of Pathology, on topics including gunshot wounds, sharp and blunt force injuries, asphyxia, electrical and thermal injuries, toxicology, postmortem changes, death certification, and environmental deaths, among others. These lectures have been part of the annual UCSD Pathology curriculum for many years, and will continue in the years to come.

Teaching for the greater community: Medical Examiner Department staff, including pathologists, investigators and others, gave dozens of presentations during 2016, with more than 72 hours total spent teaching more than 1900 people. Topics and audiences included safety stand-downs/drinking and driving for military personnel; awareness lectures for juvenile and adult offenders; and courses about the Medical Examiner Department for Funeral Directors, Sheriff Search and Rescue and the DA Citizen's Academy participants; forensic pathology topics for Cal Western Law School, and Grossmont College; as well as many others. These presentations were given either at the Medical Examiner facility or at other locations throughout the county. They were intended to educate, inform, and minimize misconceptions about our function.

RESEARCH INVOLVEMENT

In 2016, the Medical Examiner Department was involved in many different research opportunities. Our toxicology section published nine scientific papers (some in collaboration with our pathology and investigations sections) and, combined with the pathology division,

published in journals including the *Australian Journal of Forensic Sciences , Journal of Analytical Toxicology, Forensic Science International , European Journal of Forensic Sciences , Canadian Society of Forensic Science Journal , Forensic Sciences Research, Journal of Neuropathology & Experimental Neurology, Journal of the American Medical Association (JAMA), American Journal of Emergency Medicine,* and the *American Journal of Tropical Medicine and Hygiene.* We continued our ongoing collaboration with research doctors and scientists at Rady Children's Hospital and Harvard University to provide research specimens to study associations and possible causes of Sudden Infant Death Syndrome (SIDS), a multiyear project that has become one of the greatest contributors to the body of knowledge of this tragic issue.

Other research involvement has also included the donation of human brains, only with full consent from families. In 2016, we sent human brains to the Veteran's Administration in Los Angeles for programs involving the study of schizophrenia, bipolar disorder and depression, and the Allen Institute for Brain Science for the Human Brain Atlas project. Seizures are being studied at New York University. University of California Davis Medical Investigation of Neurodevelopmental Disorders (MIND) Institute has also received brains. We have also continued our multiyear study in collaboration with Scripps Translational Science Institute (STSI) with the goal of identifying genetic causes of sudden death. To date, several possible genetic causes of sudden death have been identified.

JOHN/JANE DOE CENTER

The identification of a decedent is one of the most critical functions of the Medical Examiner's Office and must be made by official and verifiable means. The misidentification of an individual is not an option and, conversely, if a person is not identified, we know nothing of their medical or psychiatric history or how they came to be in the situation in which they were found. In addition, families cannot have closure until the remains are identified and released for funeral services. The majority of decedents are identified by family members or through government identification (such as a driver's license). However, when a decedent carries no identification, no family is present to make identification, or the condition of the body is such that a visual identification is not possible, he or she becomes a Doe and the identification process begins.

Most decedents become identified quickly, often within a day or two, through fingerprints or tattoos. Some decedents are identified by a family member who views a photograph and then provides supporting identifying documentation. Scientific identification can be made by a dental comparison with assistance from our forensic odontologist, through radiographic comparison, or through surgical history and identifying anatomic features. When identification cannot be made by these means, DNA profile comparison is attempted. Very rarely, we will use a circumstantial identification based on physical characteristics, morphology, and known activities and location at the time of death.

When necessary, we make every effort to obtain an artist's sketch, through the assistance of a Medical Examiner's Office volunteer. We will release the sketch, along with any identifiable information and the decedent's physical characteristics, to all of San Diego's media outlets in hopes of learning an identity or contacting possible family.

When a decedent remains unidentified and we have no leads for a possible identity, several legal mandates go into effect. Those legal mandates include an entry of the decedent's information, known physical characteristics and full forensic dental examination into NCIC (National Crime Information Center) in order to perform a comparison of the decedent against reported missing persons. Often a full anthropology examination is conducted to provide information such as race/ethnicity, age, height and skeletal anomalies. We also provide a DNA sample to the California Department of Justice (DOJ) DNA Laboratory so that the decedent's genetic profile can be entered into CODIS (Combined DNA Index System) for a possible match against someone missing or wanted, whose profile is already in CODIS.

In 2016, 112 of the 3,070 cases (3.6 percent) came to the Medical Examiner's Department with an unknown or uncertain identity. Of those, 80 percent were identified in the first week and all but 11 were identified within the first 30 days. As of June 2017, all but seven – four of those skeletonized remains – were identified from 2016.

ABANDONED BODIES

State law (California Health & Safety Code Sections 7100-7105) requires that San Diego County handle the disposition of decedents who have been declared indigent, or whose body is declared abandoned when families fail to act, or when next of kin is unable to be located. The disposition is the final state of the body after death: *identified* abandoned bodies are always cremated, while *unidentified* abandoned bodies are always buried to allow for possible identification in the future.

If a family is unable to take care of the disposition of their loved one due to financial reasons, they can apply for Indigent Assistance through the Public Administrator's Office. Provided they meet the financial criteria, the Public Administrator will assist the family in selecting a cremation service and will pay for the cremation.

If the family cannot be located, fails to act, or does not apply for or qualify for Indigent Assistance, a decedent's body may be declared "Abandoned" after 30 days have passed since the death. In 2016, 150 bodies were declared abandoned. The Medical Examiner's Office handles abandoned bodies over which we have taken jurisdiction, as well as those abandoned at a hospital or mortuary as long as these agencies have completed their mandated due diligence.

On a rotating basis, local mortuaries and cremation service providers have agreed to take part in this process for a specific reimbursement. As the funding falls under the budget of the Public Administrator/Public Guardian (PA/PG), the PA/PG is involved in the disposition of every abandoned body and every indigent body.

LEGAL TESTIMONY

Another significant duty of the Medical Examiner Department is the provision of legal testimony. Pathologists, investigators and toxicologists are called upon to testify. The most frequent types of cases in which we will testify are homicides. But we are also asked to testify in criminal cases such as motor vehicle accidents (particularly those involving driving under the influence of alcohol, drugs or medications), and less commonly, in civil cases. Forensic Autopsy Specialists who assist with autopsies may sometimes be called to testify as witnesses as well.

Investigators who conduct scene investigations and interviews may be called to describe their findings. Toxicologists may be called to discuss their methods for conducting toxicology studies to prove their validity. In 2016, our staff members were subpoenaed for 65 depositions, three grand juries, 200 preliminary hearings and 254 jury trials.

Pathologists provide testimony as expert witnesses regarding their autopsy findings. They may discuss evidence of trauma, natural disease or any finding the court deems relevant. Their expertise in evaluating trauma sheds valuable insight on critical aspects of legal issues. Subpoenas received in 2016 resulted in more than 323 hours spent on testimony (including preparation and local travel time). Pathology alone accounted for 290 hours of that total.

In addition to criminal matters, Medical Examiner staff members are often subpoenaed for testimony in civil matters, most commonly by deposition. In this situation, the County bills the attorneys, whether the subpoena is received from the plaintiff's or defendant's attorney, for the time that any of these County employees are called away from their job duties. The County's fee for such civil court appearances is based on the reimbursement for wages and benefits to the County, and is not the sort of "expert witness" fee that private employees might garner.

Pathologists also frequently meet with various members of legal teams that might include district attorneys and their investigators, defense attorneys and their investigators, civil plaintiff or defense attorneys or law enforcement personnel. These meetings generally take place prior to hearings and trials, and various aspects of the autopsy findings may be discussed and clarified prior to an appearance in court. We have an "open door" policy in that we will gladly

meet with those on either side of a legal proceeding to describe our objective documentation and opinions. In conclusion, Medical Examiner staff members are available as resources and as witnesses to those who call on them regarding legal matters.

ORGAN AND TISSUE DONATION

Organ and tissue transplantation is an ever-growing field of medicine. With ever-evolving new techniques, medications and technology, the need for life-saving organ and tissue donation continues to increase. When a death occurs, organs such as the heart, lungs, liver and kidneys can be transplanted to replace damaged or diseased organs in a recipient. Tissues such as skin, bone, or cartilage may be used for grafts in burn victims or reconstruction in trauma patients or those with degenerative disease.

A large number of the suitable organ and tissue donors fall under Medical Examiner jurisdiction. The Medical Examiner recognizes the need to permit organ and tissue recovery whenever possible and *only when there is next-of-kin or prior consent***.** We also balance our statutory requirements to ensure the integrity of the body to allow determination of cause and manner of death, collection of evidence and the documentation of injuries and natural disease.

To those ends, we work closely with Lifesharing, the County's only organ and tissue procurement organization, and the San Diego Eye Bank to allow for organ and tissue recovery prior to and following autopsy. At the same time, we ensure that all necessary documentation is made in cases that fall under Medical Examiner jurisdiction. Maximization of donation benefits not only the recipients of organs and tissues, but also grieving families who may find some solace in the knowledge that even with the loss of a loved one, they were able to improve, or even save, the life of one or more recipients.

Tissue donation: During 2016, 63 percent of LifeSharing's tissue donors consisted of either Medical Examiner referrals (89) or Medical Examiner cases (206). Of the remaining cases, consent for donation was not permitted for medicolegal reasons, the patient had not pre-registered to be a donor and the family did not give consent for donation, or other factors prevented donation. A single tissue donor can help multiple people; therefore, donations represent can significantly enhance lives.

Organ donation: Of Lifesharing's organ donors for 2016, 67 percent were Medical Examiner cases. These donations resulted in the procurement of 235 organs, which translating into 235 lives saved!

Eye/cornea donation: In 2015, the San Diego Eye Bank recovered corneas from 316 donors at the Medical Examiner.

The above statistics highlight the importance of the Medical Examiner's close working relationships with Lifesharing and the Eye Bank. Our office not only assists the families of our cases, but is also a part of the chain that allows donation of organs and tissues to those in need.

PREPAREDNESS AT THE MEDICAL EXAMINER'S OFFICE

MASS DISASTER PREPARATION

Mass disasters or mass fatalities can take many different forms, including disease epidemics or pandemics like influenza, natural disasters such as earthquakes or wildfires, accidents such as aircraft crashes or industrial/nuclear incidents and terrorist attacks. Whether these fatalities involve natural or human causes, the Medical Examiner's Office must be ready to respond as part of the greater community of essential emergency services. Our response plans are continually reviewed and updated as necessary and provide a general outline for our plans in the event of mass fatalities. Our office has given multiple presentations to various groups including the Red Cross, San Diego Unified School District and various hospital agencies, on the Medical Examiner's role in mass disaster fatality response. This past year, we participated in several county and statewide exercises involving mass fatalities, interacting and planning with a variety of civilian and military first responders so that we will be ready when needed. These exercises – both tabletop and full-scale – ensure that if necessary, we are prepared to respond in an integrated fashion with the variety of regional and federal agencies that may be involved.

DMORT

Some of our Investigators, along with one Deputy Medical Examiner, have served as members of the National Disaster Medical System (NDMS) Region IX Disaster Mortuary Operational Response Team (DMORT). This is a federally funded and operated team that may deploy within the United States or internationally to provide mortuary assistance (investigation, identification, pathology, and disposition of remains) for mass fatality incidents.

2016 DATA SECTION

California statute mandates that our office determine the cause and manner of death for each person who falls under the jurisdiction of the Medical Examiner. However, another important function of the department is to identify patterns and trends of various types of deaths. This allows other agencies to identify issues that need additional resources and to confirm that ongoing interventional efforts are accomplishing their goals. Coupled with the right data from other agencies, the data can potentially also be used to improve the lives of those living in our community.

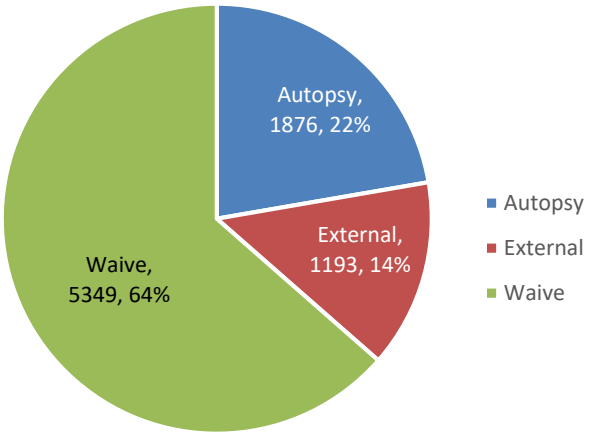
This section is designed to provide data in an easy-to-understand format so that the reader, and other regional stakeholders, can easily use the information to make decisions and stay informed. Most of the data is designed to speak for itself, but where applicable a narrative or explanatory caption will be provided to further explain the data, point out caveats and give background and context. In some areas, a multi-year perspective is given to demonstrate trends over time and show how 2016 compares with previous years.

This data represents the investigation of only a certain subset of deaths in the county: approximately 14 percent (3,070) of the roughly 22,000 deaths in 2016. This portion represents the deaths for which we chose to or were required to take jurisdiction (see Deaths We Investigate for more information), and includes ALL deaths due to non-natural causes (injury, drugs/alcohol, homicides, suicides, etc.) and a relatively small, but unique group of natural deaths (5 percent of all natural deaths) in the county.

OVERVIEW OF ALL CASES

In 2016, 8,419 deaths were reported to the San Diego County Medical Examiner's office. Jurisdiction was waived on 64 percent of these (5,349) and invoked in 36 percent (3,070) – our highest number to date. We performed 1,876 autopsies, which included 61 percent of jurisdiction cases, 22 percent of all deaths reported to us, and 8.4 percent of all deaths in the County. And we performed 1,193 external examinations (39 percent of jurisdiction cases).

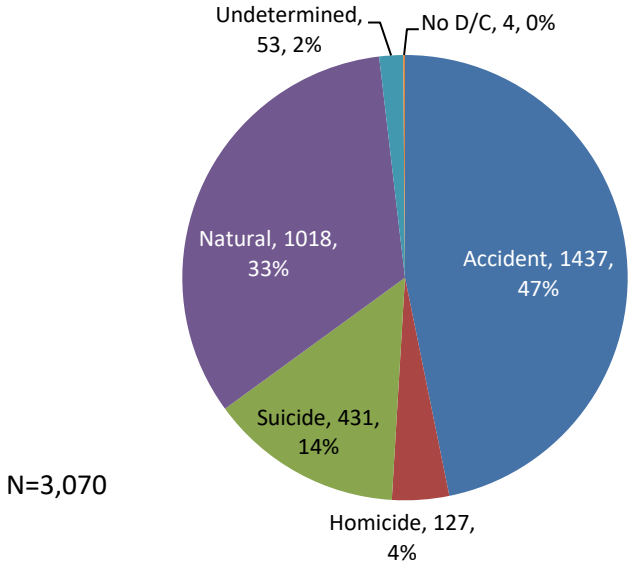
ALL DEATHS REPORTED TO M.E, 2016



N=8,419

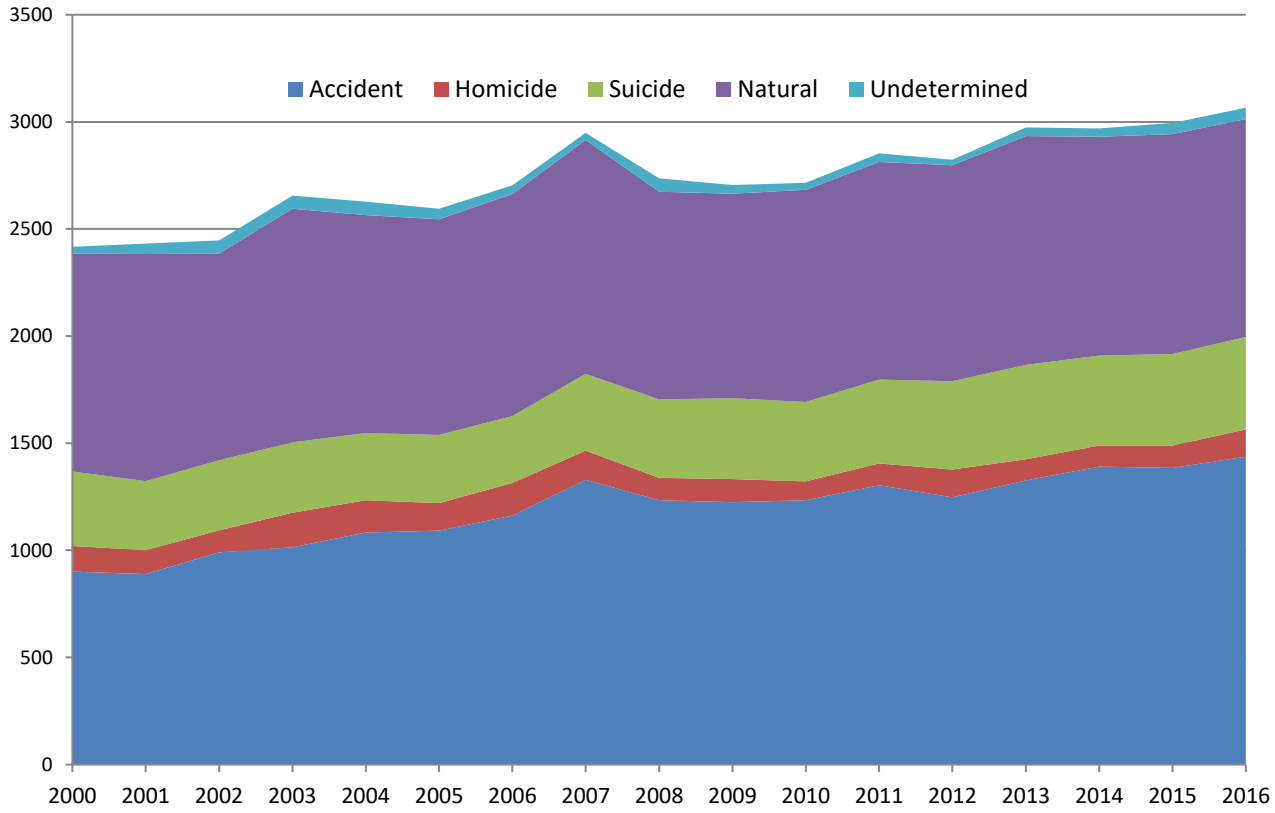
The San Diego County ME's office performs an average of 5.1 autopsies per day, and 3.3 external examinations. In 2016, 47 percent of investigations were attributed to unintentional (accident) manners of death, followed by natural causes (33 percent), suicides (14 percent), and homicides (4.1 percent). The manner of death was undetermined for 1.8 percent of deaths (53).

MANNERS OF DEATH, 2016



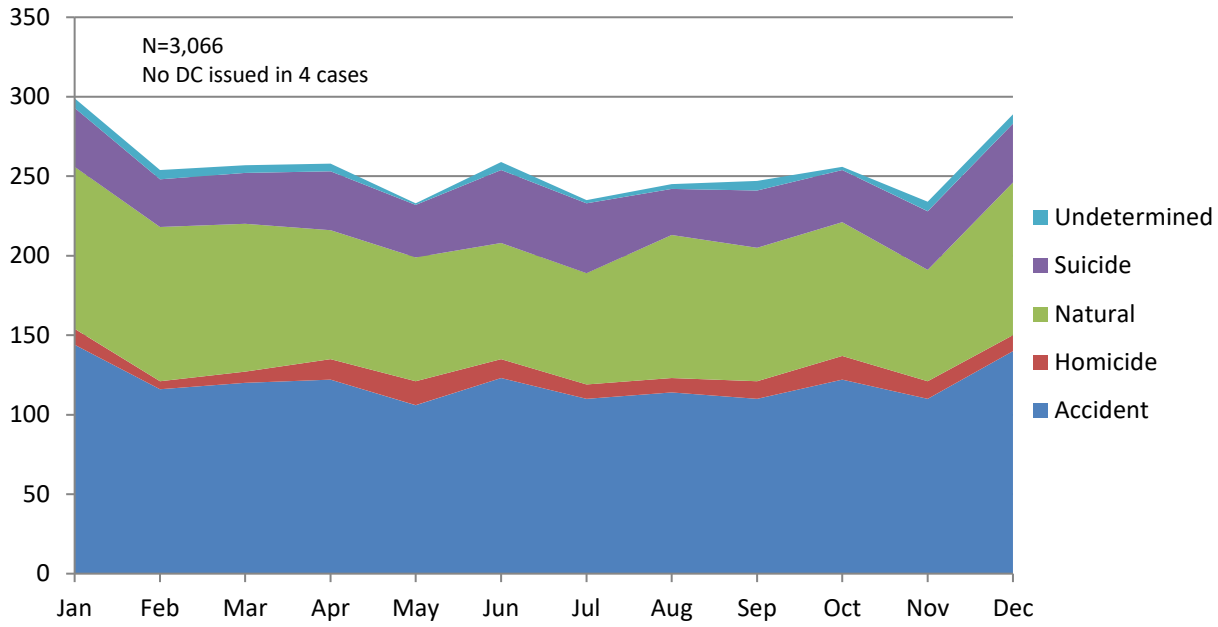
N=3,070

MANNER OF DEATH BY YEAR, 2000 – 2016

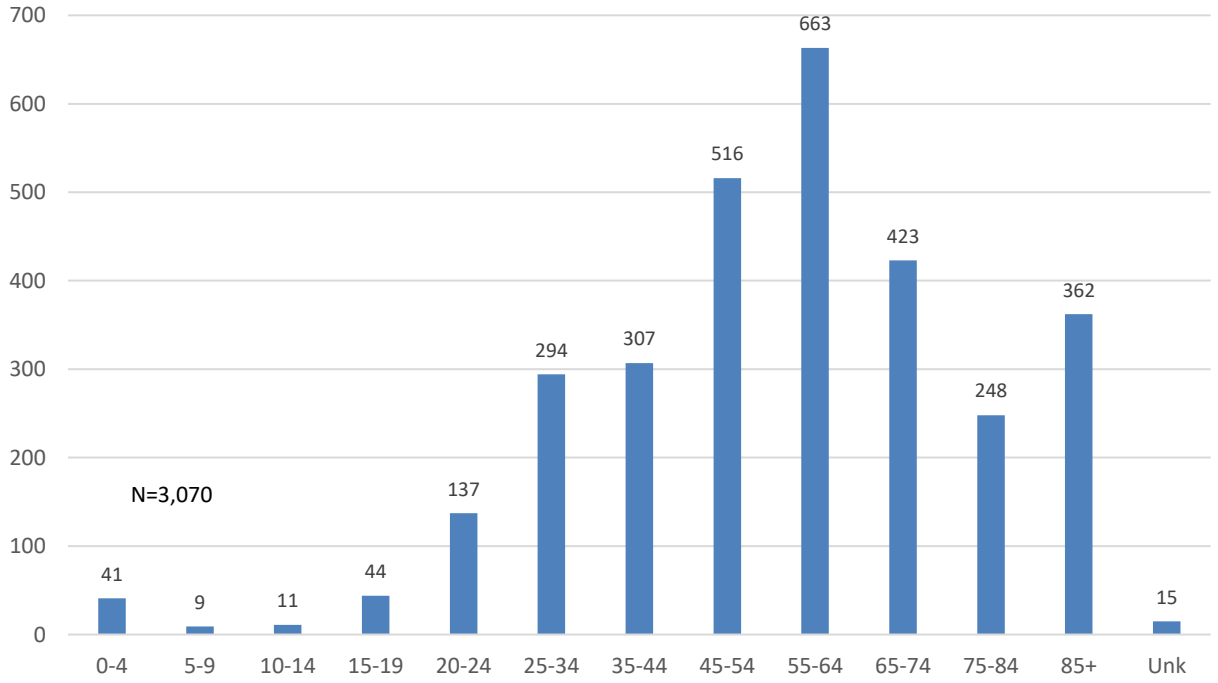


N=46,675

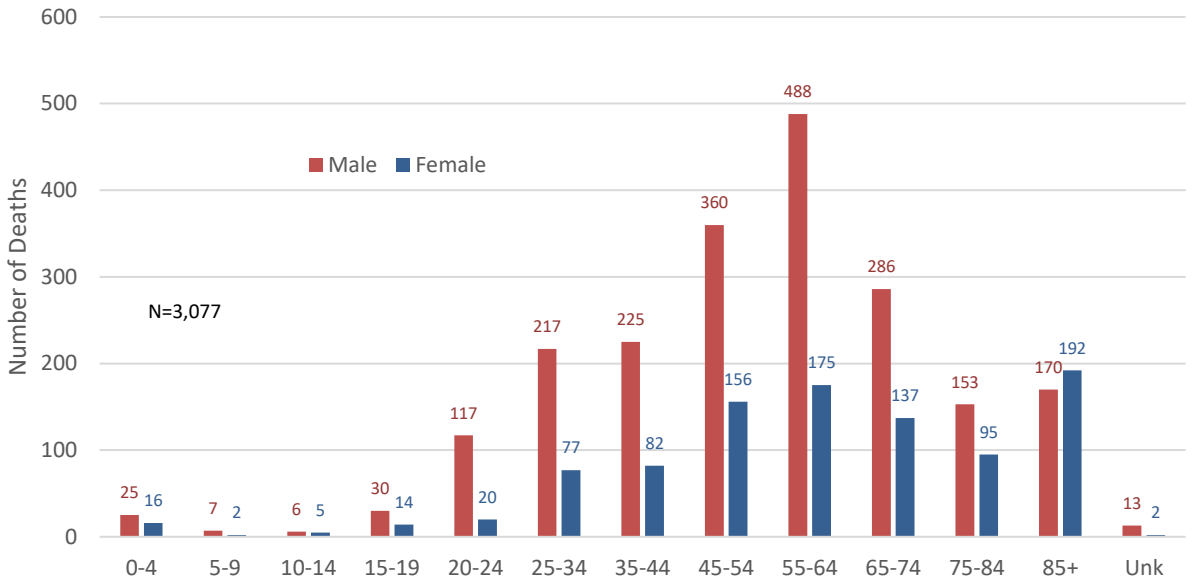
MANNER OF DEATH BY MONTH: 2016



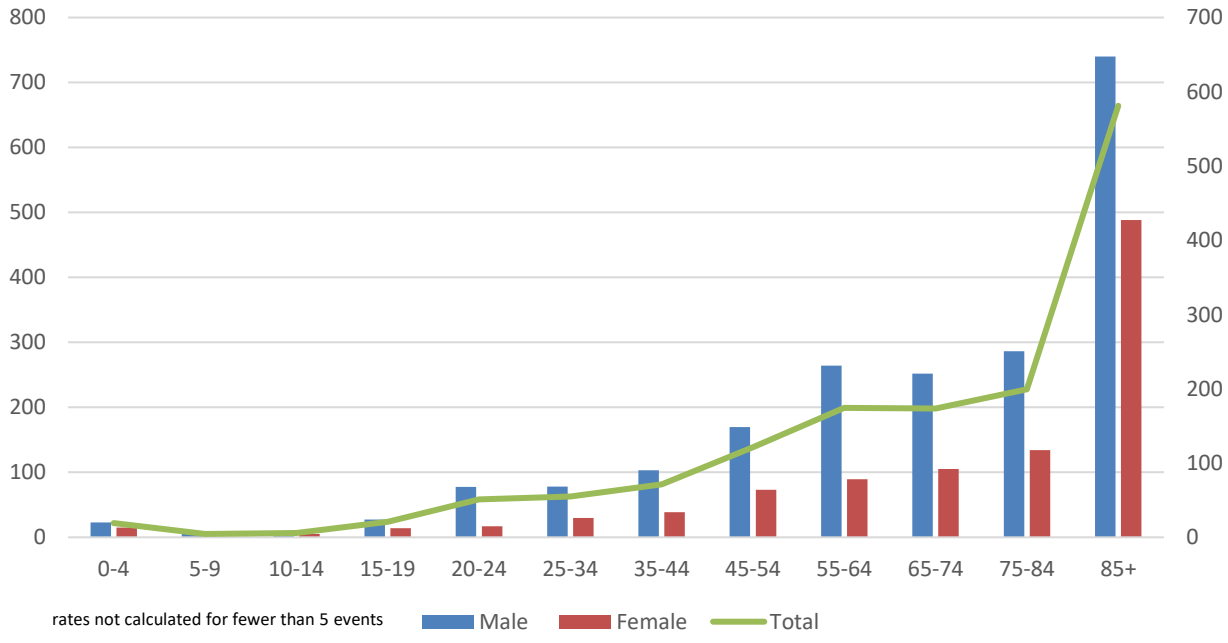
AGE DISTRIBUTION OF DECEDENTS, 2016



NUMBER OF DECEDENTS BY AGE AND SEX, 2016

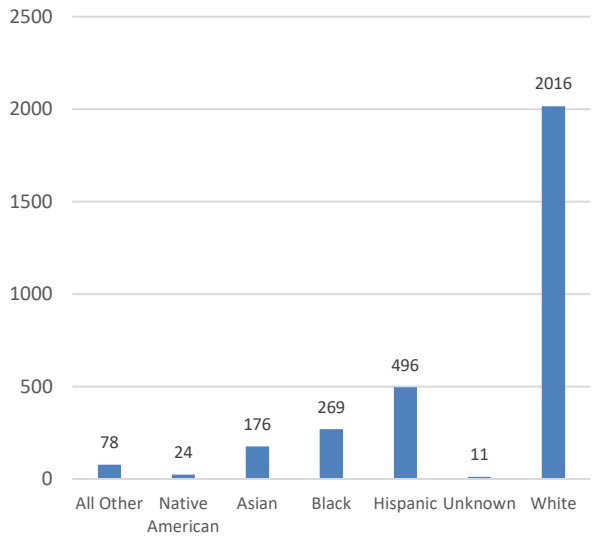


RATE PER 100,000 OF INVESTIGATIONS BY AGE AND SEX, 2016

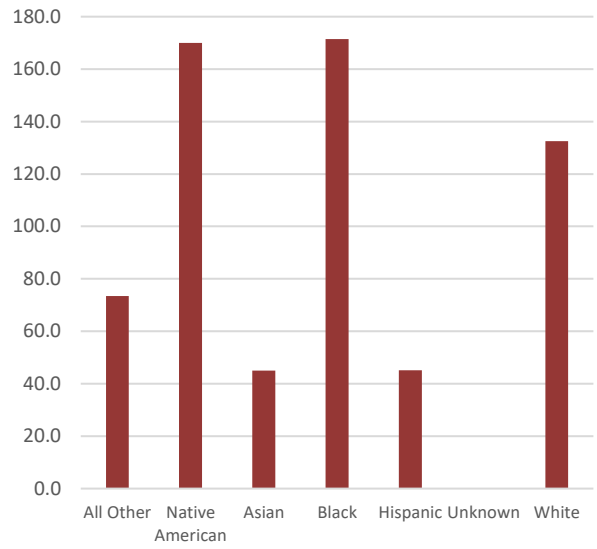


NUMBER AND RATE OF DEATHS BY RACE/ETHNICITY, 2016

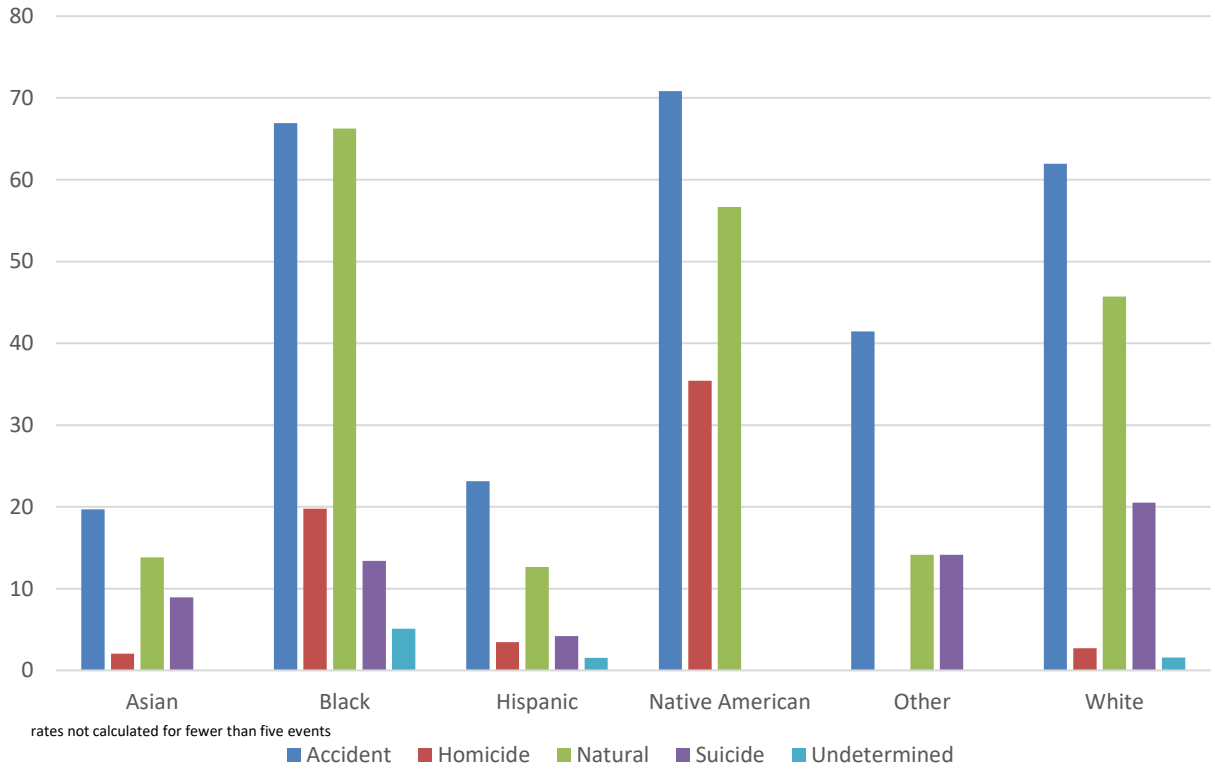
NUMBER OF DEATHS



RATE OF DEATHS PER 100,000

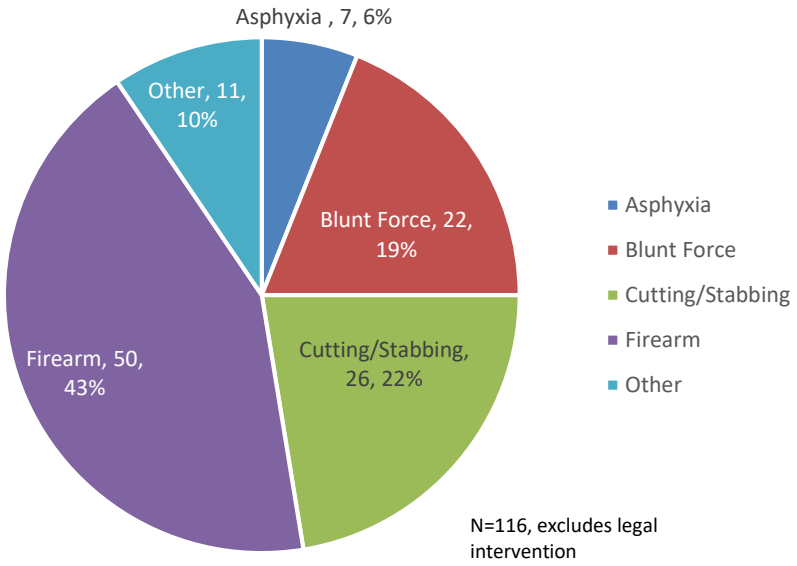


RATES OF MANNER BY RACE/ETHNICITY, 2016



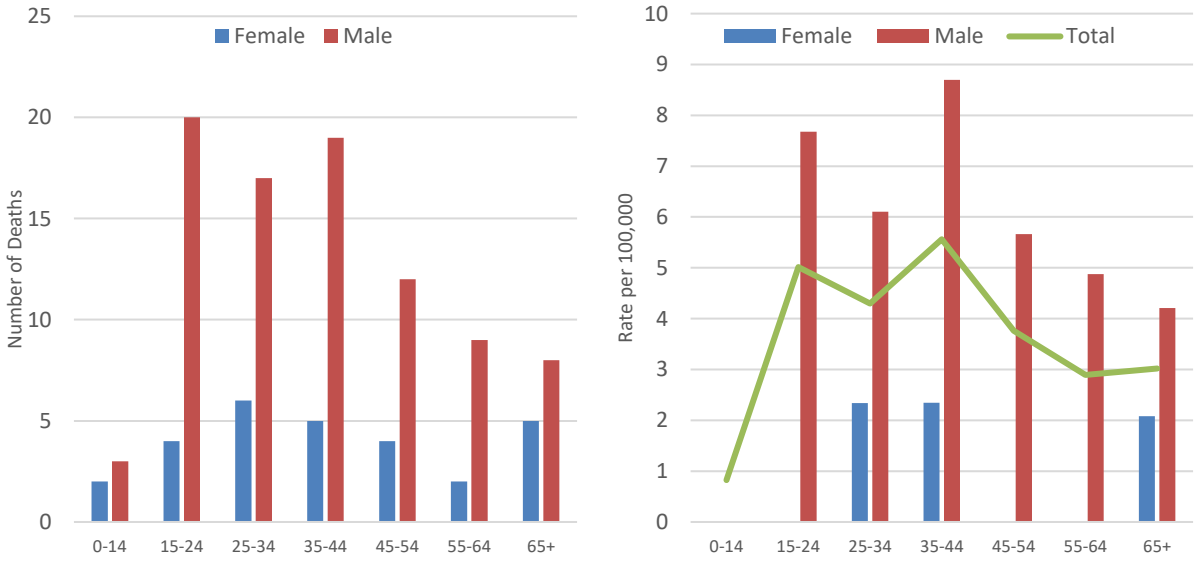
HOMICIDE

HOMICIDE METHODS: 2016



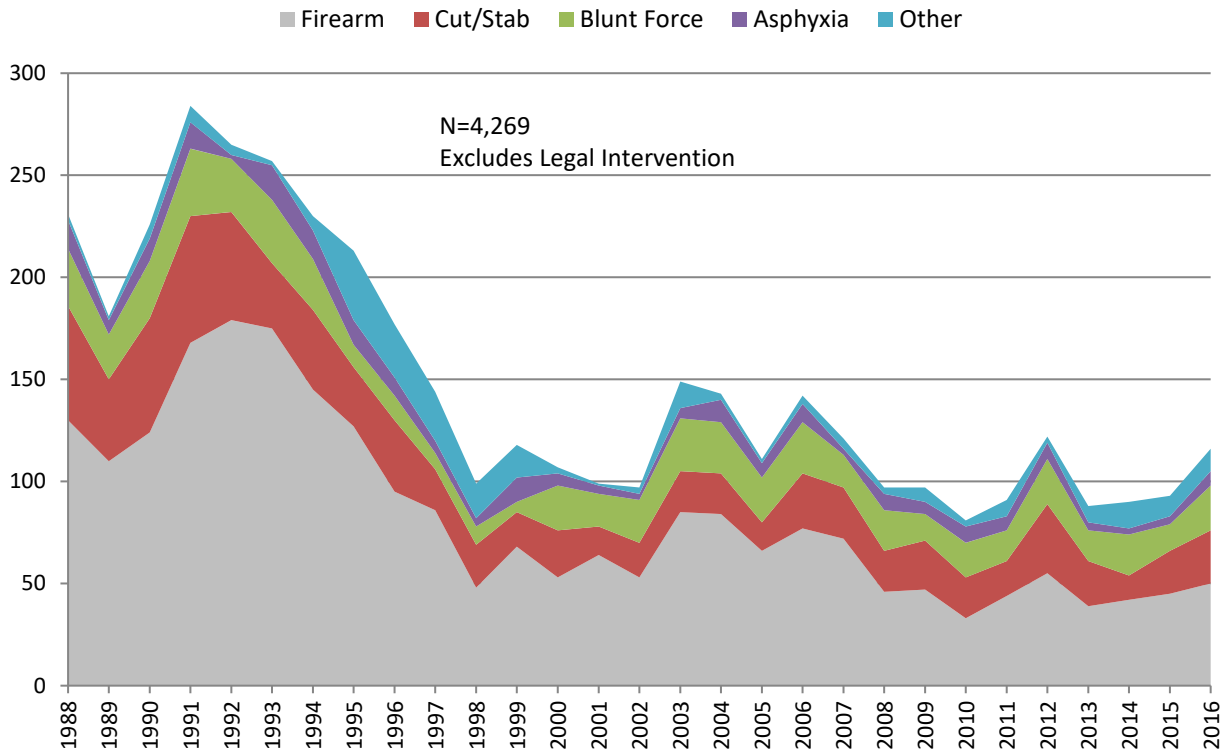
N=116, excludes legal intervention

NUMBER AND RATE OF HOMICIDE VICTIMS BY AGE AND GENDER, 2016

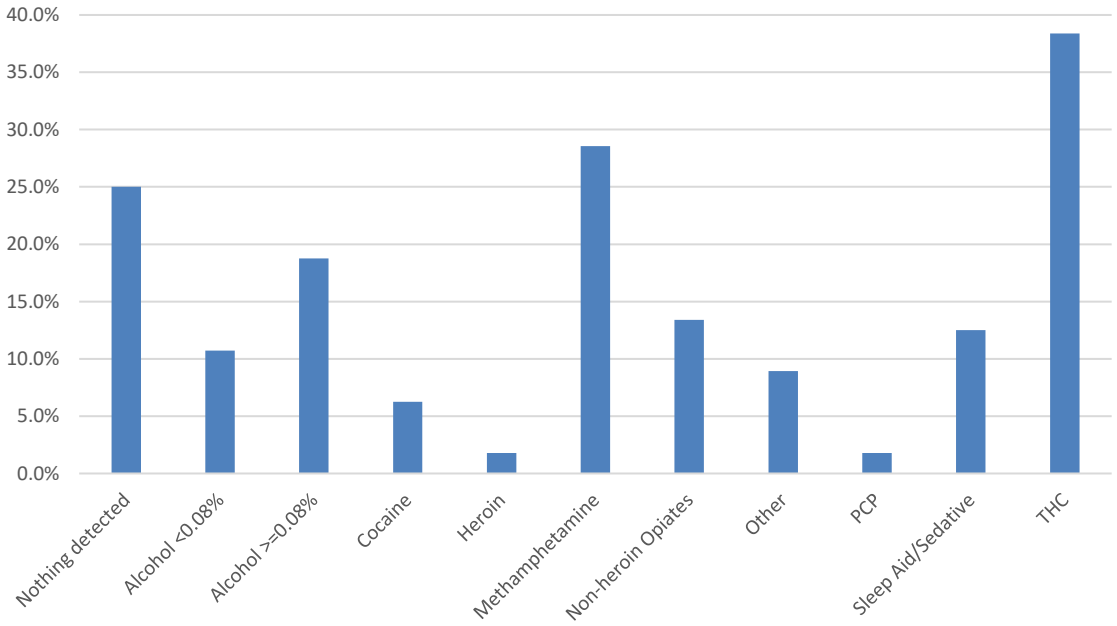


N=116, excludes legal intervention. Rates not calculated for fewer than 5 incidents

HOMICIDE METHOD BY YEAR: 1988 - 2016

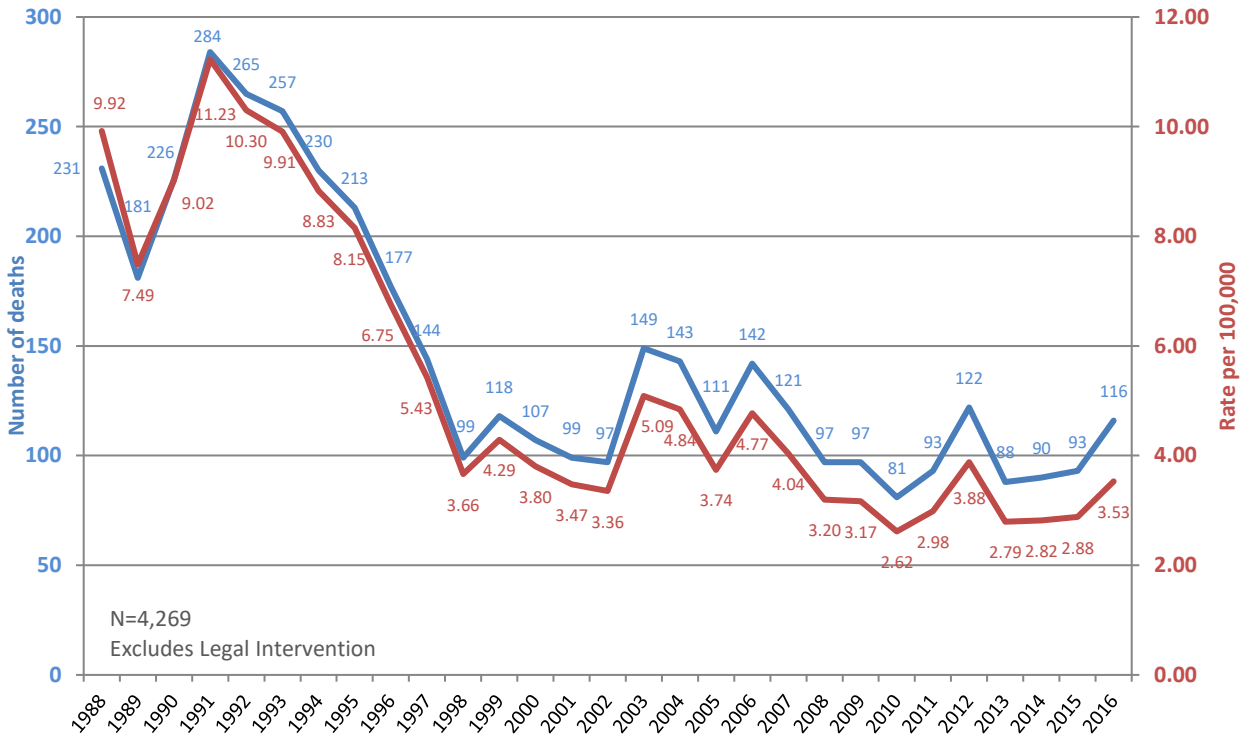


TOXICOLOGY RESULTS - PERCENT OF HOMICIDE: 2016



Percent of homicides in which testing was performed. Excludes legal intervention. 112 of 116 non-legal intervention homicides were tested.

HOMICIDE COUNT AND RATE BY YEAR, 1988 - 2016

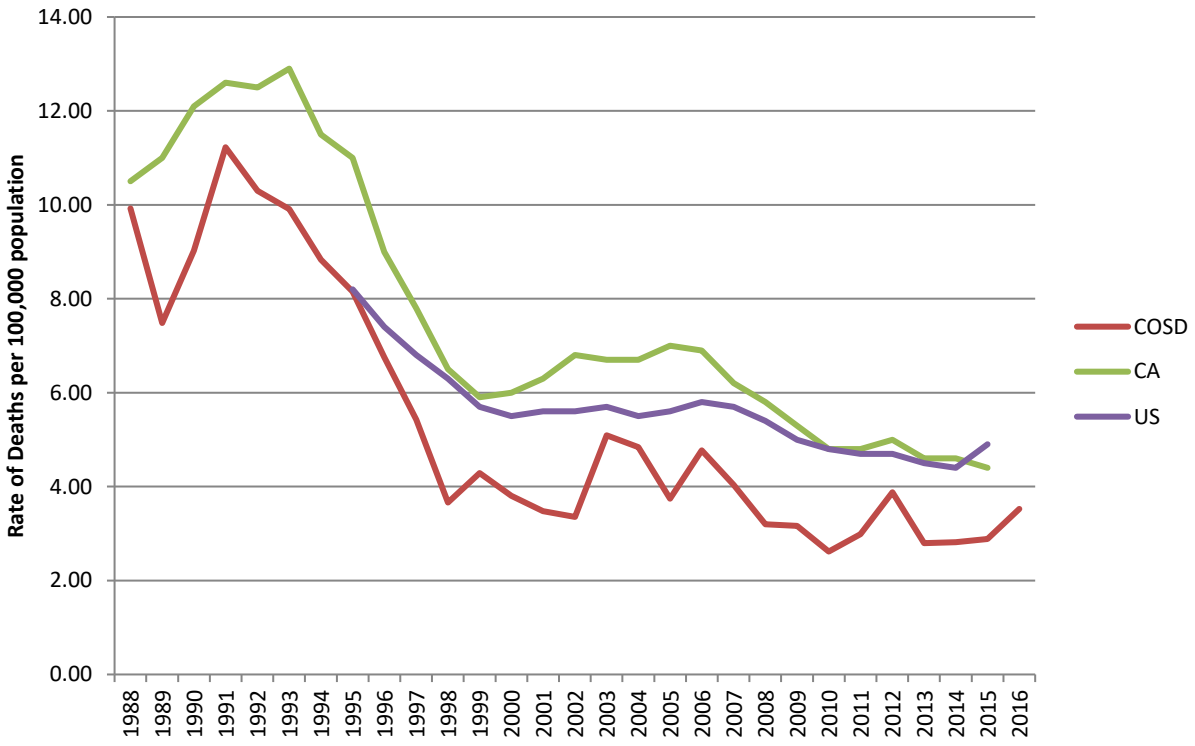


Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number	231	181	226	284	265	257	230	213	177	144	99	118
Rate per 100,000	9.9	7.5	9.0	11.2	10.3	9.9	8.8	8.2	6.8	5.4	3.7	4.3

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number	107	99	97	149	143	111	142	121	97	97	81	93
Rate per 100,000	3.8	3.5	3.4	5.1	4.8	3.7	4.8	4.0	3.2	3.2	2.6	3.0

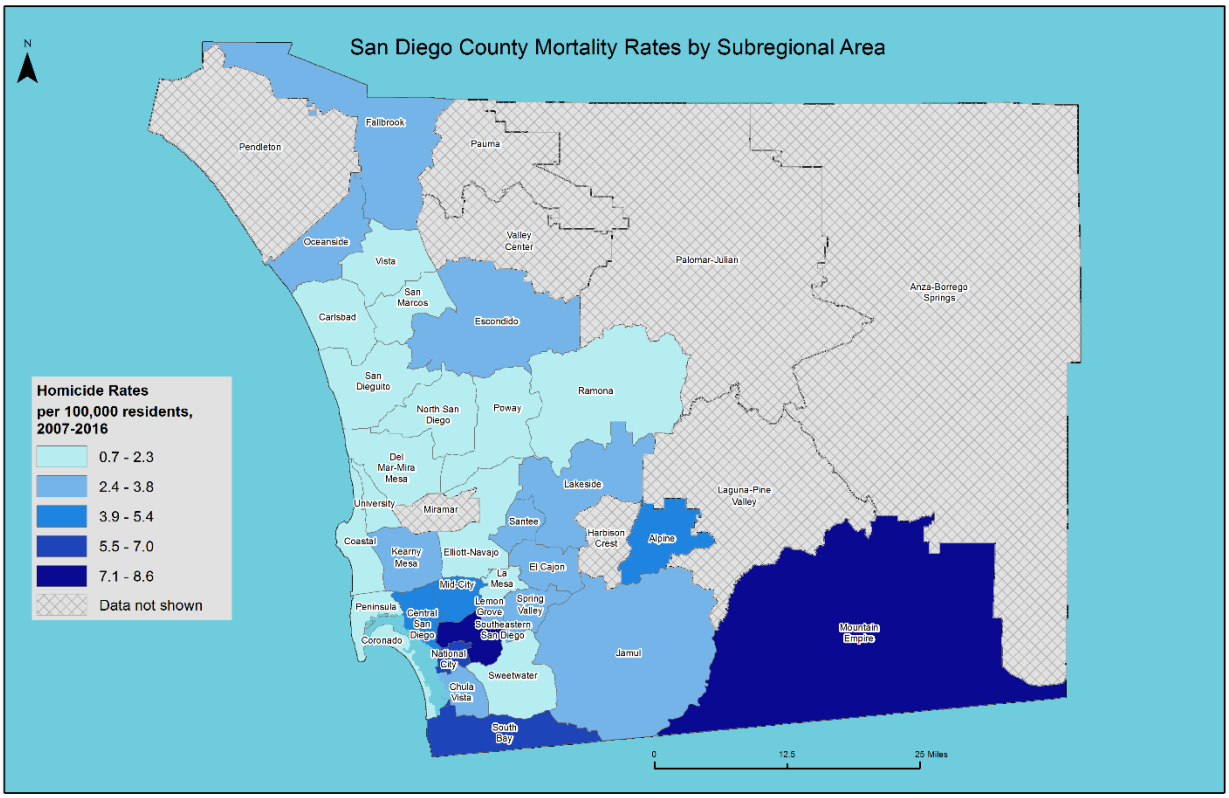
Year	2012	2013	2014	2015	2016
Number	122	88	90	93	116
Rate per 100,000	3.9	2.8	2.8	2.9	3.5

HOMICIDE RATE PER 100,000 COMPARED TO NATIONAL AND STATE RATES



Sources: US - USDOJ FBI Criminal Justice Information Services Division. https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/table-1 Crime in the U.S.; accessed 5/3/2017. CA - *Homicide in California*, Kamala D. Harris, Atty. General, California Department of Justice.

HOMICIDE RATE PER 100,000 BY SUBREGIONAL AREA, 2007 - 2016



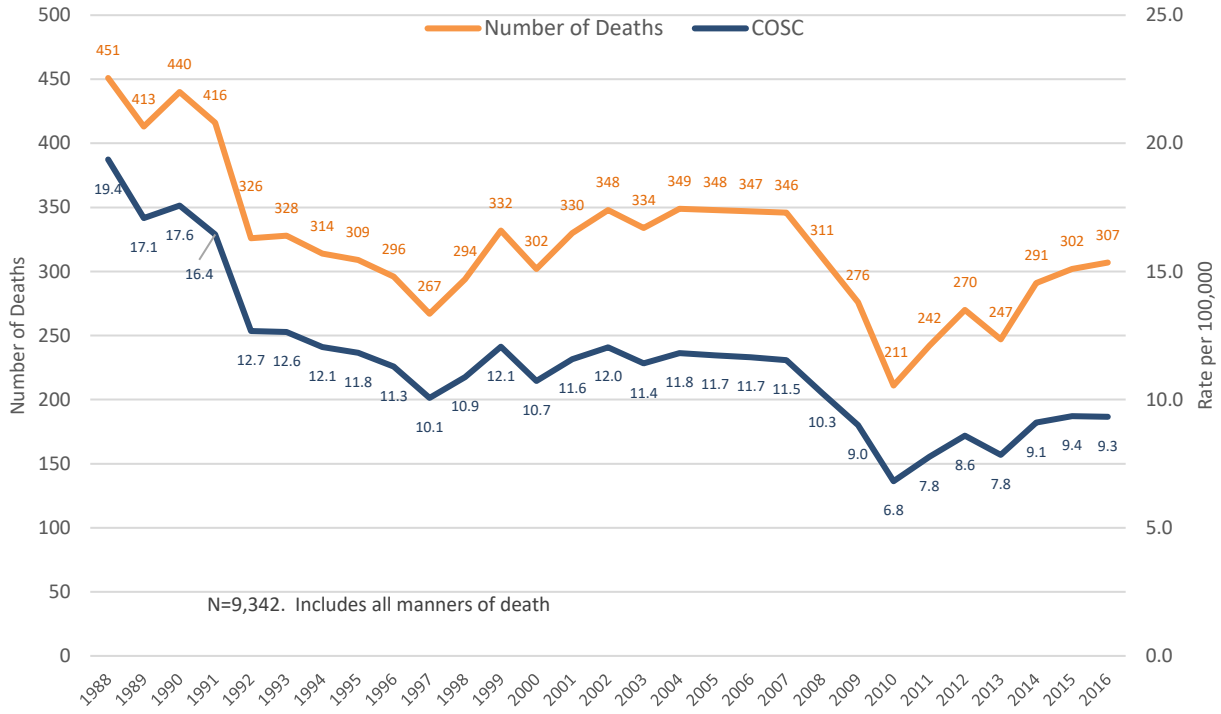
*Rates per 100,000 residents, 2007-2016. Rates are not shown for fewer than 5 deaths.
**Subregional Area location of 'residence' was used where available, and 'event' or 'death' used to fill in missing data.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

8.6	Mountain Empire	3.1	Harbison Crest	1.3	Poway
8.1	Southeastern San Diego	2.9	Santee	1.2	Elliott Navajo
5.5	National City	2.9	San Diego County	1.2	Del Mar Mira Mesa
5.5	South Bay	2.7	Escondido	0.9	Peninsula
4.9	Central San Diego	2.4	Chula Vista	0.7	San Dieguito
4.7	Mid City	2.4	Kearny Mesa	0.7	North San Diego
4.7	Alpine	2.1	Coronado	*	Anza Borrego Springs
3.8	Spring Valley	2.0	La Mesa	*	Laguna Pine Valley
3.5	Lemon Grove	1.9	Sweetwater	*	Miramar
3.4	Oceanside	1.7	Ramona	*	Palomar Julian
3.4	Jamul	1.6	Vista	*	Pauma
3.4	Lakeside	1.4	Carlsbad	*	Pendleton
3.3	Fallbrook	1.4	University	*	Valley Center
3.2	El Cajon	1.3	San Marcos		
3.2	Harbison Crest El Cajon[5]	1.3	Coastal		

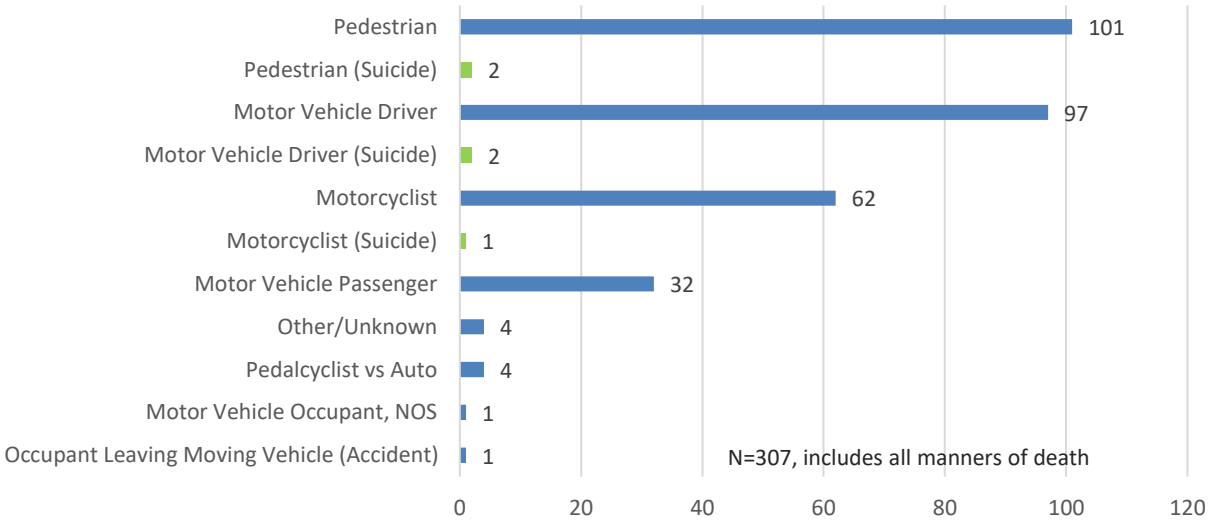
[5]Due to data aggregation methods, health data for the Harbison Crest SRA may be misleading. Health data is presented as an aggregate of the two SRAs, Harbison Crest/El Cajon for better data stability and representation of the area.

MOTOR VEHICLE FATALITIES

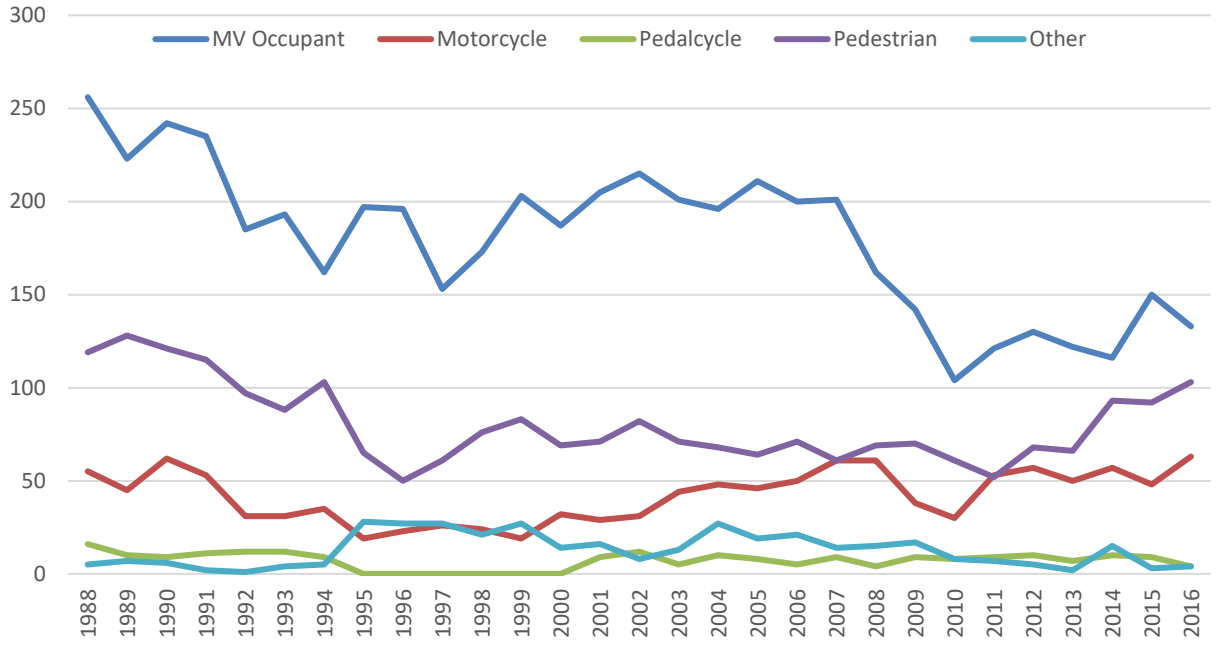
MOTOR VEHICLE RELATED FATALITIES: 1988 - 2016



MOTOR VEHICLE-RELATED FATALITIES BY VICTIM TYPE: 2016



TRAFFIC-RELATED FATALITIES BY YEAR, 1988 - 2016

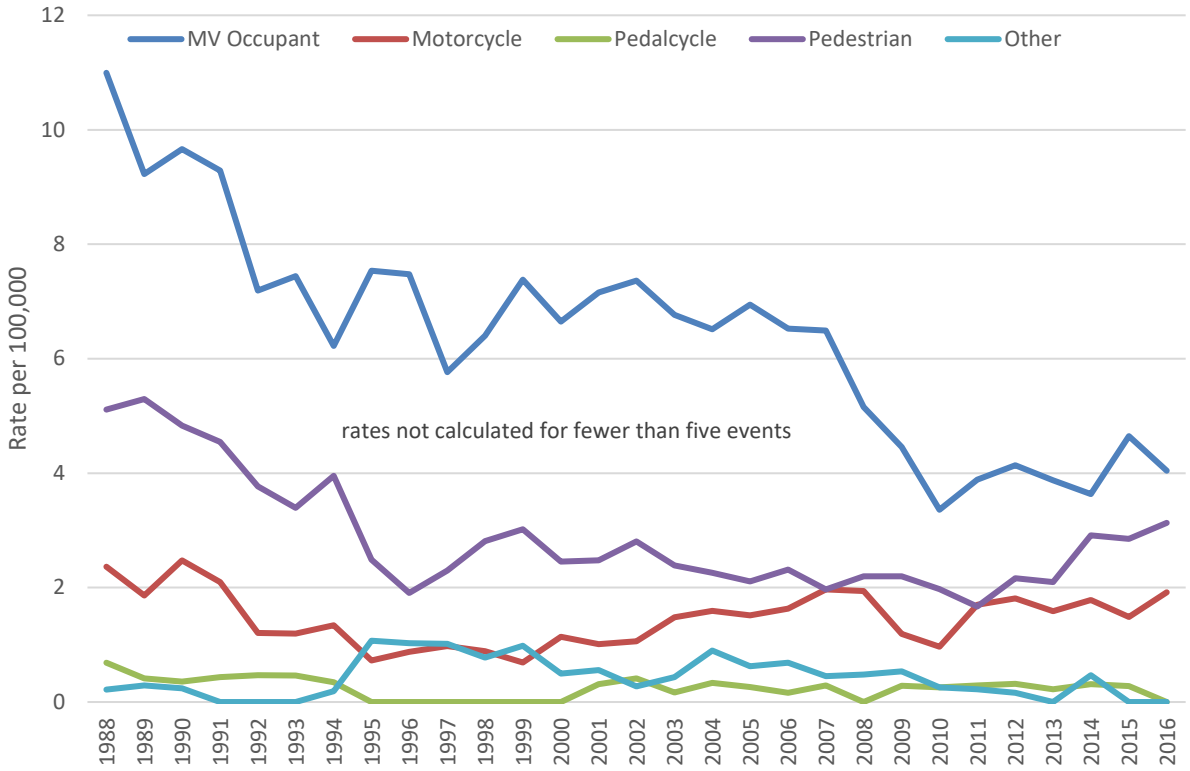


	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MV Occupant	256	223	242	235	185	193	162	197	196	153	173	203
Motorcycle	55	45	62	53	31	31	35	19	23	26	24	19
Pedalcycle	16	10	9	11	12	12	9	0	0	0	0	0
Pedestrian	119	128	121	115	97	88	103	65	50	61	76	83
Other	5	7	6	2	1	4	5	28	27	27	21	27
Total	451	413	440	416	326	328	314	309	296	267	294	332

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
MV Occupant	187	205	215	201	196	211	200	201	162	142	104	121
Motorcycle	32	29	31	44	48	46	50	61	61	38	30	53
Pedalcycle	0	9	12	5	10	8	5	9	4	9	8	9
Pedestrian	69	71	82	71	68	64	71	61	69	70	61	52
Other	14	16	8	13	27	19	21	14	15	17	8	7
Total	302	330	348	334	349	348	347	346	311	276	211	242

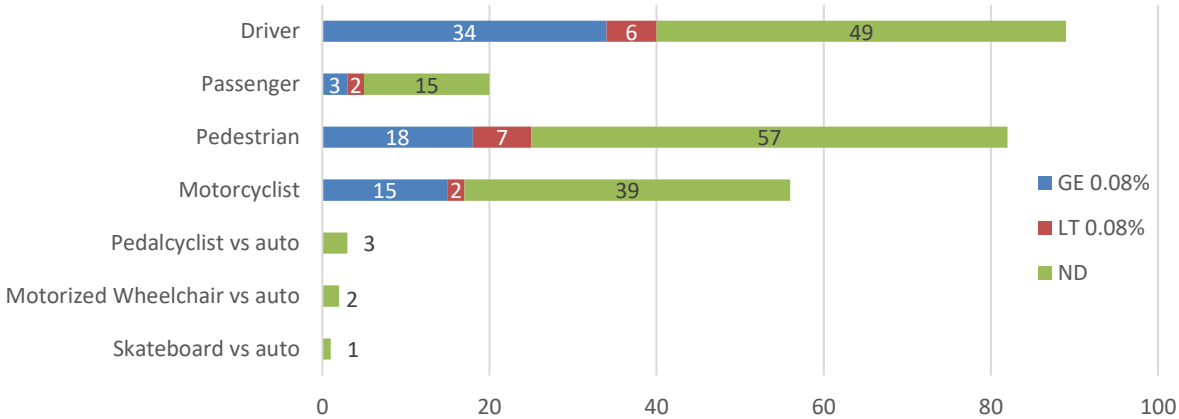
	2012	2013	2014	2015	2016
MV Occupant	130	122	116	150	133
Motorcycle	57	50	57	48	63
Pedalcycle	10	7	10	9	4
Pedestrian	68	66	93	92	103
Other	5	2	15	4	4
Total	270	247	291	302	307

TRAFFIC-RELATED FATALITY RATE BY YEAR, 1988 - 2016



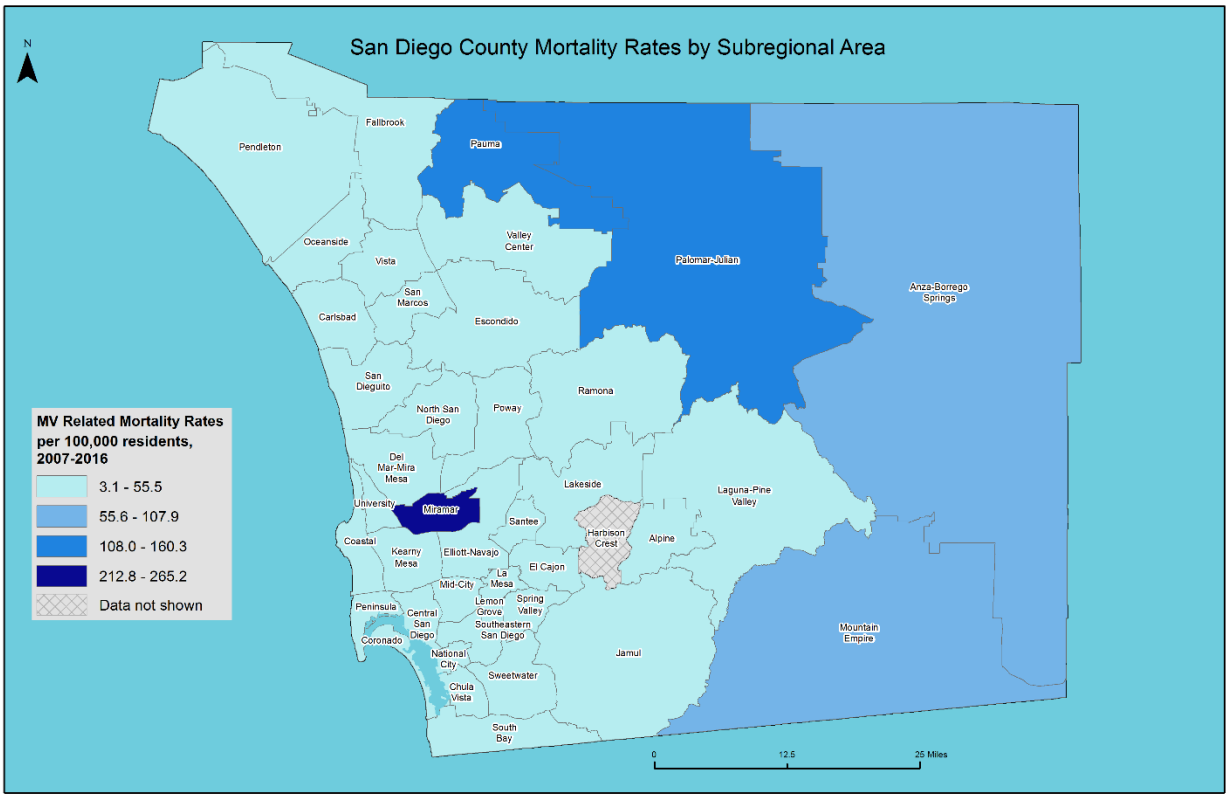
Motor vehicle occupant death rates dropped by more than half from the late 1980's to 2010, and have remained relatively low for the past seven years. Motorcyclist deaths sharply declined from 1988 to the late 1990's, coinciding with the implementation of California's mandatory helmet law. But much of this decline has reversed over the last 15 years. Pedestrian fatalities continued the upward trend seen over the last six years.

ALCOHOL TOXICOLOGY BY MOTOR VEHICLE VICTIM TYPE: 2016



Total of 253 tested; 54 not tested, usually representing delayed deaths with no appropriate sample availble

MOTOR VEHICLE RELATED DEATH RATES BY SUBREGIONAL AREA, 2007 – 2016



*Rates per 100,000 residents, 2007-2016. . Rates are not shown for fewer than 5 deaths.
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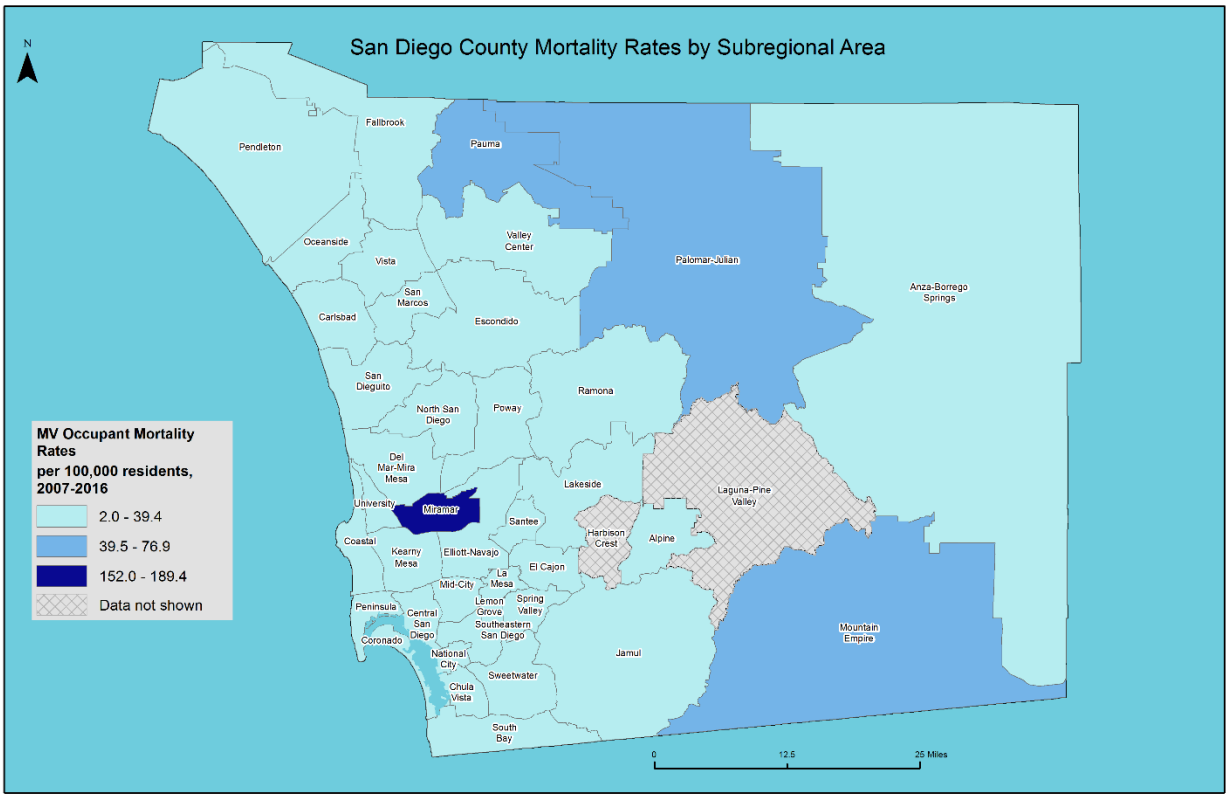
*Rates per 100,000 residents, 2007-2016.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

265.2 Miramar	10.8 Pendleton	6.8 Oceanside
134.5 Pauma	10.5 Harbison Crest	6.0 Chula Vista
114.5 Palomar Julian	10.1 Escondido	6.0 San Marcos
70.9 Mountain Empire	8.7 San Diego County	5.9 Southeastern San Diego
67.8 Anza Borrego Springs	8.4 Harbison Crest El Cajon5	5.9 Carlsbad
32.1 Jamul	8.4 Vista	5.7 Mid City
29.7 Alpine	8.2 Coastal	5.7 South Bay
27.4 Valley Center	8.1 La Mesa	5.3 Spring Valley
20.6 Fallbrook	8.0 San Dieguito	4.8 Peninsula
18.7 Ramona	7.9 Santee	4.7 Del Mar Mira Mesa
17.6 Laguna Pine Valley	7.7 Coronado	4.5 Poway
12.5 Kearny Mesa	7.7 University	3.9 North San Diego
12.0 Lakeside	7.1 El Cajon	3.1 Sweetwater
11.1 Central San Diego	7.0 Lemon Grove	
11.1 National City	6.9 Elliott Navajo	

MOTOR VEHICLE OCCUPANT DEATH RATES BY SUBREGIONAL AREA, 2006 – 2016



*Rates per 100,000 residents, 2007-2016. . Rates are not shown for fewer than 5 deaths.
**Subregional Area location of 'event' was used where available, and 'residence' or 'death' used to fill in missing data.
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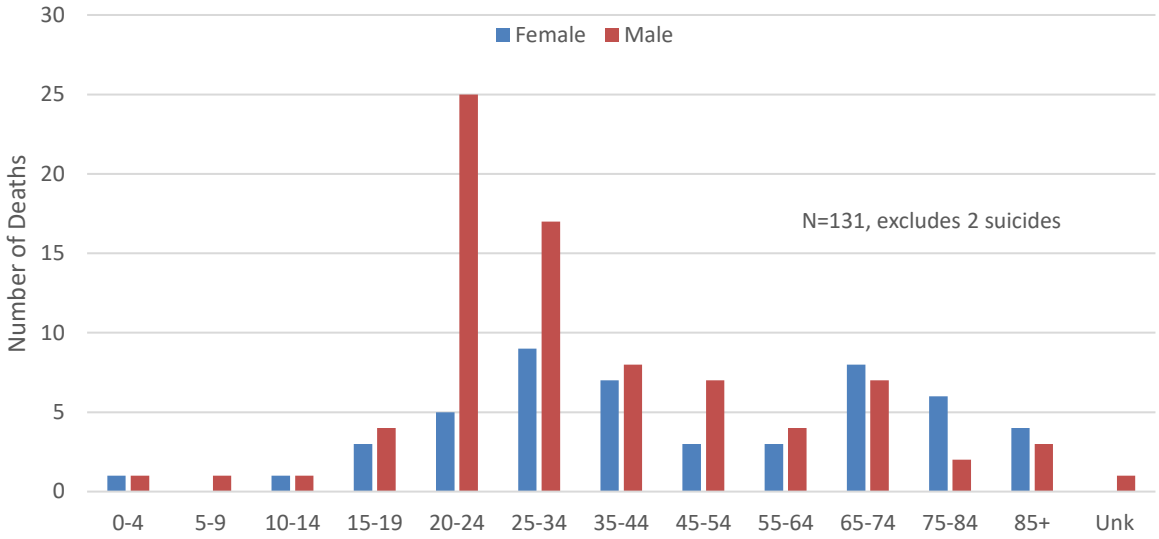
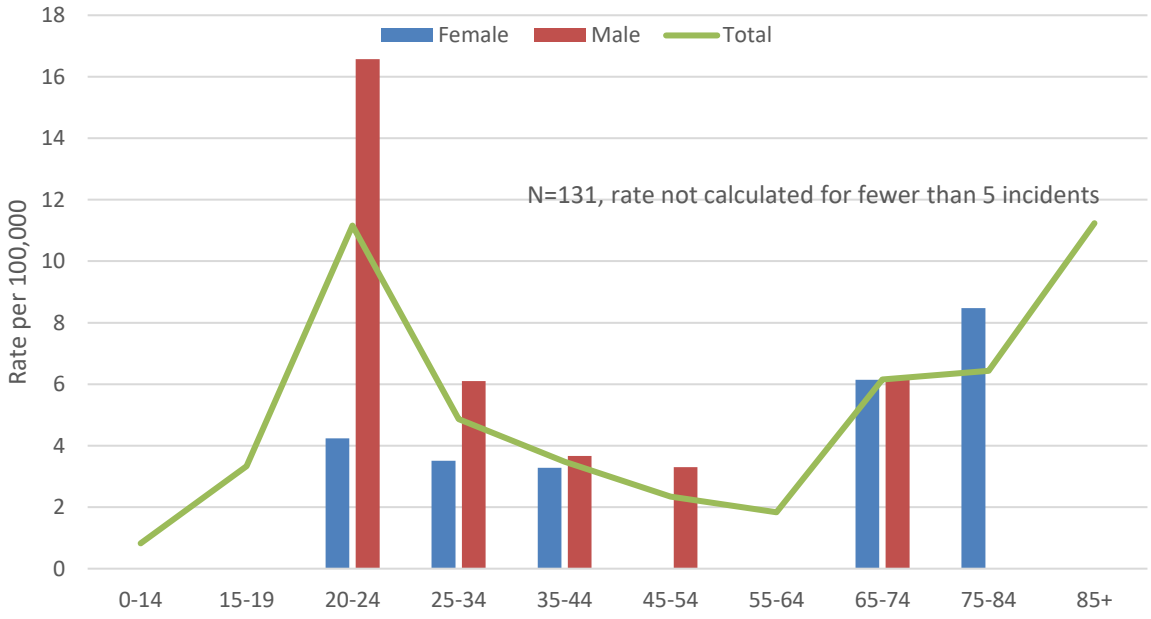
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

189.4 Miramar	4.9 Santee	2.6 South Bay
63.0 Palomar Julian	4.9 University	2.6 Carlsbad
61.3 Pauma	4.8 San Dieguito	2.5 Poway
45.1 Mountain Empire	4.4 Harbison Crest	2.5 Southeastern San Diego
23.0 Anza Borrego Springs	4.3 San Diego County	2.5 Spring Valley
20.4 Alpine	4.1 Central San Diego	2.5 Mid City
18.0 Jamul	4.1 Elliott Navajo	2.4 Peninsula
15.4 Valley Center	3.9 Coastal	2.4 Chula Vista
13.3 Fallbrook	3.8 La Mesa	2.4 Del Mar Mira Mesa
9.6 Ramona	3.6 Vista	2.2 North San Diego
9.0 Pendleton	3.5 Lemon Grove	2.1 El Cajon
6.3 Kearny Mesa	3.2 National City	2.0 Sweetwater
6.2 Lakeside	3.0 Harbison Crest El Cajon5	* Laguna Pine Valley
5.6 Coronado	2.8 Oceanside	
5.4 Escondido	2.8 San Marcos	

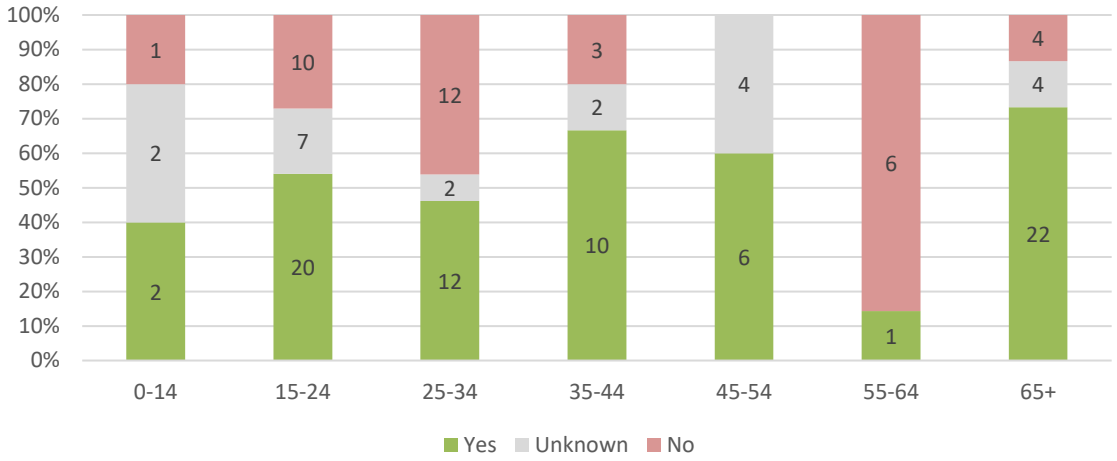
NUMBER OF MOTOR VEHICLE OCCUPANTS DEATHS BY AGE AND GENDER, 2016



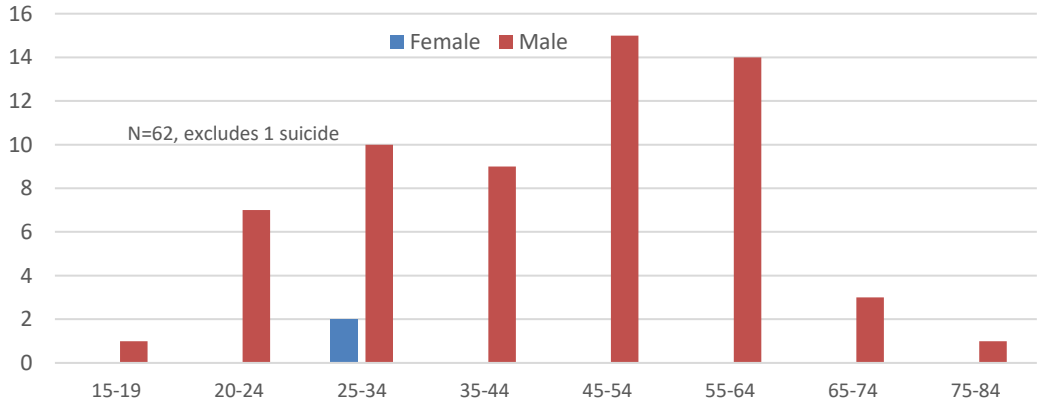
RATE OF MOTOR VEHICLE OCCUPANTS DEATHS BY AGE AND GENDER, 2016



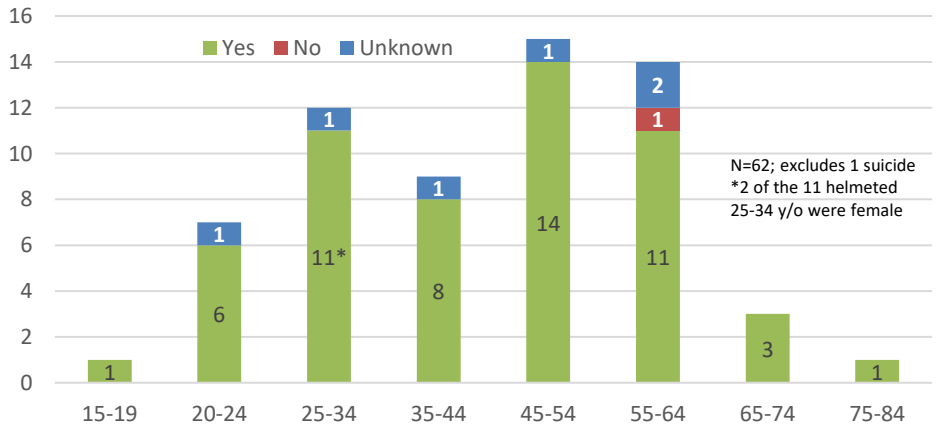
SEAT BELT USE BY AGE GROUP: MOTOR VEHICLE OCCUPANTS, 2016



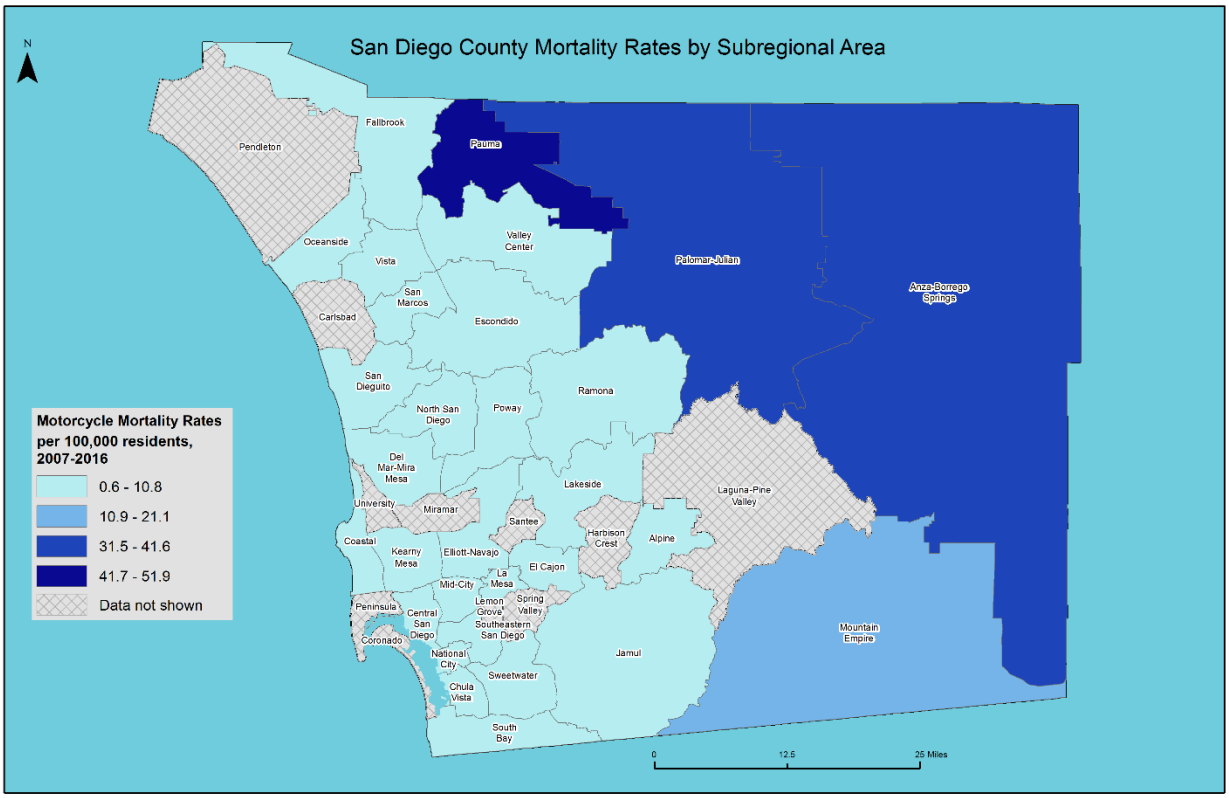
UNINTENTIONAL MOTORCYCLIST DEATHS BY AGE AND GENDER, 2016



HELMET USE: UNINTENTIONAL MOTORCYCLIST FATALITIES, 2016



MOTORCYCLE DEATHS BY SUBREGIONAL AREA, 2007 – 2016



*Rates per 100,000 residents, 2007-2016. . Rates are not shown for fewer than 5 deaths.
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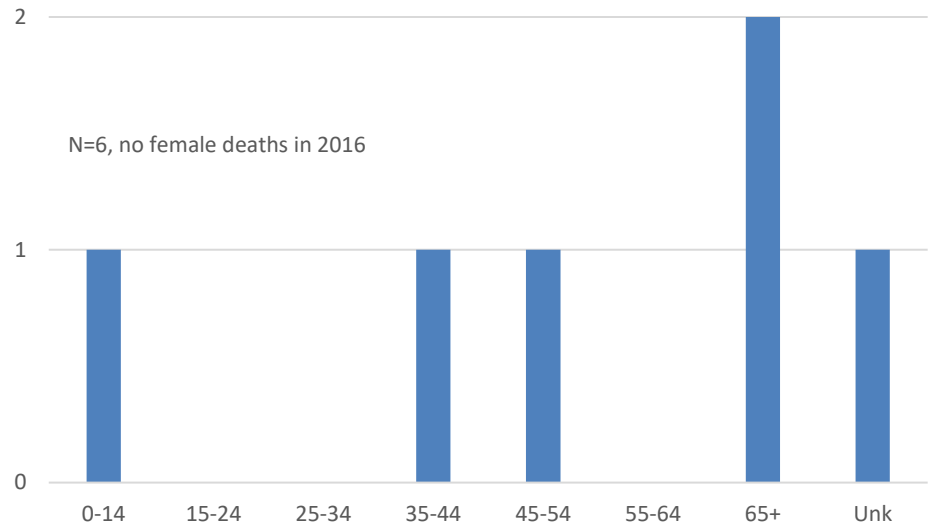
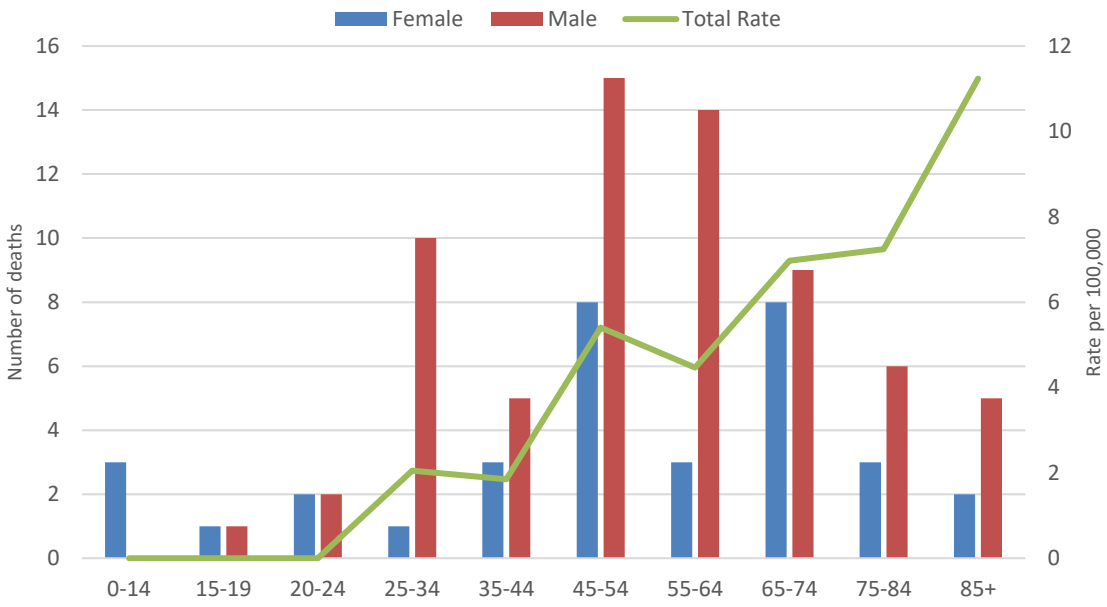
51.9	Pauma	1.6	Vista	0.7	Southeastern San Diego
40.1	Palomar Julian	1.6	San Marcos	0.6	Sweetwater
34.5	Anza Borrego Springs	1.5	Oceanside	0.6	North San Diego
18.3	Mountain Empire	1.5	Harbison Crest	*	Carlsbad
10.7	Jamul	1.3	Harbison Crest El Cajon5	*	Coronado
5.8	Alpine	1.3	San Dieguito	*	Laguna Pine Valley
5.5	Ramona	1.2	El Cajon	*	Lemon Grove
5.1	Valley Center	1.1	La Mesa	*	Miramar
4.2	Fallbrook	1.1	Poway	*	Pendleton
2.4	Lakeside	0.9	Mid City	*	Peninsula
2.1	Kearny Mesa	0.9	Coastal	*	Santee
1.8	National City	0.9	Chula Vista	*	Spring Valley
1.6	Escondido	0.9	Elliott Navajo	*	University
1.6	Central San Diego	0.9	South Bay		
1.6	San Diego County	0.7	Del Mar Mira Mesa		

PEDALCYCLIST DEATHS BY AGE AND GENDER, 2016

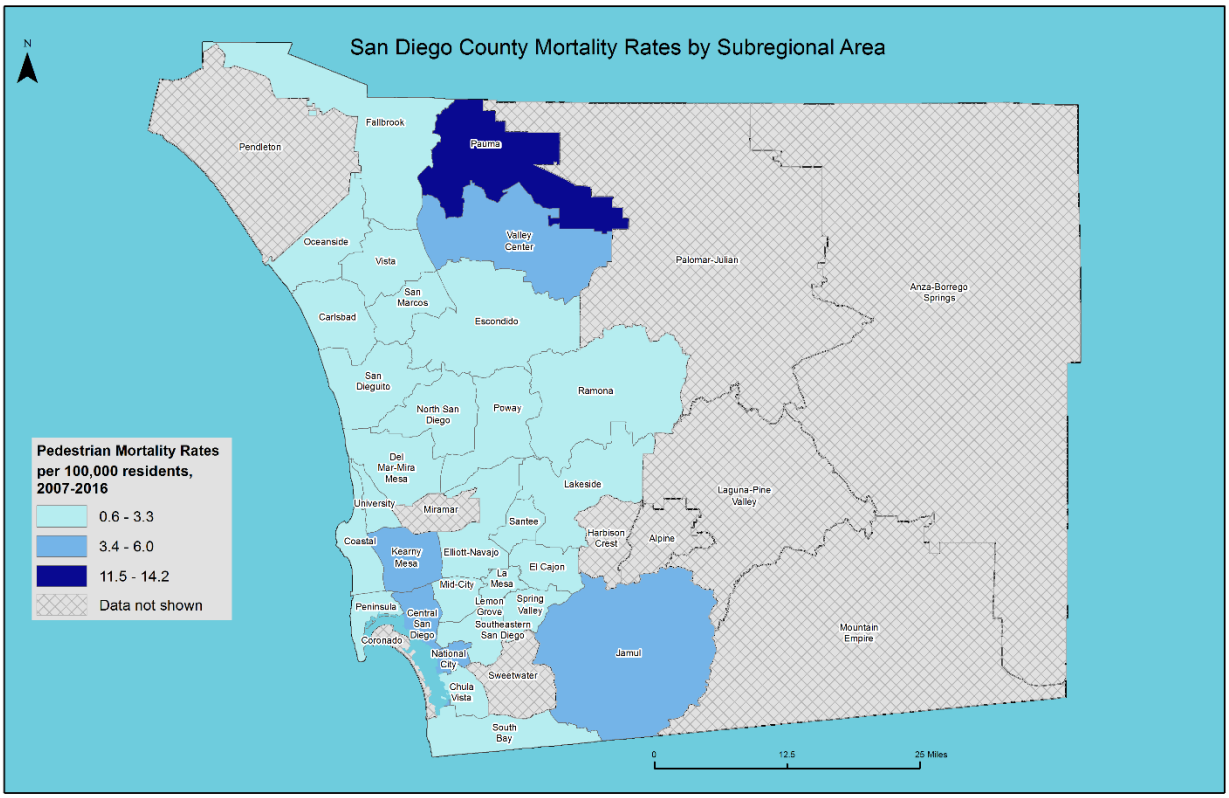


UNINTENTIONAL PEDESTRIAN DEATHS BY AGE AND GENDER, 2016



N=101, excludes 2 suicides, rates not caculated for fewer than 5 incidents

PEDESTRIAN DEATHS PER 100,000 BY SUBREGIONAL AREA, 2007 – 2016



*Rates per 100,000 residents, 2007-2016. . Rates are not shown for fewer than 5 deaths.
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14.2	Pauma	2.4	Lakeside	1.3	San Dieguito
5.5	National City	2.4	Escondido	1.1	Peninsula
4.0	Valley Center	2.2	Chula Vista	0.9	North San Diego
4.0	Central San Diego	2.2	University	0.6	Poway
3.5	Kearny Mesa	2.2	San Diego County	*	Alpine
3.4	Jamul	2.2	Oceanside	*	Anza Borrego Springs
3.2	Harbison Crest	2.1	Mid City	*	Coronado
3.0	Harbison Crest El Cajon5	1.9	Lemon Grove	*	Laguna Pine Valley
2.9	La Mesa	1.7	Fallbrook	*	Miramar
2.9	El Cajon	1.6	Elliott Navajo	*	Mountain Empire
2.9	Vista	1.5	Santee	*	Palomar Julian
2.8	Coastal	1.5	South Bay	*	Pendleton
2.6	Southeastern San Diego	1.4	Del Mar Mira Mesa	*	Sweetwater
2.5	Ramona	1.3	San Marcos		
2.5	Carlsbad	1.3	Spring Valley		

UNINTENTIONAL DEATHS DUE TO MEDICATIONS, ALCOHOL, AND ILLICIT DRUGS

The following graphs represent medications, alcohol and prescription drugs that either alone or in combination represented a primary cause of death or contributed to a death. In other words, these substances were listed on the death certificate as playing a role in a death. In this publication, the word "drug" refers to illicit drugs and the word "medication" refers to medications normally obtained through a prescription.

In some cases, the intoxication contributed to the circumstances of the death and was *required* for an explanation of those circumstances, such as drowning in a bathtub while intoxicated (neurologically intact, sober adults should not drown in a bathtub unless they are unwilling or unable to get above the water line). However, in other cases such as motor vehicle fatalities although the crash may have been made more likely to occur because of the intoxication, by convention we do not include intoxications as part of the cause of death in these circumstances. The death certificate lists that type of death as having been due to physical injuries.

Where numbers of deaths related to an individual drug or medication are provided, one should not add the values of different substances to reach a total. This is because several medications may be involved in one case. In other words, the same case may be represented multiple times by different drugs or medications.

Some notable trends:

1. There has been a general increasing trend in unintentional deaths due to drugs and medications over the 15 years. After a drop in 2014, 2015 and 2016 have each seen an increase in the total number of these types of deaths.

2. After more than 10 years of increase, prescription medication death rates peaked in 2011/2012 and have shown a general decline or have plateaued over the last five years.

3. The largest groups of medications and drugs represented in this data are opiates (heroin, morphine, and related compounds) and benzodiazepines, similar to in previous years. Thirty two percent of prescription opiate deaths showed a benzodiazepine present, and 83 percent of deaths with benzodiazepines had a prescription opiate present.

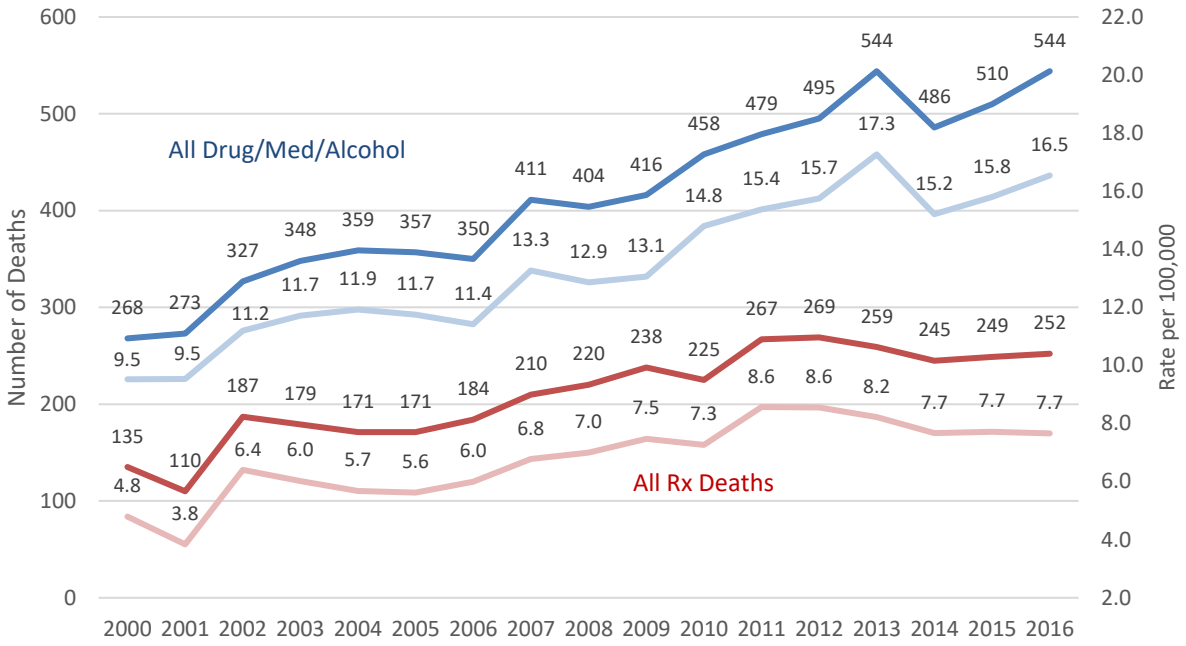
4. Heroin has continued its increase in frequency seen since 2005/2006. It was the most common drug/medication in those between 20 and 29 years of age over the last five years. In 56 percent of heroin deaths, a stimulant was also present, and of those cases 90 percent represented methamphetamine. In contrast to prescription opiates, 22 percent of heroin deaths also showed a benzodiazepine present, usually alprazolam or diazepam.

5. Methamphetamine was still the largest cause of drug/medication- related deaths in 2016, rising to an all-time high. Methamphetamine was also the number one or two ranked substance in those between 10 and 69 years of age in 2016, and over the last five years. Most (62 percent) methamphetamine deaths showed no other substance present, but 76 percent of the "meth only" decedents also experienced cardiovascular disease. Of the methamphetamine deaths with another substance present, half included heroin.

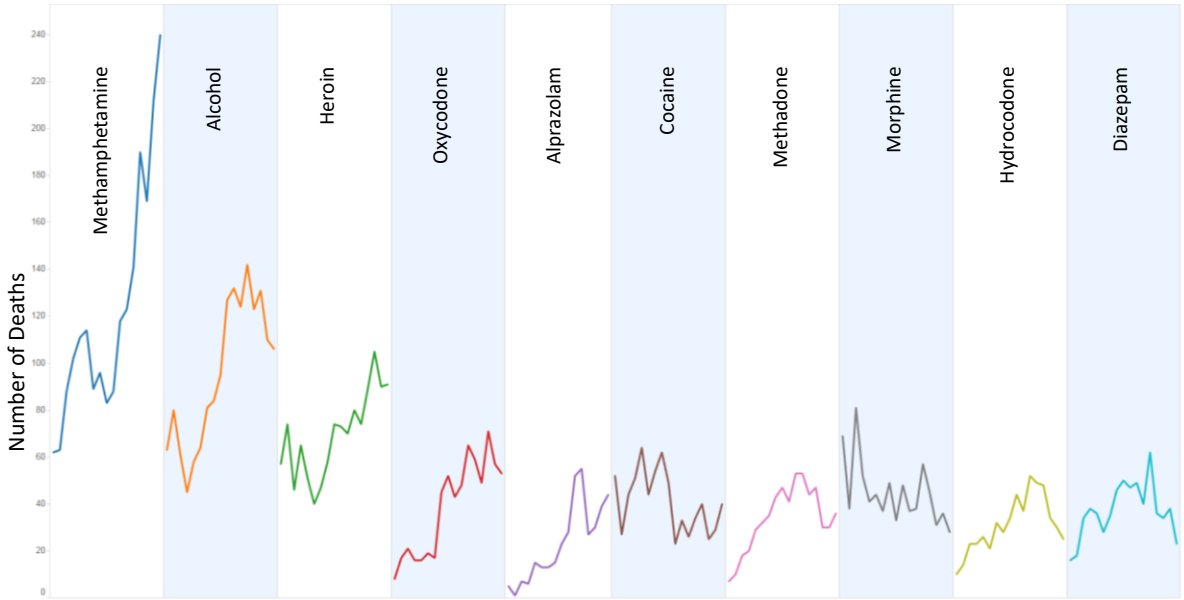
6. The highest rate of drug/medication deaths is between those ages 45 to 64 years, with an approximately 2:1 male:female ratio.

7. 2016 saw cases involving four novel psychoactive substances (i.e. designer drugs). These included one acetyl fentanyl death, one mitragynine death (also known as kratom, a plant-derived opioid), and two U-47700 deaths (an opioid analgesic developed in the 1970's and not available for human use).

NUMBER OF UNINTENTIONAL DRUG/ALCOHOL RELATED DEATHS, 2000 – 2016

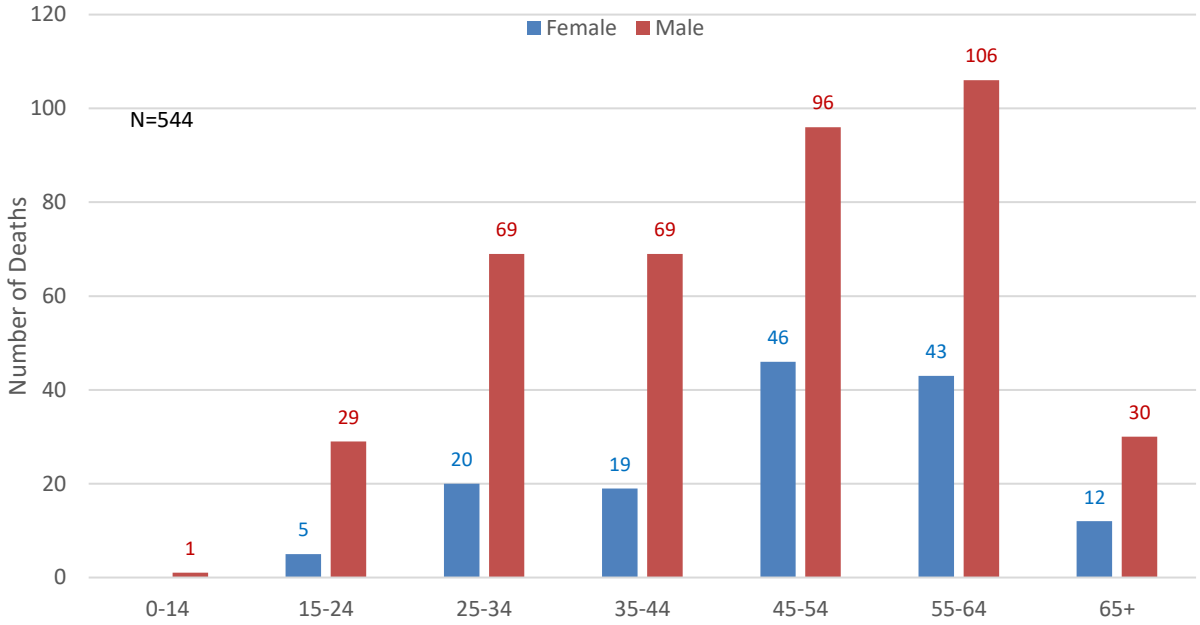


NUMBER OF DEATHS DUE TO SELECTED SUBSTANCES, 2000 – 2016

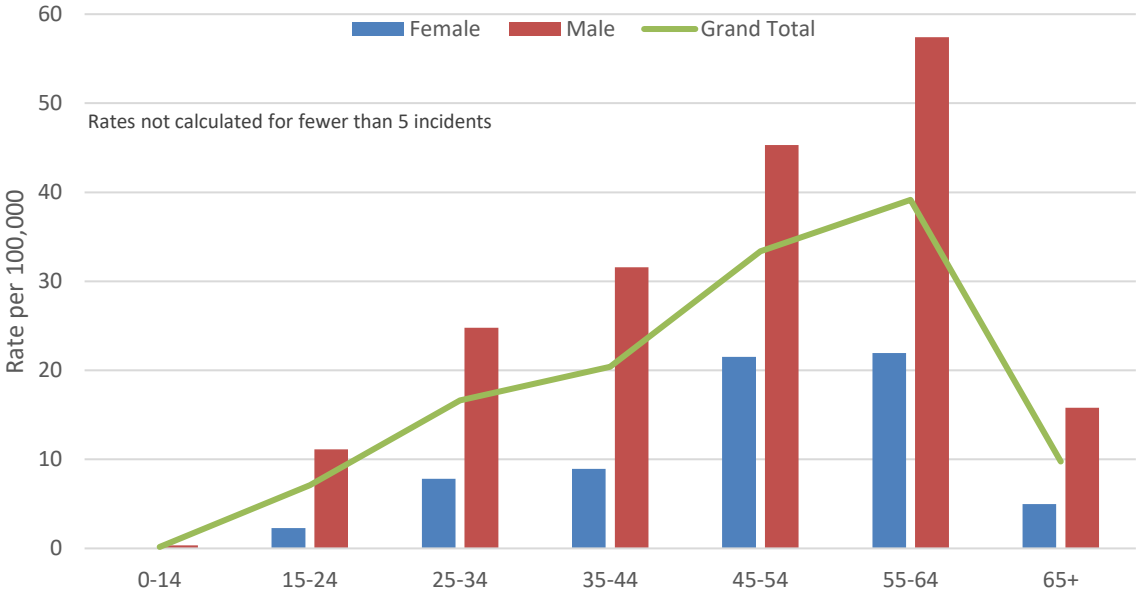


Each vertical band represents years 2000 – 2016;
Substances sorted left to right by 2016 value

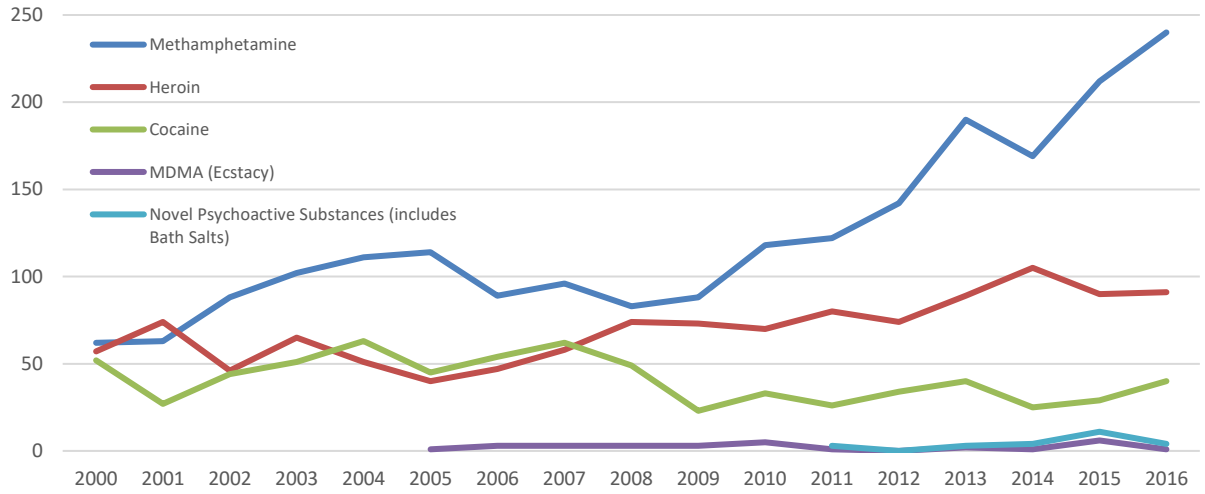
NUMBER OF DRUG/MED/ALCOHOL DEATHS BY AGE AND GENDER, 2016



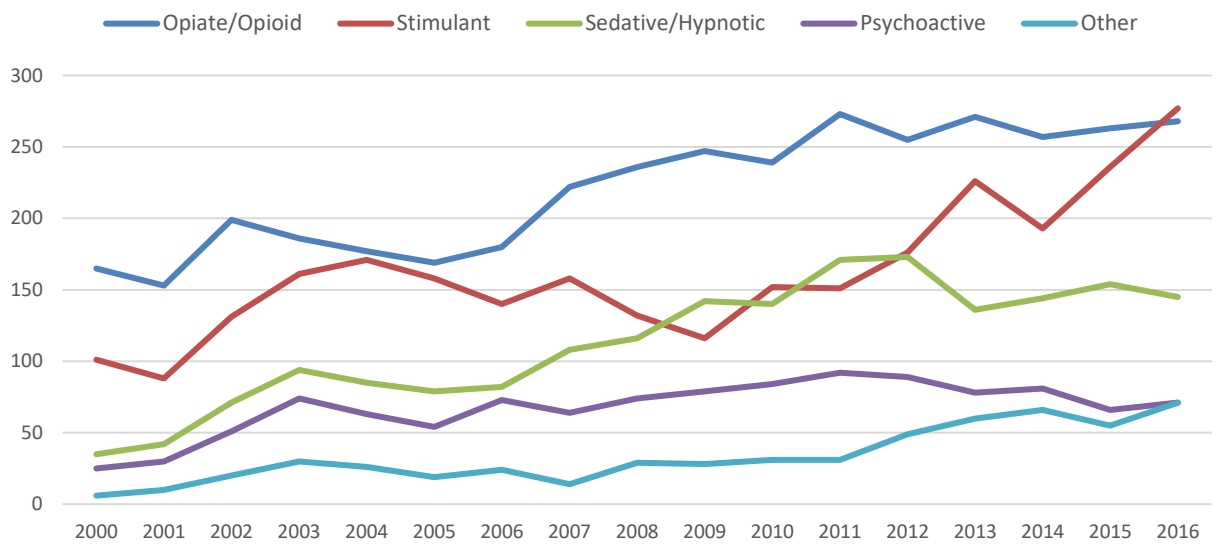
RATES OF DRUG/MED/ALCOHOL DEATHS BY AGE AND GENDER, 2016



UNINTENTIONAL ILLICIT DRUG DEATHS, 2000 – 2016



UNINTENTIONAL DEATHS DUE TO DRUG/MEDICATION TYPE, 2000 – 2016



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Opiate/Opioid	165	153	199	186	177	169	180	222	236	247	239	273	255	271	257	263	268
Stimulant	101	88	131	161	171	158	140	158	132	116	152	151	176	226	193	236	277
Sedative/Hypnotic	35	42	71	94	85	79	82	108	116	142	140	171	173	136	144	154	145
Psychoactive	25	30	51	74	63	54	73	64	74	79	84	92	89	78	81	66	71
Other	6	10	20	30	26	19	24	14	29	28	31	31	49	60	66	55	71

UNINTENTIONAL DEATHS - SELECTED DRUGS & MEDICATIONS, 2000 – 2016

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Methamphetamine	62	63	88	102	111	114	89	96	83	88	118	122	142	190	169	212	240
Alcohol	63	80	61	45	58	64	81	84	95	127	132	124	142	123	131	110	106
Heroin	57	74	46	65	51	40	47	58	74	73	70	80	74	89	105	90	91
Morphine	69	38	81	52	40	45	37	49	33	48	37	38	57	45	31	36	28
Cocaine	52	27	44	51	63	45	54	62	49	23	33	26	34	40	25	29	40
Oxycodone	8	17	21	16	16	19	17	45	52	43	48	65	59	49	71	57	53
Diazepam	16	18	34	38	36	28	35	46	50	47	49	40	62	36	34	38	23
Methadone	7	10	18	20	29	32	35	43	47	41	53	53	44	47	30	30	36
Hydrocodone	10	14	23	23	26	21	32	28	34	44	37	52	49	48	34	30	25
Alprazolam		5	1	7	6	15	13	13	15	23	28	52	55	27	30	39	44
Diphenhydramine	2	5	14	13	14	10	14	21	17	21	21	30	25	30	26	23	35
Fentanyl	7	5	9	9	8	19	23	20	23	23	12	14	12	14	15	21	33
Tramadol	5	5	2	10	8	2	4	8	4	10	17	16	19	19	20	17	17
MDMA	1			1		1	3	3	3	3	5	1		2	1	6	1
Phencyclidine (PCP)			1							1		1		2	1	1	1
Novel Psychoactive Substances (NPS) – See table on page 89												3		3	4	11	4

UNINTENTIONAL DEATHS, TOP 25 DRUGS/MEDICATIONS BY AGE, 2016

Substance	15-19	20-24	25-34	34-44	45-54	55-64	65+	Total
Methamphetamine		**8**	**29**	**40**	**61**	**82**	**20**	**240**
Alcohol	1	3	20	8	41	23	10	106
Heroin	**1**	**10**	**34**	**15**	**13**	**14**	**4**	**91**
Oxycodone	2	4	4	5	14	21	3	53
Alprazolam		2	15	8	7	8	4	44
Gabapentin		2	6	7	13	12	3	43
Cocaine	**1**	**3**	**8**	**11**	**5**	**11**	**1**	**40**
Methadone	1		9	6	6	11	3	36
Diphenhydramine			10	9	7	8	1	35
Fentanyl		2	10	9	8	3	1	33
Morphine		2	4	4	6	11	1	28
Hydrocodone		1	1	3	9	10	1	25
Benzodiazepine			3	7	9	4	2	25
Diazepam	1	1	6	4	2	6	3	23
Trazodone		1	1	2	3	8	2	17
Clonazepam	1	1	3	2	3	6	1	17
Tramadol		1	2	3	6	4	1	17
Opiate			2	5	3	3	1	14
Citalopram			2	3	1	6	1	13
Carisoprodol				5	3	4	0	12
Quetiapine			2	1	4	2	2	11
Codeine		1	1	3	2	1	1	9
Difluoroethane		3		5		1	0	9
Zolpidem			1	1	3	4	0	9
Venlafaxine				2	6			8

Note: Because an individual case may be due to a combination of medications, the medications are not mutually exclusive.

NOVEL PSYCHOACTIVE SUBSTANCE-RELATED DEATHS, 2011 - 2016

	2011	2012	2013	2014	2015	2016
MDPV†	1		1			
Methylone†	2		1			
Ethylone†				1		
Mitragynine (Kratom)				1	4	2
AH-7921			1‡			
U-47700						1
Methoxyphencyclidine				1		
Methoxetamine			1‡			
Acetyl Fentanyl				1	3	1
Butyr Fentanyl					3	
Acetyl and Butyr Fentanyl					1	
Total NPS	**3**		**3**	**4**	**11**	**4**

†Bath salts; ‡Same case; No NPS were implicated in death prior to 2011

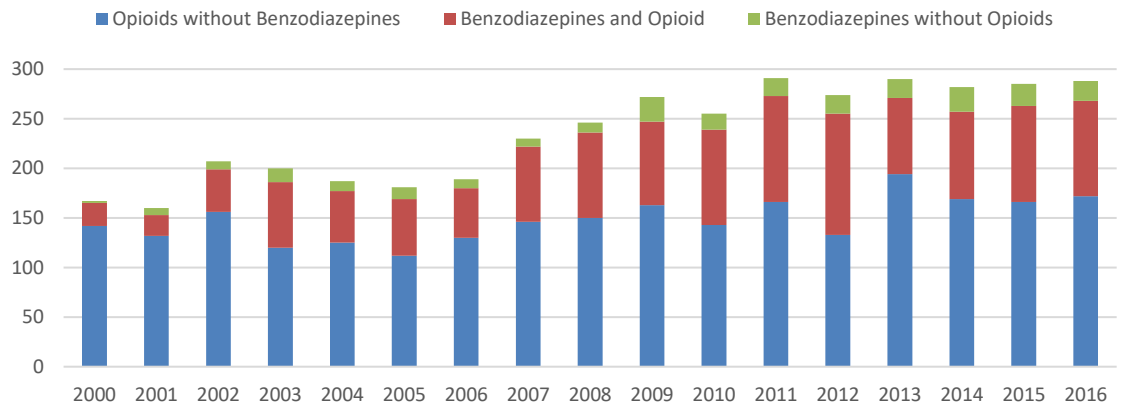
2016 UNINTENTIONAL DRUG/MED/ALCOHOL DEATHS BY COMBINATION

Illicit	217
Prescription	131
Prescription and Illicit	72
Alcohol	49
Prescription and Alcohol	31
Illicit and Alcohol	15
Prescription, Illicit and alcohol	7
Other	7
Prescription and OTC	6
Prescription, Illicit and OTC	2
Prescription, alcohol and OTC	2
Prescription, Illicit, Alcohol and OTC	1
Illicit and Other	1
Unknown	1
Illicit and OTC	1
Alcohol and Other	1

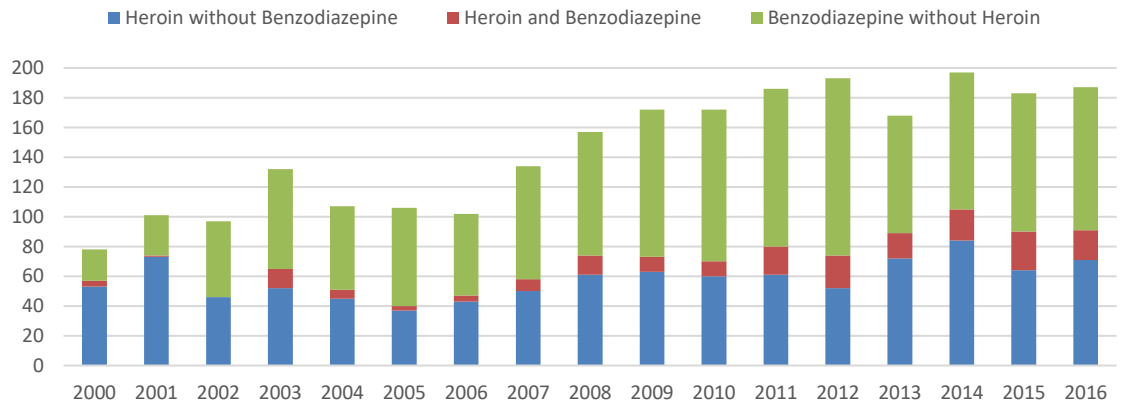
Note: includes all medication/alcohol/drug-related deaths whether the substance(s) were the primary cause of death or contributory to the death. Illicit – heroin, cocaine, ecstasy, methamphetamine, PCP, NPS as above. Prescription – medications *normally* obtained by prescription. OTC – over the counter medications. Other includes nine difluoroethane (a refrigerant used in compressed air, usually associated with "huffing") deaths.

UNINTENTIONAL DEATHS DUE TO OPIATES AND BENZODIAZEPINES, 2000 - 2016

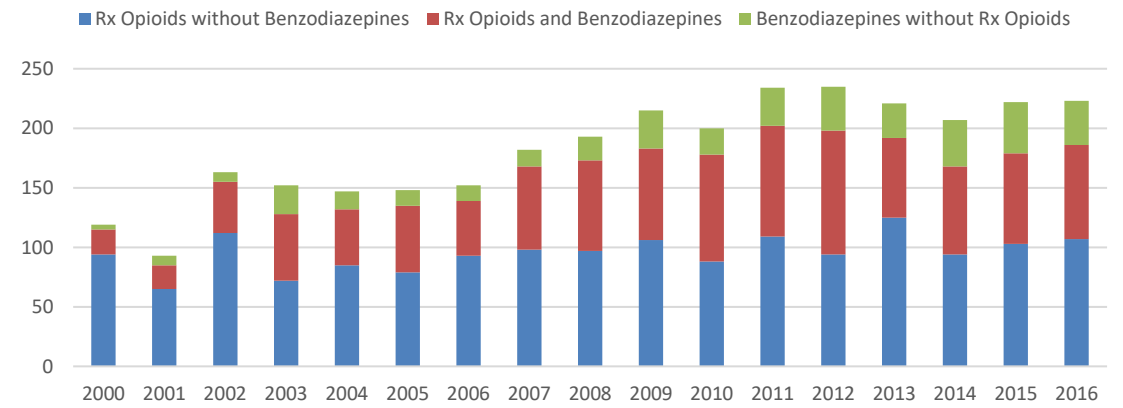
ALL OPIATES AND BENZODIAZEPINES



HEROIN AND BENZODIAZEPINES



PRESCRIPTION OPIATES AND BENZODIAZEPINES



RELATIVE FREQUENCY OF SUBSTANCES IN CAUSE OF DEATH BY AGE, 2016

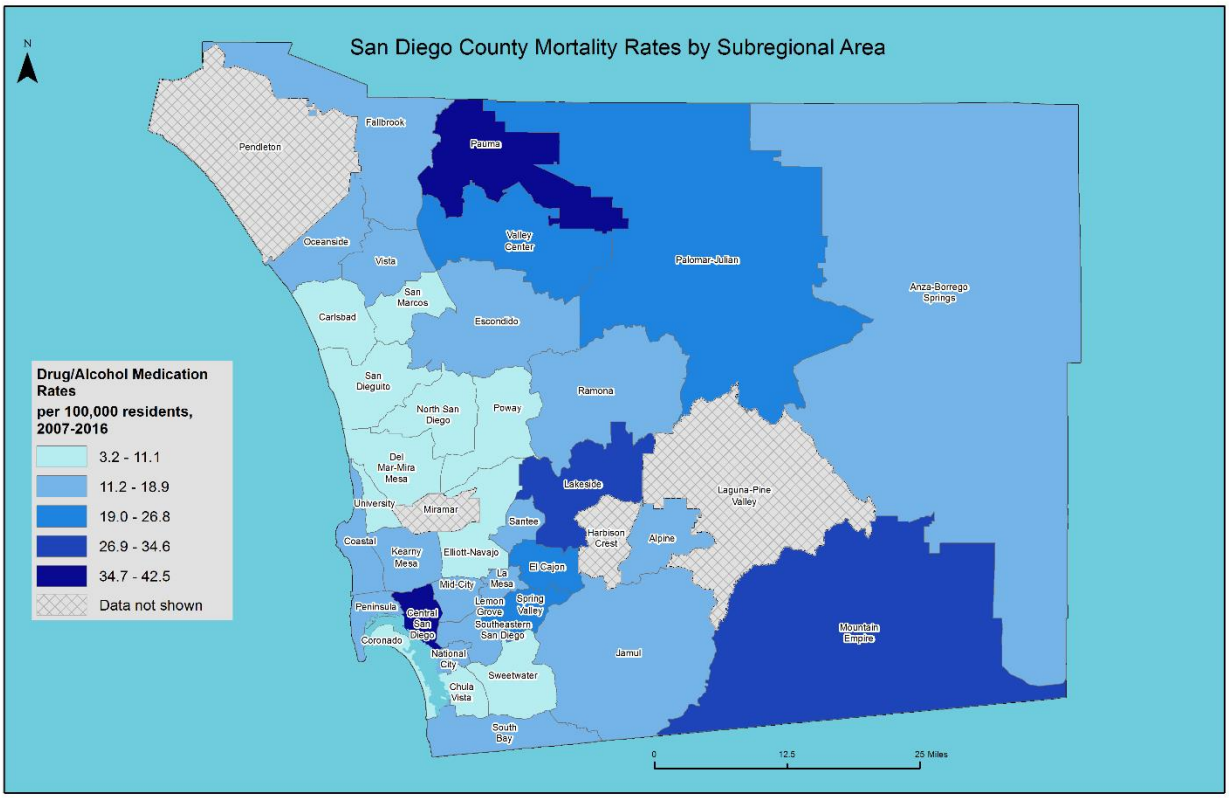
	10-19	20-29	30-39	40-49	50-59	60-69
1	Oxycodone (2)	Heroin (28)	Methamphetamine (33)	Methamphetamine (47)	Methamphetamine (87)	Methamphetamine (45)
2	*1 each of 8 difference substances*	Methamphetamine (23)	Heroin (27)	Alcohol (25)	Alcohol (31)	Alcohol (18)
3		Alcohol (9) Alprazolam (9)	Alcohol (19)	Gabapentin (13)	Oxycodone (17)	Oxycodone (13)
4		Cocaine (8)	Diphenhydramine (13) Fentanyl (13)	Oxycodone (12) Heroin (12)	Heroin (13)	Heroin (10)
5		Oxycodone (7)	Alprazolam (12)	Methadone (9) Alprazolam (9)	Hydrocodone (12) Gabapentin (12)	Methadone (7) Alprazolam (7)
6		Fentanyl (6)	Cocaine (10)	Benzodiazepine (7) Tramadol (7) Cocaine (7) Venlafaxine (7)	Morphine (11)	Morphine (6)

RELATIVE FREQUENCY OF SUBSTANCES IN CAUSE OF DEATH BY AGE, 5 YEAR CUMULATIVE, 2012-2016

	10-19	20-29	30-39	40-49	50-59	60-69
1	Oxycodone (9)	Heroin (133)	Methamphetamine (128)	Methamphetamine (221)	Methamphetamine (379)	Methamphetamine (127)
2	Alprazolam (5) Heroin (5)	Methamphetamine (84)	Heroin (114)	Alcohol (150)	Alcohol (221)	Alcohol (86)
3	Alcohol (3) Methadone (3) Morphine (3)	Alcohol (54)	Alcohol (81)	Heroin (68)	Oxycodone (106)	Oxycodone (43)
4	Clonazepam (2) MDMA (2) Methamphetamine (2) Diphenhydramine (2) Diazepam (2)	Alprazolam (42)	Alprazolam (49)	Oxycodone (56)	Heroin (90)	Morphine (38)
5	*1 each of nine different substances*	Cocaine (32)	Oxycodone (40)	Gabapentin (51)	Diazepam (68)	Heroin (37)
6		Oxycodone (3)	Methadone (33)	Hydrocodone (49)	Morphine (67)	Hydrocodone (35)

Blue Opiates Green Cocaine Orange Benzodiazepine
Yellow Methamphetamine Gray Alcohol

DRUG/MEDICATION RELATED DEATH RATES BY SUBREGIONAL AREA: 2007 – 2016

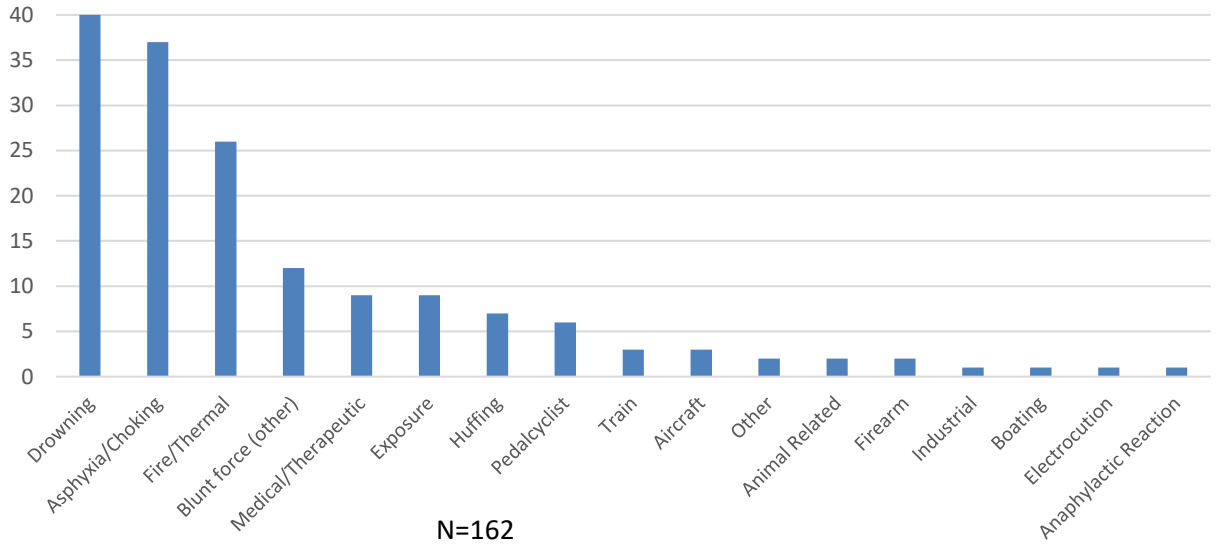


*Rates per 100,000 residents, 2007-2016. Rates are not shown for fewer than 5 deaths.
**Subregional Area location of 'residence' was used where available, and 'event' or 'death' used to fill in missing data.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

42.5 Pauma	17.2 Anza Borrego Springs	10.8 Carlsbad
36.7 Central San Diego	17.0 Mid City	10.8 San Marcos
34.6 Lakeside	16.9 Jamul	10.3 Coronado
33.3 Mountain Empire	16.7 La Mesa	10.1 San Dieguito
25.8 Palomar Julian	16.7 Oceanside	9.9 Elliott Navajo
24.9 Harbison Crest	16.3 Kearny Mesa	7.5 University
23.0 Lemon Grove	16.3 Ramona	6.8 Poway
21.9 Spring Valley	15.7 Vista	6.6 Del Mar Mira Mesa
21.3 Harbison Crest El Cajon5	15.2 Santee	5.6 North San Diego
19.4 Valley Center	15.0 San Diego County	3.2 Sweetwater
19.0 El Cajon	14.8 Escondido	* Laguna Pine Valley
17.6 Peninsula	13.7 Coastal	* Miramar
17.5 Alpine	13.0 South Bay	* Pendleton
17.4 National City	11.4 Fallbrook	
17.2 Southeastern San Diego	11.0 Chula Vista	

UNINTENTIONAL DEATHS, OTHERS

OTHER ACCIDENTAL MANNERS OF DEATH, 2016

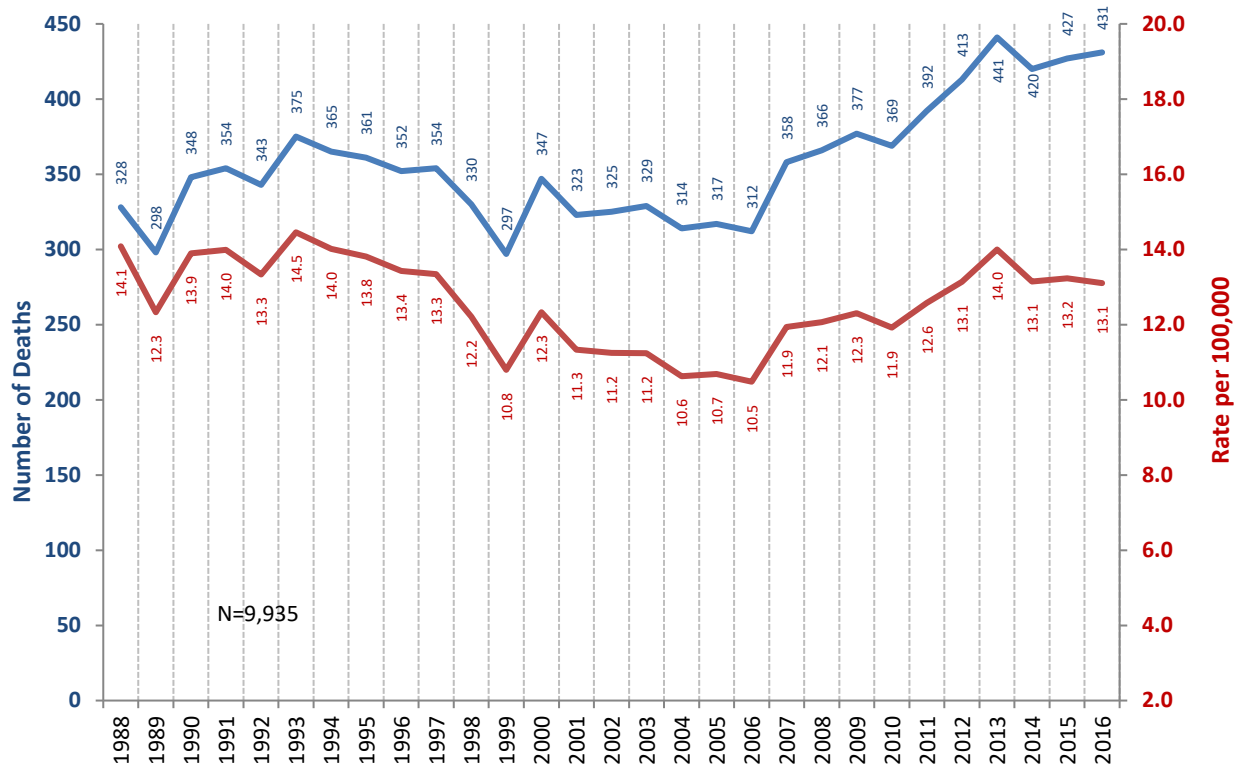


OTHER MECHANISMS OF ACCIDENTAL DEATH: MECHANISM BY AGE GROUP, 2016

	0-14	15-24	25-34	35-44	45-54	55-64	65+	Unk	Total
Drowning	3	2	4	4	12	4	10	1	40
Asphyxia/Choking	1	1			7	8	20		37
Fire/Thermal	2		2	3	2	6	11		26
Blunt force (other)	1			1	4	2	4		12
Medical/Therapeutic			2		3		4		9
Exposure		1	1		3	2	1	1	9
Huffing		2		3	1	1			7
Pedalcyclist	1			1	1		2	1	6
Train		1	1			1			3
Aircraft			1	1			1		3
Other				1			1		2
Animal Related	1						1		2
Firearm		1	1						2
Industrial				1					1
Boating					1				1
Electrocution				1					1
Anaphylactic Reaction				1					1
Grand Total	9	8	12	17	34	24	55	3	162

SUICIDES

SUICIDES BY YEAR: 1988 – 2016



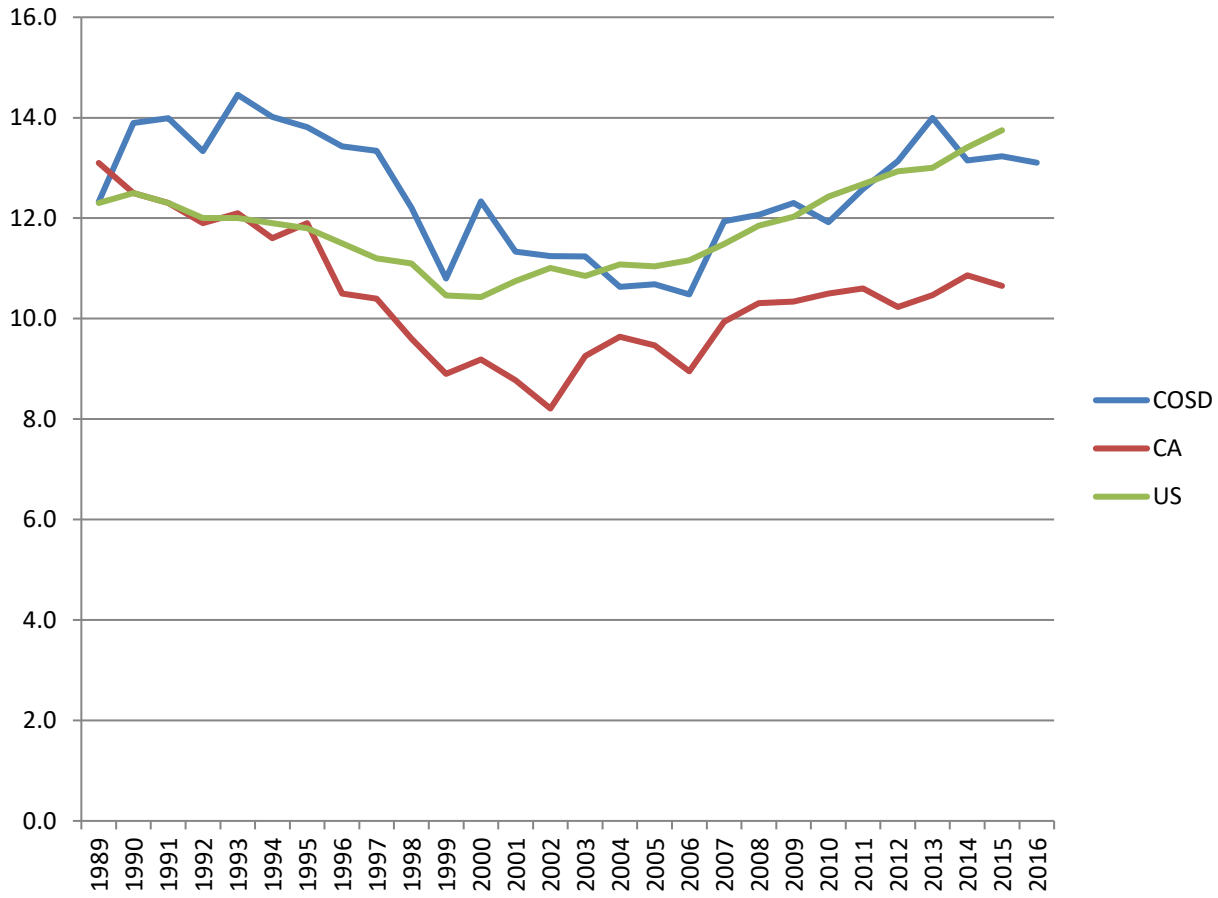
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number	**328**	**298**	**348**	**354**	**343**	**375**	**365**	**361**	**352**	**354**	**330**	**297**
Rate/100,000	**14.1**	**12.3**	**13.9**	**14.0**	**13.3**	**14.5**	**14.0**	**13.8**	**13.4**	**13.3**	**12.2**	**10.8**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number	**347**	**323**	**325**	**329**	**314**	**317**	**312**	**358**	**366**	**377**	**369**	**392**
Rate/100,000	**12.3**	**11.3**	**11.2**	**11.2**	**10.6**	**10.7**	**10.5**	**11.9**	**12.1**	**12.3**	**11.9**	**12.6**

	2012	2013	2014	2015	2016
Number	**413**	**441**	**420**	**427**	**431**
Rate/100,000	**13.1**	**14.0**	**13.1**	**13.2**	**13.1**

In 2014 – the most recent data available from the Centers for Disease Control and Prevention (CDC) – the national rate of suicide was highest among adults aged 45 to 59 years at 19.7 – 20.6 per 100,000 people. But when broken down by gender, men over 85 years old had the highest rate at 50 per 100,000.

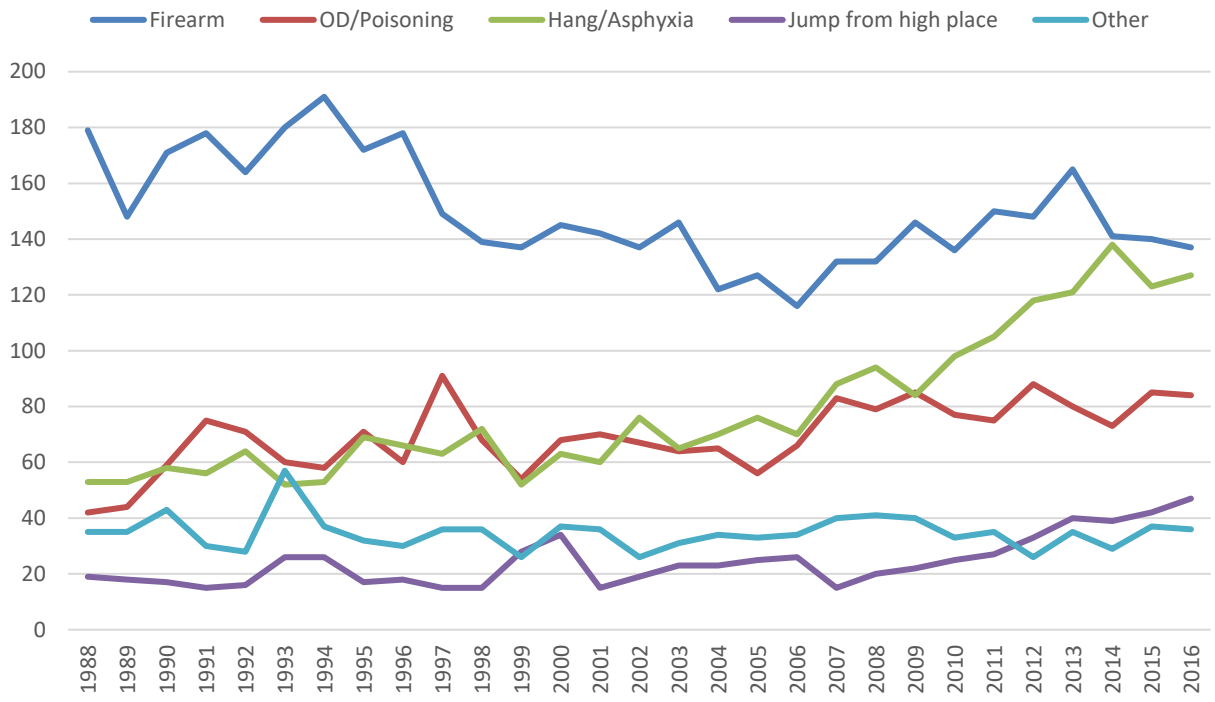
SUICIDE RATES BY YEAR: COUNTY, STATE, AND NATIONAL COMPARISON



Historically, suicide rates have followed national rates. However, San Diego County's rate is higher than that of California as a whole.

Sources: Years 1988-1998: National data - Centers for Disease Control and Prevention (CDC) data on American Foundation for Suicide Prevention website accessed June 2, 2015, http://www.afsp.org/understanding-suicide/facts-and-figures; State Data - CA Dept. of Public Health website, Suicide Deaths, California (various years), accessed June 16, 2015. Years 1999-2014: Centers for Disease Control and Prevention (CDC) Data & Statistics Fatal Injury Report for 2015, accessed May 15, 2017, crude rates, http://www.cdc.gov/injury/wisqars/fatal_injury_reports.html.

SUICIDE METHOD BY YEAR: 1988 - 2016

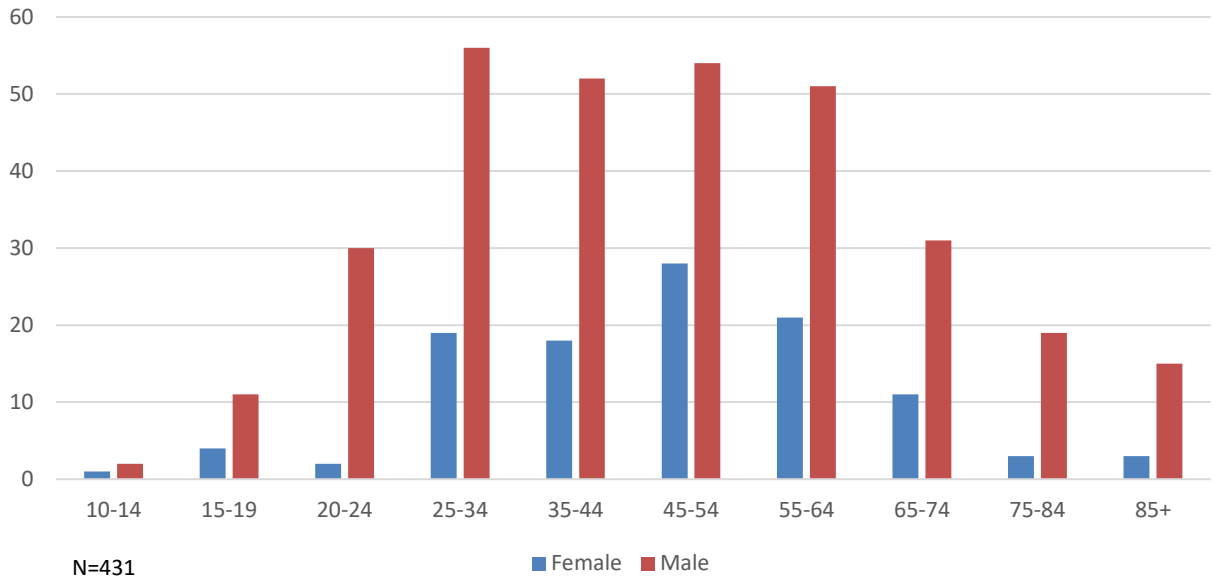


	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Firearm	**179**	**148**	**171**	**178**	**164**	**180**	**191**	**172**	**178**	**149**	**139**	**137**
OD/Poisoning	**42**	**44**	**59**	**75**	**71**	**60**	**58**	**71**	**60**	**91**	**68**	**54**
Hang/Asphyxia	**53**	**53**	**58**	**56**	**64**	**52**	**53**	**69**	**66**	**63**	**72**	**52**
Jump	**19**	**18**	**17**	**15**	**16**	**26**	**26**	**17**	**18**	**15**	**15**	**28**
Other	**35**	**35**	**43**	**30**	**28**	**57**	**37**	**32**	**30**	**36**	**36**	**26**

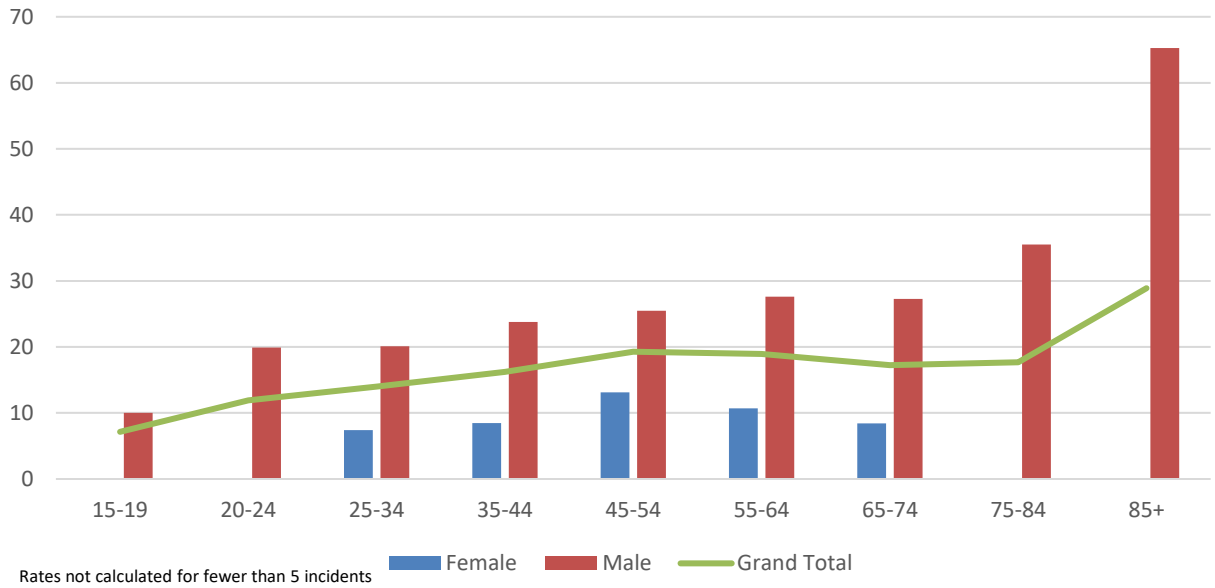
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Firearm	**145**	**142**	**137**	**146**	**122**	**127**	**116**	**132**	**132**	**146**	**136**	**150**
OD/Poisoning	**68**	**70**	**67**	**64**	**65**	**56**	**66**	**83**	**79**	**85**	**77**	**75**
Hang/Asphyxia	**63**	**60**	**76**	**65**	**70**	**76**	**70**	**88**	**94**	**84**	**98**	**105**
Jump	**34**	**15**	**19**	**23**	**23**	**25**	**26**	**15**	**20**	**22**	**25**	**27**
Other	**37**	**36**	**26**	**31**	**34**	**33**	**34**	**40**	**41**	**40**	**33**	**35**

	2012	2013	2014	2015	2016
Firearm	**148**	**165**	**143**	**140**	**137**
OD/Poisoning	**88**	**80**	**73**	**85**	**84**
Hang/Asphyxia	**118**	**121**	**138**	**123**	**127**
Jump	**33**	**40**	**39**	**42**	**47**
Other	**26**	**35**	**27**	**37**	**36**

NUMBER OF SUICIDES INVESTIGATED BY AGE AND GENDER, 2016

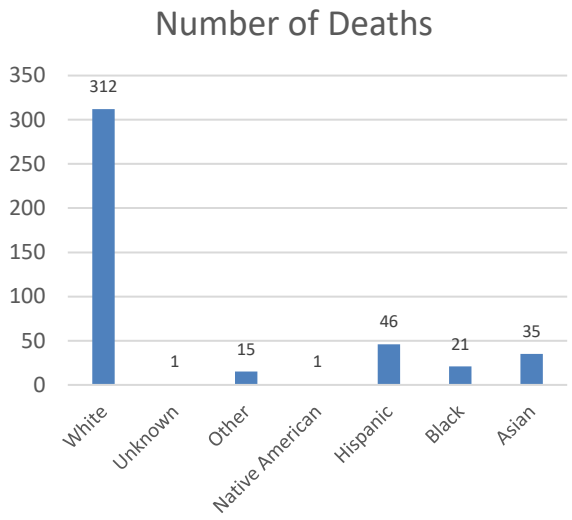


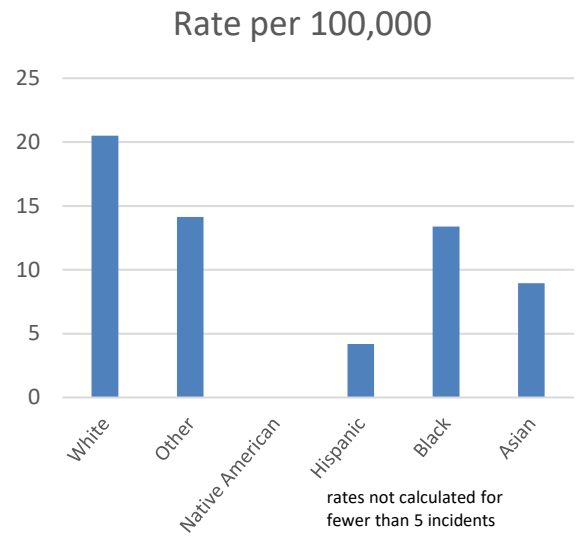
SUICIDE RATES BY AGE AND GENDER, 2016



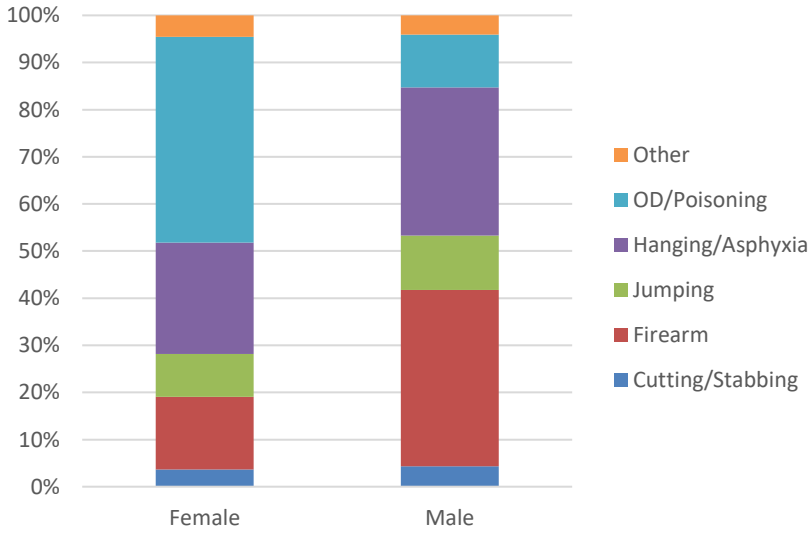
Historically, the highest suicide rate has been among men 85 years and older.

SUICIDE NUMBERS AND RATES BY ETHNICITY, 2016

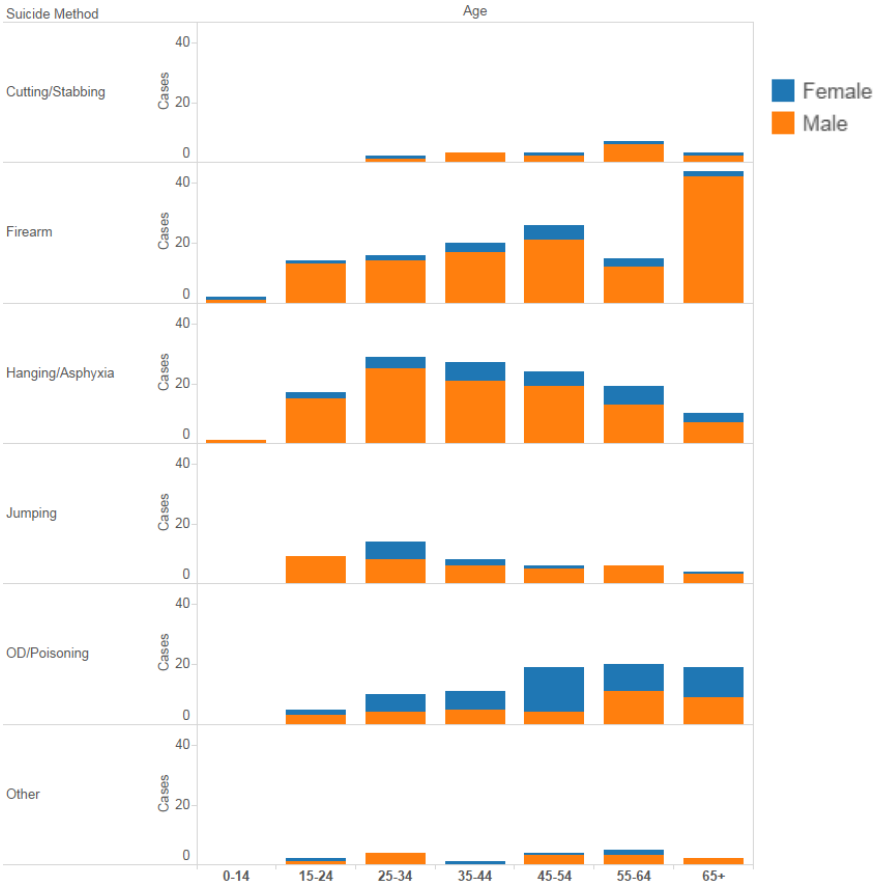




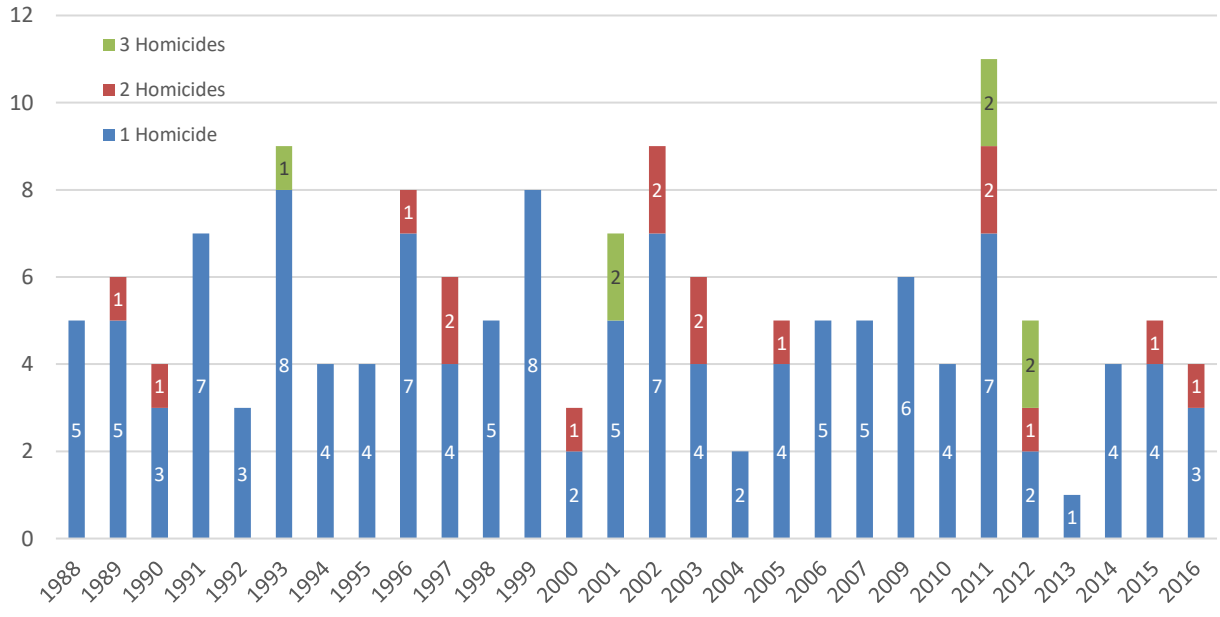
SUICIDE METHODS BY GENDER, 2016



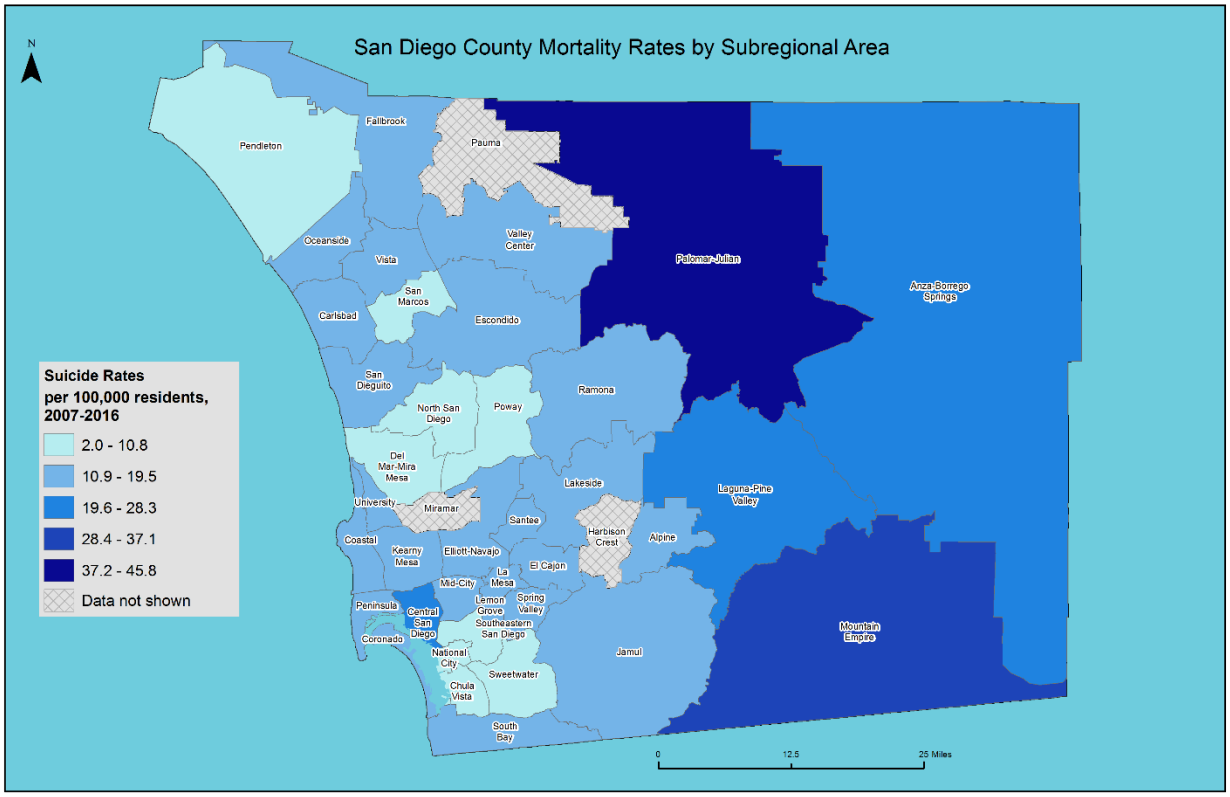
SUICIDE DEATHS BY AGE, GENDER, AND METHOD, 2016



HOMICIDE/SUICIDE EVENTS, 1988 – 2016



SUICIDE RATE PER 100,000 BY SUBREGIONAL AREA, 2007 – 2016

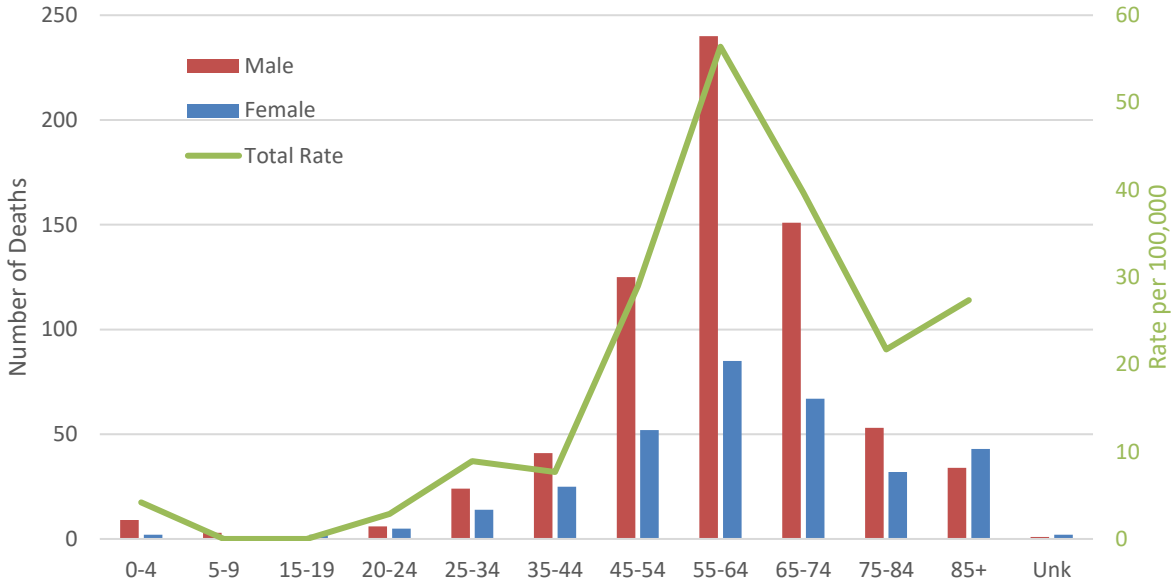


*Rates per 100,000 residents, 2007-2016. Rates are not shown for fewer than 5 deaths.
**Subregional Area location of 'residence' was used where available, and 'event' or 'death' used to fill in missing data.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

45.8 Palomar Julian	14.3 Harbison Crest El Cajon5	11.3 University
30.1 Mountain Empire	14.3 Vista	11.3 Spring Valley
28.1 Laguna Pine Valley	14.3 Peninsula	10.3 San Marcos
21.8 Anza Borrego Springs	13.7 Valley Center	10.3 Poway
20.0 Central San Diego	13.7 Fallbrook	9.1 Del Mar Mira Mesa
18.0 Kearny Mesa	13.4 Harbison Crest	8.8 National City
17.5 Lakeside	13.2 Ramona	8.7 North San Diego
16.6 La Mesa	13.1 San Dieguito	8.3 Chula Vista
16.3 Jamul	12.7 Carlsbad	8.1 Southeastern San Diego
16.3 Alpine	12.7 San Diego County	7.1 Sweetwater
15.9 Coronado	12.6 Santee	2.0 Pendleton
15.6 Lemon Grove	12.5 South Bay	* Miramar
15.5 Oceanside	12.1 Mid City	* Pauma
15.0 Elliott Navajo	11.9 Coastal	
14.9 El Cajon	11.5 Escondido	

NATURAL DEATHS

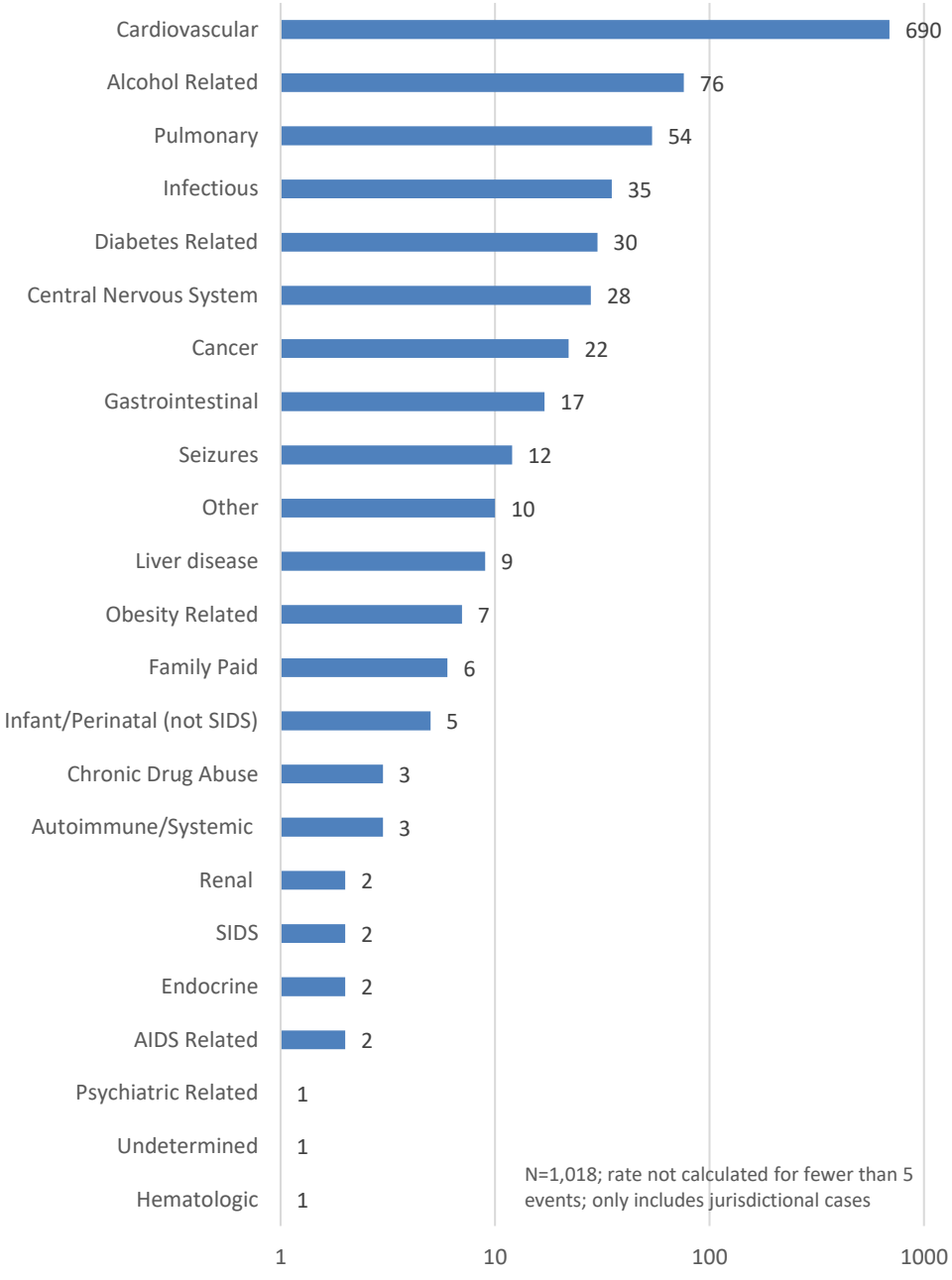
DEATHS DUE TO NATURAL CAUSES BY AGE AND SEX AND TOTAL RATE, 2016



N=1,018; rate not calculated for fewer than 5 events; only includes jurisdictional cases

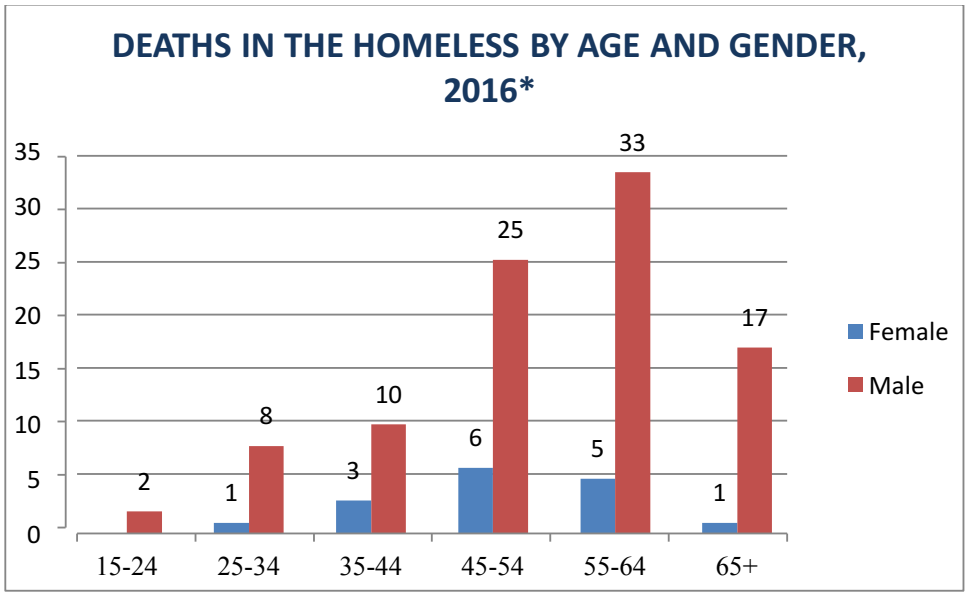
The Medical Examiner certifies approximately 5 percent of the natural deaths in the County. The peak in rate in individuals between 55 and 64 years old represents a bias in Medical Examiner cases towards sudden and unexpected natural deaths, often due to undiagnosed fatal disease in middle-aged adults.

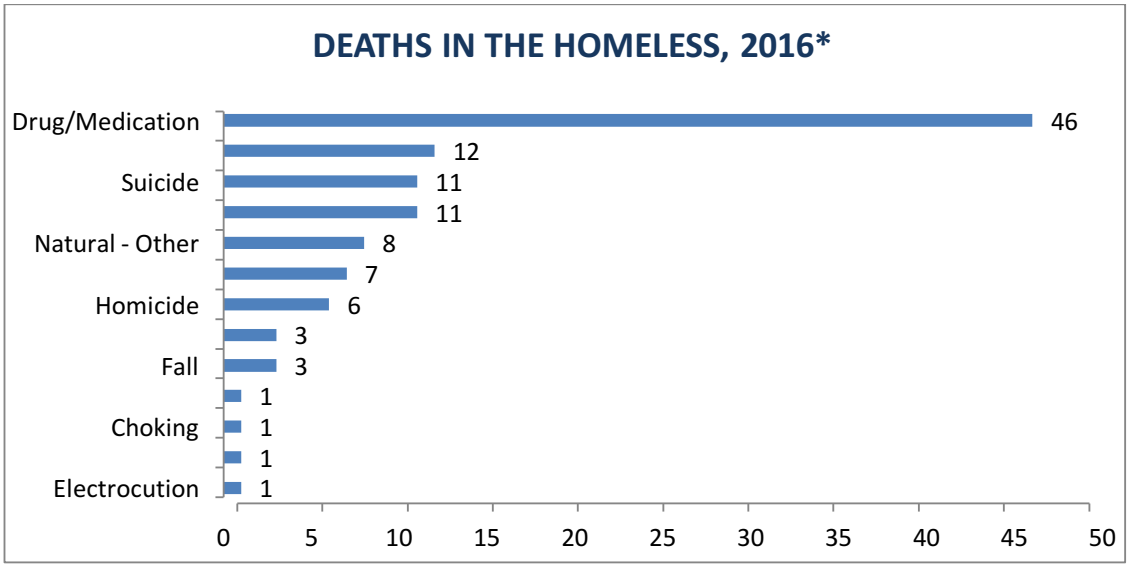
DEATHS FROM NATURAL CAUSES BY TYPE, 2016



HOMELESS

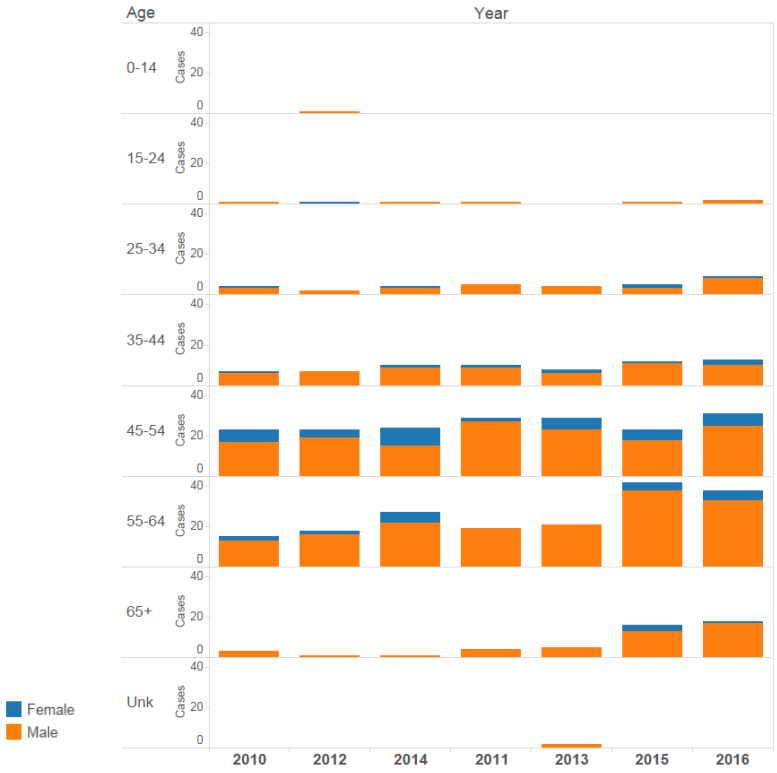
The 2016 WeALLCount Campaign (aka, Point-In-Time Count) identified 8,669 homeless individuals in the County in January 2016.



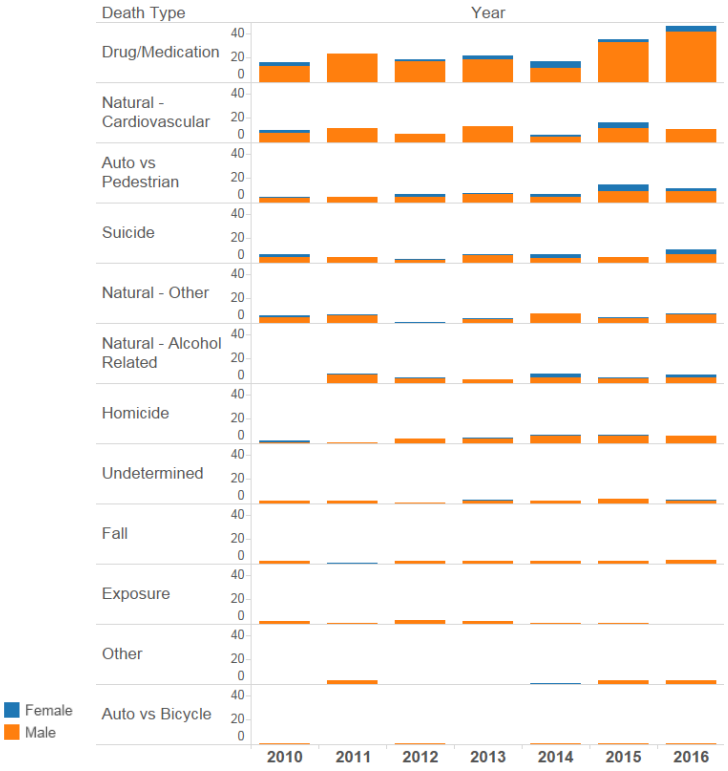


*Note: An earlier version of the Annual Report included data from 2015. This page has been updated to reflect 2016 data.

DEATHS IN THE HOMELESS BY AGE AND YEAR, 2000 - 2016



DEATHS IN THE HOMELESS BY METHOD AND YEAR, 2000 - 2016



PEDIATRIC DEATHS & SIDS

PEDIATRIC DEATHS BY AGE AND MANNER OF DEATH, 2016

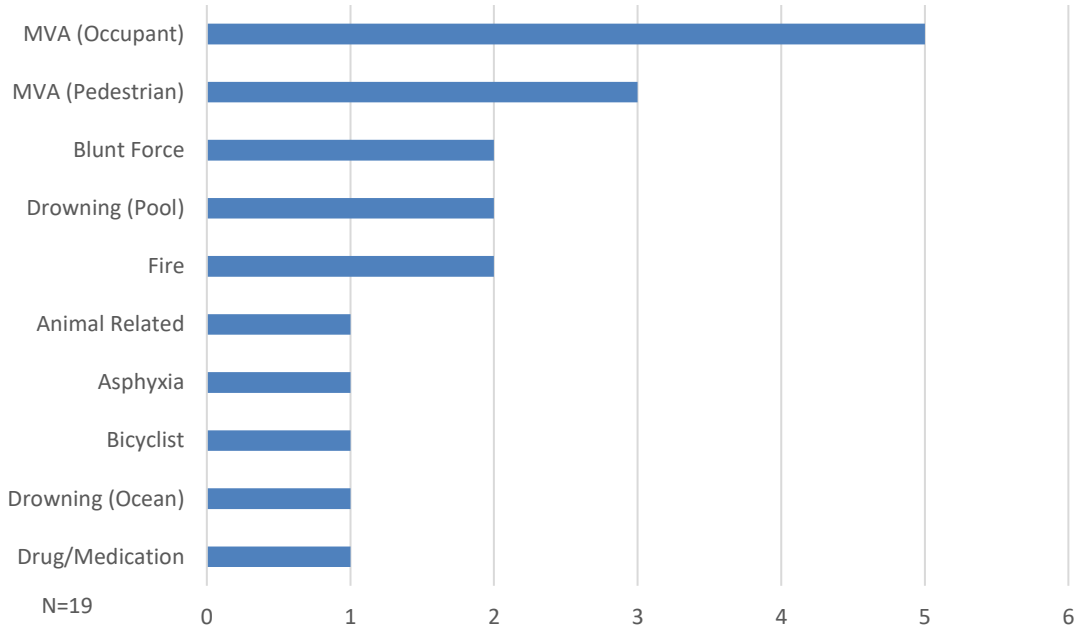
Age	Accident	Homicide	SIDS	Other Natural	Suicide	Undetermined*	Total
<1	2	1	2	8		17	30
1	1	2		1		2	6
2	2						2
3	1						1
4							0
5	1			1			2
6	1						1
7				1			1
8	3			1			4
9				1			1
10	3						3
11	3						3
12					2		2
13	2				1		3
14							0
15	1	1			2		4
16	1	1		2	2		6
17	4				5		9
Total	25	5	2	15	12	19	78

Does not include cases sealed at the request of law enforcement.

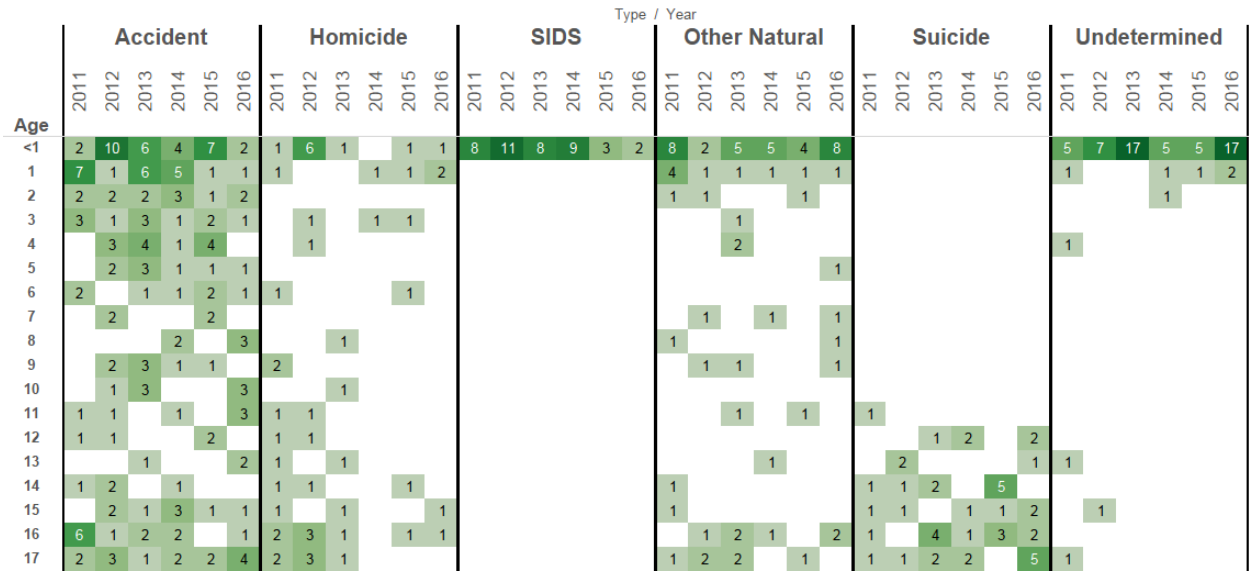
*A total of 19 of these cases were certified with an undetermined manner of death. These include:

Undetermined Type	Number
Bed sharing	10
Sudden unexpected death in infancy	5
Undetermined	2
Perinatal death of undetermined etiology	1
Sudden unexpected death in childhood	1

ACCIDENTAL DEATHS AGE 0 TO 13 BY MECHANISM, 2016

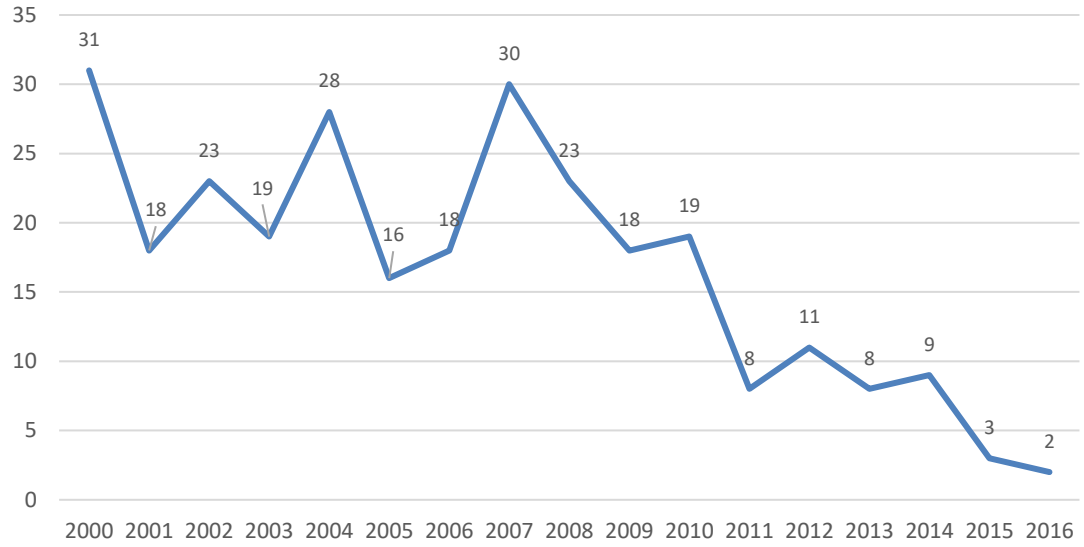


PEDIATRIC DEATHS BY YEAR AND MANNER, 2011 – 2016

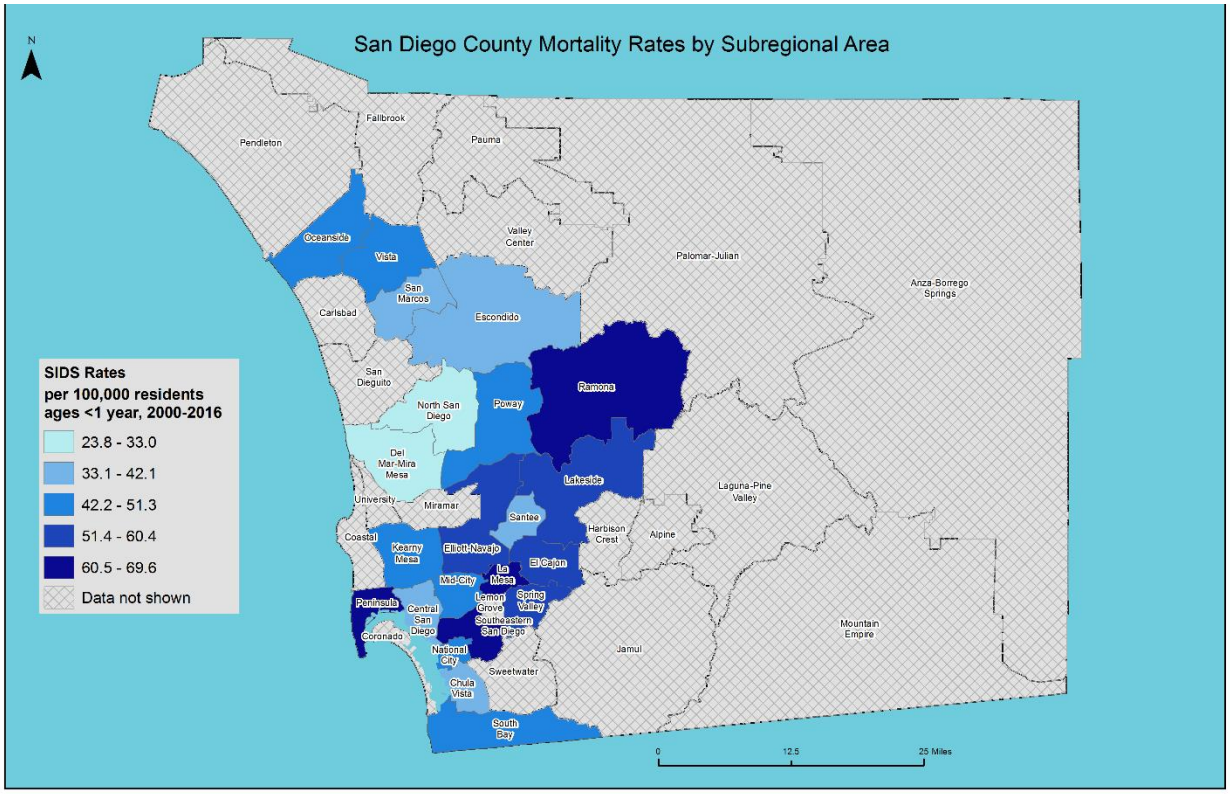


Does not include cases sealed at the request of law enforcement.

SIDS DEATHS BY YEAR, 2000 – 2016



SIDS DEATH RATES BY SUBREGIONAL AREA, 2000 – 2016

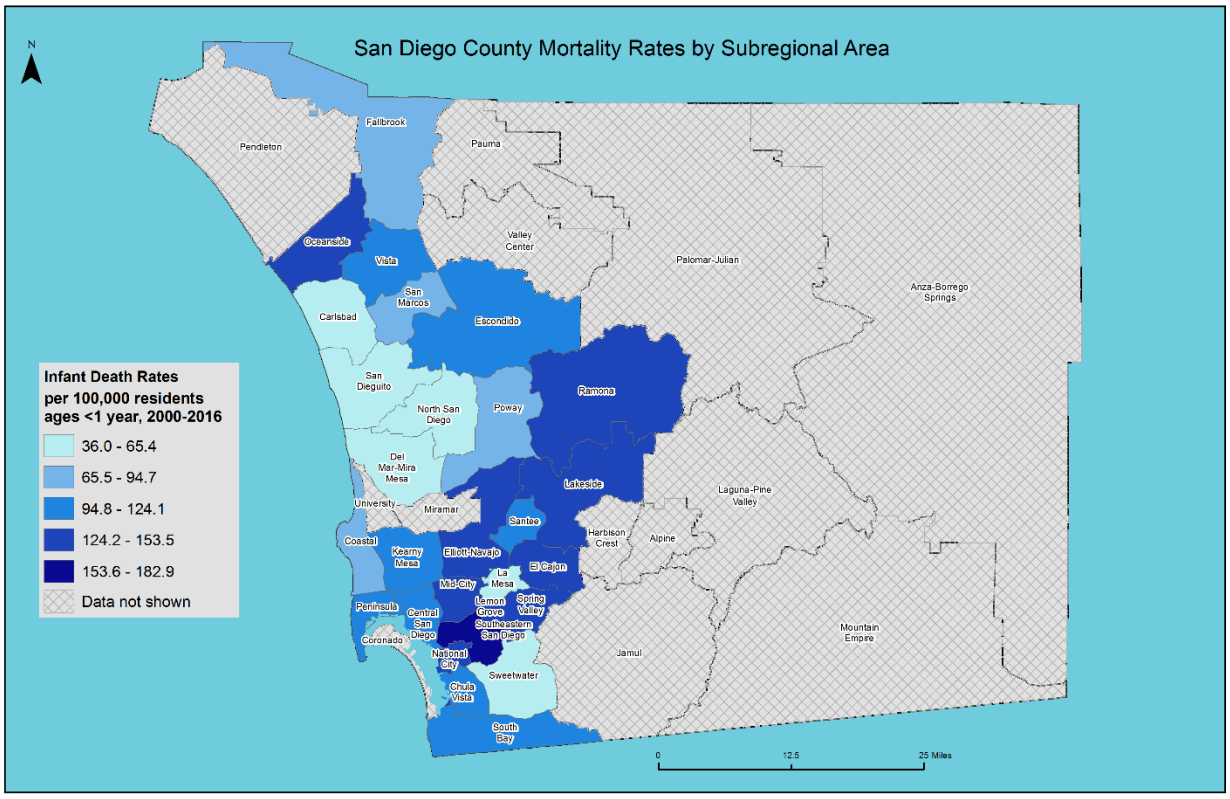


*Rates per 100,000 residents ages <1 year (2000-2016). Rates are not shown for fewer than 5 deaths.
**Subregional Area location of 'residence' was used where available, and 'event' or 'death' used to fill in missing data.
Maps & analysis by County of San Diego, HHSA, Public Health Services, Community Health Statistics Unit, June, 2017. Contact Isabel Corcos or Leslie Ray 619.285.6429.

746.4	Harbison Crest El Cajon[5]	45.9	Kearny Mesa	*	Fallbrook
69.6	Southeastern San Diego	44.7	Vista	*	Jamul
69.1	La Mesa	41.4	Santee	*	Laguna Pine Valley
67.8	Ramona	41.2	San Diego County	*	Lemon Grove
63.6	Harbison Crest	38.4	Central San Diego	*	Miramar
61.0	Peninsula	35.0	Escondido	*	Mountain Empire
54.7	Spring Valley	33.5	Chula Vista	*	Palomar Julian
53.4	El Cajon	33.1	San Marcos	*	Pauma
52.9	Elliott Navajo	31.1	North San Diego	*	Pendleton
52.5	Lakeside	23.8	Del Mar Mira Mesa	*	San Dieguito
49.6	National City	*	Alpine	*	Sweetwater
47.5	South Bay	*	Anza Borrego Springs	*	University
47.2	Oceanside	*	Carlsbad	*	Valley Center
46.4	Poway	*	Coastal		
46.1	Mid City	*	Coronado		

[5]Due to data aggregation methods, health data for the Harbison Crest SRA may be misleading. Health data are presented as an aggregate of the two SRAs, Harbison Crest/El Cajon for better data stability and representation of the area.

M.E.-INVESTIGATED INFANT DEATHS BY SUBREGIONAL AREA, 2000 – 2016



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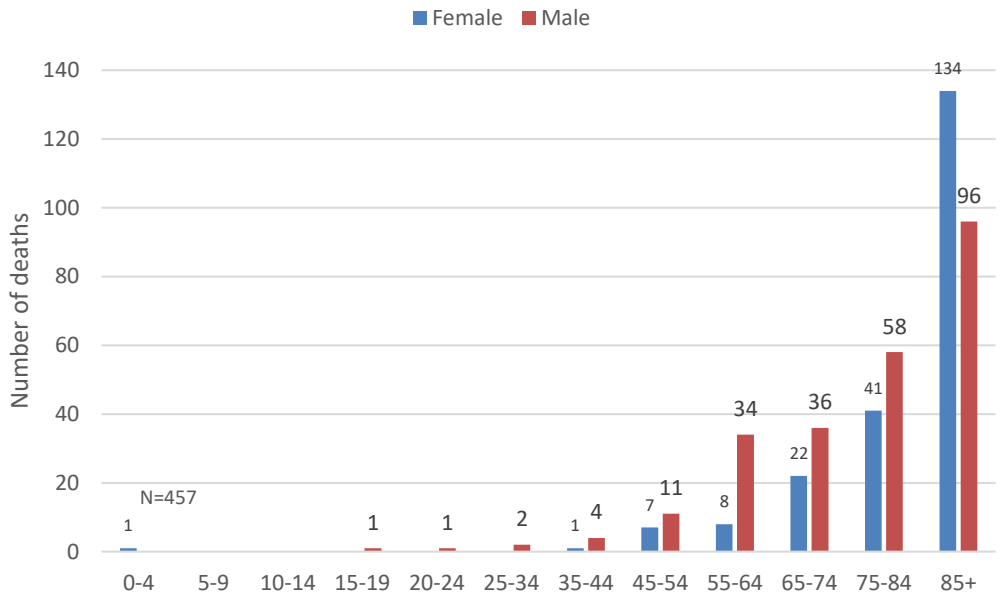
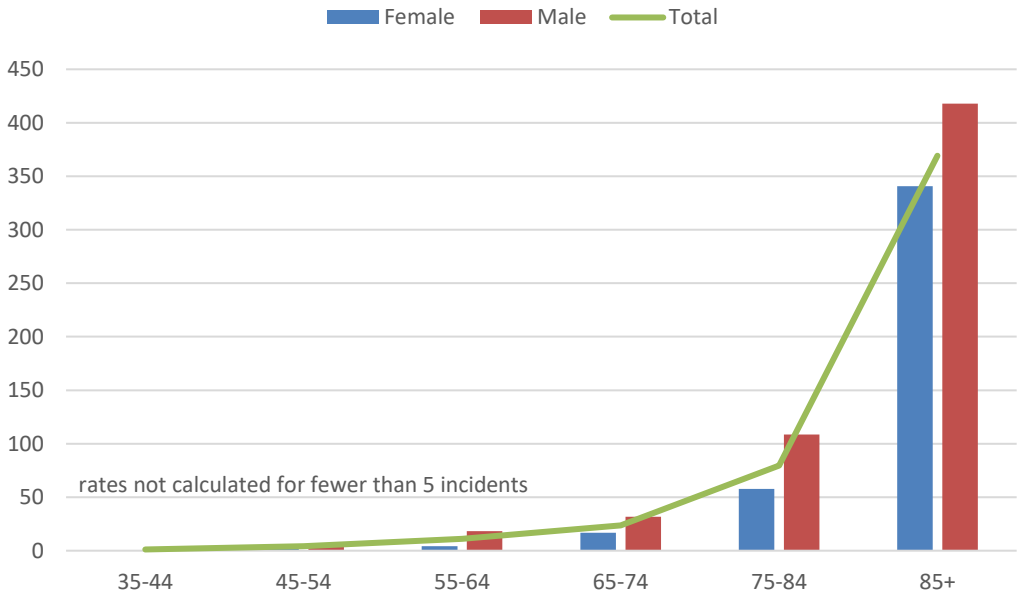
182.9	Southeastern San Diego	113.4	Kearny Mesa	36.0	San Dieguito
165.3	Harbison Crest	107.7	Santee	*	Alpine
151.7	Lemon Grove	105.6	San Diego County	*	Anza Borrego Springs
149.3	Harbison Crest El Cajon5	102.7	Escondido	*	Coronado
149.1	Ramona	98.3	South Bay	*	Jamul
148.8	National City	95.6	Chula Vista	*	Laguna Pine Valley
148.2	Mid City	92.5	Fallbrook	*	Miramar
147.1	Lakeside	79.6	Poway	*	Mountain Empire
142.8	Elliott Navajo	70.9	San Marcos	*	Palomar Julian
138.0	El Cajon	69.9	Coastal	*	Pauma
136.8	Spring Valley	62.2	La Mesa	*	Pendleton
125.0	Oceanside	55.9	Carlsbad	*	University
122.0	Peninsula	51.9	North San Diego	*	Valley Center
120.4	Vista	44.2	Del Mar Mira Mesa		
118.5	Central San Diego	42.3	Sweetwater		

FALL-RELATED DEATHS

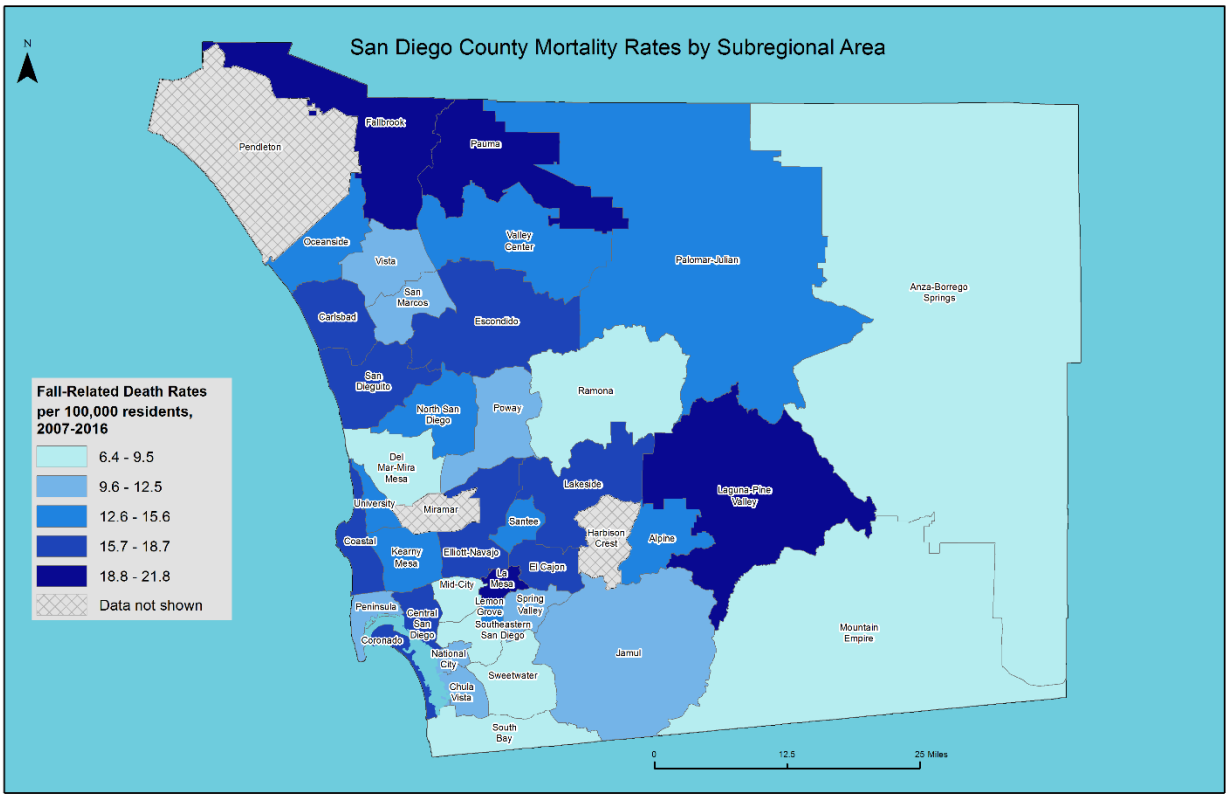
DEATHS FROM FALLS BY AGE AND SEX, 2016



FALL-RELATED DEATH RATE BY AGE AND SEX, 2016



FALL-RELATED DEATH RATES BY SUBREGIONAL AREA, 2007 – 2016



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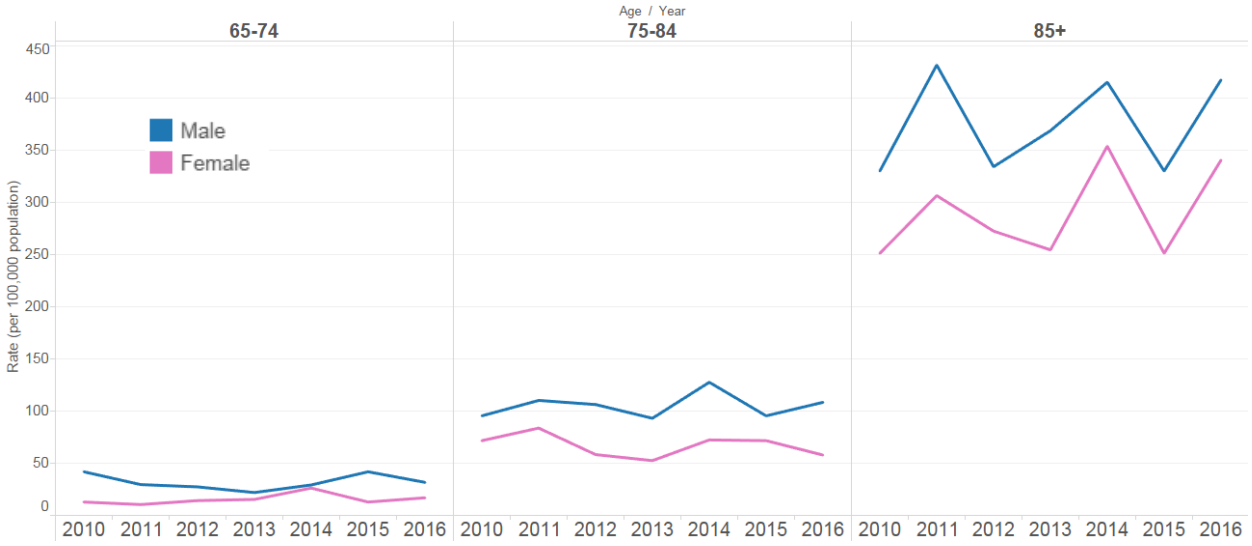
21.8	La Mesa	15.3	Harbison Crest	10.7	Jamul
21.1	Laguna Pine Valley	15.2	Kearny Mesa	10.6	Poway
19.5	Fallbrook	15.2	Lemon Grove	9.7	Vista
18.9	Pauma	14.3	Palomar Julian	9.2	South Bay
18.5	Carlsbad	13.8	Oceanside	9.1	Southeastern San Diego
18.4	Coastal	13.4	Alpine	8.6	Mountain Empire
17.9	San Dieguito	13.4	University	8.3	Mid City
17.6	Coronado	13.0	San Diego County	7.9	Del Mar Mira Mesa
17.4	El Cajon	12.9	North San Diego	7.2	Ramona
16.6	Harbison Crest El Cajon5	12.6	Santee	6.9	Anza Borrego Springs
16.6	Lakeside	12.4	San Marcos	6.4	Sweetwater
16.3	Escondido	12.0	Peninsula	*	Miramar
15.7	Elliott Navajo	12.0	Spring Valley	*	Pendleton
15.7	Central San Diego	11.8	National City		
15.4	Valley Center	11.7	Chula Vista		

FALL-RELATED DEATH RATES BY YEAR AND AGE, 2010 – 2016



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