

Suicide Firearm Deaths in El Paso, Texas, USA: A Retrospective Study

Munasinghe KR^{1*}, Rascon MA¹, DiazeJ¹, Vadysinghe AN², Vidanapathirana M³

¹Medical Examiner's Office, El Paso, Texas, USA

²Department of Forensic Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

³Department of Forensic Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka

Abstract

Introduction: Firearms are often used to commit suicide, especially in countries where firearms are easily available. This research was conducted to identify the patterns of suicide firearm deaths; socio-demographic profile, past history, circumstantial facts, weapons used, autopsy, and toxicology analysis.

Methodology: A descriptive-cross-sectional study was conducted. All autopsy reports with investigative narratives, police reports, scenes, and autopsy photographs were perused from 2016 to 2012 using data collection forms. Purposive sampling was used to collect 200 suicide firearm deaths.

Results: Out of 3150 deaths, 12% (n=391) were suicides. Of them, 200 (51%) were suicide firearm deaths. There were 90% males. Ages ranged from 13 to 91 years and 51% were less than 40 (<40) years victims. According to circumstances, 13% notified by suicide letters, 74% occurred at home, and eye witnessing (p=0.003) and hearing (p=0.021) of the suicide were significantly associated with age <40 years. Past history included; medical illnesses (19%), suicide attempts (10%), domestic issues (31%), and occupational familiarity with firearms (31%). Occupational familiarity was significantly associated with whites (p=0.034) and <40 years victims (p=0.001<0.05). Automatic pistols were used by 57% and revolvers by 27%. The use of handguns was significantly associated with females (p=0.029). The Head was the commonest region involved (88%) and the entry wound in the head was significantly associated with <40 years of victims (p=0.003<0.05). Blood for alcohol was positive at 16%. Performing toxicology tests significantly associated with age <40 years (p=0.000), occupational familiarity (p=0.001) and absence of medical illnesses(p=0.018). A full autopsy was performed on 66%. Head injury as the cause of death is significantly associated with age <40 years (p=0.018<0.05).

Conclusion: Age, gender, race, medical conditions, and occupational familiarity are significantly associated with suicide firearm deaths. The white race is significantly associated with familiarity with firearms. Females have more predilection to handguns. Performing toxicology is higher with the absence of medical illnesses, occupational familiarity, and age <40 years.

Keywords: Firearms, handguns, head injuries, medical issues, suicide, toxicology

Received: 12 Dec 2019, **Revised version accepted:** 05 June 2022, **Published:** 30 June 2022. ***Corresponding author:** Munasinghe KR, ✉ Email: kanchanarm@gmail.com  ORCID: <https://orcid.org/0000-0001-7075-800X>

Cite this article as: Munasinghe KR, Rascon MA, DiazeJ, Vadysinghe AN, Vidanapathirana M. Suicide Firearm Deaths in El Paso, Texas, USA: A Retrospective Study. Medico-Legal journal of Sri Lanka. 2022;10(1):13-22

DOI: <http://doi.org/10.4038/mlj.v10i1.7456>

Copyright: © 2019 with the Medico-legal Journal of Sri Lanka.



This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium provided the original author and source are credited.

Introduction

In the USA, suicide is now among the three leading causes of death among those aged 15–44 years (in both sexes); these figures do not include suicide attempts, which are 20 times more frequent than

successful suicides. The rates of suicide among young people have been increasing to such an extent that they are now at the highest risk in a third of all developed/developing countries.[1]

The use of firearms for self-defense is widespread, however, they are often used to commit suicide, especially in countries where firearms are easily available. There are different types of firearms, and they can be divided into two main groups rifles and shotguns based on the anatomy of the bore. Rifles have rifling in the bore whereas shotgun has a smooth bore. They can also be divided into handguns and shoulder guns, and the handguns are further divided into revolvers and pistols.

Patterns of use of firearms vary between jurisdictions and over time. The most common method of committing suicide in the United States is shooting by firearms. [2]

However, there are regional differences. Thus, in a study of 698 male and 221 female suicides in San Antonio, Texas, males used a firearm in 72% of cases, hung themselves by 14%, overdosed on drugs by 07%, and in 08% of cases used other means and of the 221 females, 49% used firearms, 32% drugs, 10% hanging, and 9% other means.[3]

Thus, in this population, the use of firearms was the preferred method of suicide for both men and women. Therefore, it is useful to compare the risks and benefits of issuing firearms for self-defense in the USA.

Therefore, the current study was performed to identify socio-demographic profile, medical factors, past suicidal attempt/ideation, scene findings, the autopsy findings, toxicology analysis, whether other methods of suicides were combined with gunshot injury and the circumstantial evidence in the cases examined at El Paso County medical examiner's office.

Methodology

This retrospective descriptive cross-sectional study was conducted at El Paso County medical examiner's office. A purposive sampling was used to collect 200 cases of suicide due to firearm injuries. All autopsy reports with their investigative narratives, police reports, scene photographs, and autopsy photographs were perused. The firearm deaths where the manner of death was diagnosed as suicide over about five years from 31st of December 2016 to April 2012 were studied using a data collection form. These documents belonged to all (03) board-certified Forensic Pathologists who were working at that unit.

The demographic factors were defined as follows. Age groups were classified into four defined groups; less than 18 years old children, 19-39 years young

adults, 40-59 years middle-aged persons, and more than 60 years old age persons. The races were white, Hispanic, black, Native Americans (Red Indians), and Asians. The marital status was classified into 5 groups; married, common-law marriages, widow, divorced, and single.

Among circumstantial factors, the suicide notification methods were classified as phone calls, Facebook notifications, suicide letters, text messages, voice messages, and verbal notifications. Place of committing suicide was classified as home, outside places, other premises, and inside vehicles. The methods of familiarity with firearms were classified as military occupation, war veterans, and other weapon training. The risk factors were classified as domestic issues, caring issues, medical issues, allegations of physical or sexual assault, and alcohol or substance abuse.

Firearms were classified as handguns or shoulder guns. The types of autopsies were classified as a complete autopsy or external examination.

The IBM SPSS version 19 was used to calculate frequencies, presented as proportions and percentages. Chi2 tests were performed on bivariate tests and a p-value <0.05 was considered statistically significant. Written permission to conduct this research was obtained from El Paso County medical examiner's office. The anonymity of the data of the deceased was maintained and the collected data will be used only in scientific publications.

Results

A. Socio-Demographic Factors

Out of 3150 reports of autopsies and external examinations, 12% (n=391) were suicides. Of them, 51% (n=200) were suicides due to firearm injuries.

Among the suicide deaths due to firearm injuries, there were 90% (n=179) males and the remaining 10% (n=21) were females. The ages ranged from 13 – 91 years (mean 45.1 +/- SD 20.688) and 48% (n=95) were young adults between 19-39 years and the age distribution is shown in Table 01.

When the race is considered, 50% (n=101) were white and the distribution is shown in Table 01. Regarding the marital status, 47% (n=93) were married and the distribution of the marital status is shown in Table 01.

Table 01. Demographic factors

Variable	Types	N=200 n (%)
Age	<18 years (children)	07 (03)
	19-39 years(young adults)	95 (48)
	40-59 years (middle aged)	44 (22)
	>60 years (old age)	54 (27)
Race	White	101 (50)
	Hispanic	88 (44)
	Black	09 (04)
	Asian	01 (01)
	Native	01 (01)
Marital Status	Married	93 (47)
	Divorced	35 (18)
	Widow	14 (07)
	Common law marriage	03 (01)
	Single	55 (27)

B. The Circumstantial Facts

Under the circumstances of the suicide firearm incidents, according to the investigative narratives, 24% (n=49) had suicide ideation and the distribution of the suicide ideation is shown in Table 02.

Incidents had taken place at home in 74% (n=148) and the places where the incident took place include home, outside places, other premises, and inside vehicles. The “other premises” included a hotel room, workplace, business place, and friends residence. The “Outside places” included parking slots, parks, gardens, roadways, canal, mountains, and desert. The place of the incidents is shown in Table 02.

When the mode of the suicide notification is considered, 76% (n=151) did not notify the suicide ideation by any means, and 13% (n=26) were notified by suicide letters. The methods of notification of the suicide ideation are shown in Table 02.

The 12% (n=24) of the incidents have been witnessed by someone. Witnessing the suicide incident was found in 19% (n=19) of <40 years of age and 05% (n=05) of >40 years of age and this difference was statistically significant ($\chi^2=8.658$, $df=1$, $p=0.003$).

Regarding the hearing of the firearm sound, 32% (n=64) did not witness the event but heard the sound of the firearm, and the distribution is shown in Table 02. Hearing the firearm sound of suicides was found in 52% of <40 years of age and 36% of >40 years of age and the difference was statistically significant ($\chi^2=5.354$, $df=1$, $p=0.021$).

Table 02. The circumstances of the incidents of suicide by firearms

Variable	Types	N=200 n (%)
Suicide ideation	Present	49 (24)
	No	51 (26)
	Not mentioned	100 (50)
Place of incident	Home	148 (74)
	Vehicle	24 (12)
	Outside places	17 (09)
	Other premises	11 (05)
Mode of suicide notification	Suicide letter	26 (13)
	Phone call	08 (04)
	Verbal notification	06 (03)
	Text messages	05 (02)
	Facebook notification	03 (01)
	Voice messages	01 (01)
	No notification	151 (76)
Witnessed the incident	Yes	24 (12)
	No	176 (88)
Heard the firearm sound	Heard but not witnessed	64 (32)
	Heard and witnessed	24 (12)
	Not heard & not witnessed	112 (56)

C. The History of The Victims Relevant to Suicide by Firearms

When the past medical history relevant to the suicide by firearms were considered, 19% (n=37) had multiple medical illness and the distribution of the past medical history is shown in Table 03 and the category on “Single medical problems” included; cancer (n=09), hypertension (n=05), diabetes mellitus (n=04), HIV (n=02), chronic obstructive pulmonary disease (n=02), sleep apnoea (n=02), migraine (n=01), obesity (n=01), osteoporosis (n=01), thyroid disease (n=01), multiple sclerosis (n=01) and renal failure (n=01). The category on “Psychiatric illnesses” included; depression (n=36), PTSD (n=14), schizophrenia (n=01) and bipolar affective disorder (n=01).

The occupational familiarity with the firearms is shown in Table 03. However, 69% (n=139) did not show any occupational familiarity with firearms. The category of “others with weapon training” included; homeland security, immigration, custom border protection, US border patrol, military police, and retired sheriff. Forty-one percent (n=42) of those <40 years of age and 19% (n=19) of >40 years of age showed occupational familiarity with firearms and this difference was statistically significant ($\chi^2=11.194$, $df=1$, $p=0.001$). Further, 37% (n=38) of whites and 23% (n=23) of non-whites had

occupational familiarity with firearms and this difference was statistically significant ($\chi^2=4.481$, $df=1$, $p=0.034$).

A history of previous attempts of suicide was available among 10% (n=19) and the distribution is shown in Table 03.

When the risk factors were considered, 31% (n=62) had domestic issues and the distribution of the risk factors is shown in Table 03. The category “Domestic issues” included; marital issues (n=37), cohabitant issues (n=20), and issues with other family members (n=05). The category “Medical issues” included terminal illnesses such as cancer, renal failure, etc. The “Allegations of physical assaults” (n=06) and “sexual assaults” (n=05) were also found. The “Caring issues” included; discharge from hospice care, loss of job, an argument with a caretaker, etc.

Table 03: The history relevant to suicide by firearms

Variable	Types	N=200 n (%)
Past medical history	Psychiatric illness	52 (26)
	Multiple medical illnesses	37 (19)
	Single medical problems	32 (16)
	Not available	15 (07)
Occupational Familiarity with firearms	No significant past history	64 (32)
	Military personnel	37 (18)
	Veterans	19 (10)
	Others with weapon training	05 (03)
Previous suicide attempts	No occupational familiarity	139 (69)
	Present	19 (10)
	Absent	69 (34)
	Not mentioned	112 (56)
Risk factors	Domestic issues	62 (31)
	Medical issues	13 (07)
	Physical or sexual assault	11 (06)
	Alcohol and substance abuse	10 (05)
	Caring issue	07 (04)
	Not known	97 (48)

D. Types of Firearms Used to Commit Suicide

When the type of weapon used was considered, there were handguns and shoulder guns. There were two types of handguns; automatic pistols (n=114) and revolvers (n=54). Among automatic pistols one (n=01) was semi-automatic. Among revolvers, one (n=01) was a double-barrel revolver.

The handguns were used in 100% (n=21) of females and 82% (n=147) of males and this difference was statistically significant (Fisher’s exact test, $p=0.029$).

The shoulder guns were rifles and shotguns. Among shotguns, one (n=01) had fired birdshot cartridges and the remaining shotguns had fired Special gauge (SG) cartridges. The distribution of the weapons is shown in Table 04.

Table 04. Type of weapon used

Type of weapon	Types	N=200 n (%)
Handguns	Automatic pistol	114 (57)
	Revolver	54 (27)
Shoulder guns	Rifle	14 (07)
	Shotgun	18 (09)

E. Analysis of injuries (Tertiary ballistics)

The sites of entry wounds were found in the head, neck, chest, and abdomen. The entries in the head were found on the temporal area (110), oral, chin, forehead, and other sites (one each in the cheek, eye, and occipital area). Out of temporal entry wounds, 95 were on the right side. Out of 17 chest injuries, 8 were on the right side, 7 on left, and 2 in the middle. The distribution of the sites of entry wounds is shown in Table 05. The entry wound was found in the head in 89% (n=91) of <40 years victims and 72% (n=71) of >40 years victims and this difference was statistically significant ($\chi^2=9.130$, $df=1$, $p=0.003$).

When the ranges of fire were considered, 89% (n=178) were contact range and the distribution of the ranges of fire are shown in Table 05. However, in 17 cases, the range of fire was not mentioned.

Among entry wounds, 31% (n=63) had muzzle imprints and of them, 10 had ejector or extractor mark the distribution of muzzle imprints are seen in Table 05. The number of entry wounds ranged from one to three. Ninety-six percent (n=192) had one entry wound and the distribution is shown in Table 05. When the direction of the tract was considered, 58% (n=116) were upwards and the distribution is shown in Table 05. Sixty-four percent (n=127) had one exit wound and the distribution of the exit wounds is shown in Table 05.

Table 05: Tertiary ballistics (Analysis of injuries)

Variable	Types	N=200 n (%)
Site of entry	Temporal	110 (55)
	Oral	39 (20)
	Chin	15 (08)

	Forehead	07 (03)
	Head other sites	03 (01)
	Neck	05 (03)
	Chest	17 (09)
	Abdomen	01 (01)
Range of fire	Contact	178 (89)
	Near contact	04 (02)
	Intermediate	01 (01)
	Not mentioned	17 (08)
Muzzle imprint	Present	63 (31)
	Absent	137 (69)
Number of entries	One	192 (96)
	Two	07 (03)
	Three	01 (01)
Tract	Upwards	116 (58)
	Downwards	45 (23)
	Horizontal	20 (10)
	Tract not mentioned	19 (09)
Number of exits	One	127 (64)
	Two	02 (01)
	Three	01 (01)
	Large	07 (03)
	No exit	63 (31)

E. Postmortem Examination Findings

Toxicology analysis revealed different toxins such as alcohol, cocaine, cannabis, amphetamine, or combinations. Some were on therapeutic medicines. Blood for alcohol was positive in 16% (n=32) and the distribution is shown in Table 06. The toxicology tests were performed in 60% (n=61) of <40 years victims and 20% (n=20) of >40 years victims and this difference was statistically significant ($\chi^2=32.190$, $df=1$, $p=0.000$). The toxicology tests were performed in 57% (n=35) of victims with occupational familiarity with firearms and 33% (n=46) of victims with no occupational familiarity with firearms and this difference was statistically significant ($\chi^2=10.374$, $df=1$, $p=0.001$). The toxicology tests were performed in 51% (n=40) of victims with no significant past medical illnesses and 34 % (n=41) of victims with significant past medical illnesses and this difference was statistically significant ($\chi^2=5.564$, $df=1$, $p=0.018$).

A full autopsy was performed in 66% (n=132) and the remaining cases were subjected to external examination. Finally, the causes of death were ascertained and the head injuries due to gunshot wounds were the cause of death in 69% (n=138) the distribution of the causes of death is shown in Table 06. The cause of death was a head injury in 94% (n=96) of <40 years victims and 84 % (n=82) of >40

years victims and this difference was statistically significant ($\chi^2=5.569$, $df=1$, $p=0.018$).

Table 06: Postmortem examination findings

Variable	Types	N=200 n (%)
Toxicology	Alcohol	32 (16)
	Alcohol with other	09 (05)
	Cocaine with other	06 (03)
	Amphetamine	02 (01)
	Cannabis	01 (01)
	Therapeutic	03 (01)
	Negative results	28 (14)
	Not performed	119 (60)
Autopsy	Complete autopsy	132 (66)
	External examination	68 (34)
Cause of death	Head injuries	138 (69)
	Intra-oral gunshot wounds	39 (19)
	Neck injuries	04 (02)
	Chest injuries	17 (08)
	Abdominal injuries	01 (01)
	Multiple injuries	01 (01)

Discussion

In our cohort, 51% of suicides were due to gunshot injuries which are comparable with other studies done in the United States of America where it was clearly shown that suicide mortality in a majority of cases is due to firearm injuries.[4]

Many studies identified gender differences in suicides. The literature revealed that males are four times more vulnerable than females which is consistent with our findings of 90% of victims being male.[5,6] This difference may be due to more firearm usage by males than females,[7,8] and the fact that males tend to use more lethal weapons than females.[9,10,11]

In 2017, suicide by any method was highest among adults 45-54 years of age in the USA. However, it is between 19-39 years in our study.[12] The second most vulnerable age group in our study is the elderly population which is comparable with a study conducted by Meehan et.al which showed that firearms are the commonest method of suicide in the elderly.[13]

Suicide risk has been associated with marital status.[14,15,16] Our study showed that suicide with firearms is more common among married individuals than among those who are single and it is compatible with other studies as well.[15] However, it noted that it is commoner among singles.[17] In this study, almost 50% are White followed by

Hispanics. These figures are congruent with the national data of the USA.[18]

Identification of suicidal ideation is very important to prevent attempts or committing suicide.[19,20] In our study more than 70% did not declare suicide ideation. A suicide note is a good indicator of suicidal behaviour,[21] and was present in approximately ten percent of persons in our cohort. Karlsson, T in a study conducted in Sweden identified a note among thirty percent of people.[22]

Cases of suicide are frequently detected after the fatal act as it is committed in isolation. Witnessed suicide is rare.[23] Dorpat et al. noted that suicides were witnessed in around 6% of all suicides.[24] However, 11% of all suicides were witnessed in this study. This figure is close to a study of shooting conducted in Australia where it was 10%.[25]

Previous studies showed that suicidal ideation is linked with all causes of mortality.[26] In our cohort, we identified suicidal ideation in 24% while it was reported as 40% in a Swedish study.[22]

Seventy percent of suicides occurred in the victim's house,[27] similar to the pattern of other firearm-related incidents.[22]

This study revealed that just over 25% of victims had psychiatric illnesses which is quite low compared with approximately 50% in a study conducted by Ahmedani BK et al.[32] Patients seek medical services from health providers and early identification of those who are vulnerable is important to minimize the risk of suicide.[28]

Even though assessment is done routinely in psychiatric patients, alcohol and drug abusers, and those with suicidal ideation.[29,30] the health care provider can play a major role in identifying those at risk.[31]

It is well recognized that medical conditions are associated with a risk of suicide.[33,34,35,36,37] This study revealed that approximately 35% of individuals in our study are having single or multiple medical conditions. The influence of such conditions on suicidal act is unclear. Therefore, assessment of such patients psychologically on a regular basis is important even though they do not show obvious signs of depression or any other psychological conditions.

Accessibility, familiarity, and ownership of firearms are a few recognized risk factors in previous studies.[38,39,40] Our study revealed that there was

no occupational familiarity in most (69%) individuals.

Attempted suicide with firearms resulted in death in almost 85% of individuals while it is around 5% in cases of drug overdose or other methods.[41,42,43]

In a study of firearm suicides, it was revealed that of the victims who sustained life-threatening injuries, more than fifty percent had suicidal thoughts for less than 24 hours[44] or less in some cases.[45,46] In our study previous attempts of suicide were identified in 10% of cases while similar findings were noted in a study conducted by Goni-Sarries et al. in 2018.[47] If there is a medical or functional impairment to the life of an individual it may be associated with suicidal risk.[46, 48]

Medical issues and psychiatric illnesses were identified in 35% and 26% of individuals in our cohort respectively. There was no identifiable risk factor in almost half of all cases, but domestic issues play a major role (31%) followed by medical issues (7%), alcohol and substance abuse (5%), and caring (4%). History of physical or sexual violence was noted in 6% of individuals in this study and those are compatible with previous studies.[49,50]

While many studies identified alcohol and substance abuse as risk factors,[51,52,53,54] only 21% abused alcohol and 3% cocaine in our study sample.

The preferred site of election of suicide firearm injury in our study was head amounting 69% which is consistent with previous studies.[55,56,57,58,59,60] The temporal area of the head is the commonest site where an entrance wound was observed which was similar in this study.[55, 61,62,63,64,65,66] Intraoral is the next preferred site (19%) and it is similarly reflected in studies done by Eisele et al. Molina et al, Kohlmeier et al and Avis.[59,61,65,67] Karger et al. identified that self-inflicted suicide firearm injuries to the chest are around 16% and it is almost half in our study.[57]

Our study showed more than 80% had used handguns and the majority committed suicide with automatic pistols. A similar picture is seen in studies of, Balci et al, Azmak et al, Kohlmeier et al., and Frei et al.[67,68,69,70]

Single entry is a key feature in suicide and was seen in 96% of our cohort. This again is almost the same in previous studies of Grandmaison et al., Rouse and Dunn, Fedakar et al and Karger et al.[57,60,66,71]

When considering the trajectory pathway, it is frequently placed upward in suicides and horizontal

in homicides.[64,72] More than 50% had an upward trajectory in this sample. We found that the range of fire in our study group was contacted and it is in accordance with previous studies.[3,73]

Conclusions and Recommendations

Age, gender, race, medical conditions, and occupational familiarity are significantly associated with suicides due to firearms. Those who are less than 40 years are more vulnerable than others. Declaration of suicidal ideation was not seen in many cases and domestic issues are the main risk factor. Firearm suicides took place in a domestic setting with a single entry to the head.

Preventive strategies for firearm-related suicides should be focused on white, young adult (<40 years of age) males. Laws should be tightened in keeping personal firearms at home. Special attention should be paid to automatic pistols as most suicides were due to them. Access to a firearm to other members especially females in the family should be restricted. Detection and treatment of medical conditions including psychiatric illnesses are one of the key strategies at the community level to prevent suicides with firearms. Those who had past suicide attempts also should be given priority in preventive programs as it is a high-risk group.

Marital counseling and family counseling would be better approaches for primordial prevention of suicide and firearm deaths. Knowledge of common patterns of firearm use in suicides will be important in conducting post-mortem examinations. Among vulnerable subjects for suicide refraining from the consumption of alcohol and drugs should be made a priority. Further studies are warranted to explore more performing autopsies for firearm-related suicides.

Disclosure statement

Conflicts of Interest: The authors declare that they have no conflicts of interest.

Funding: None

References

- Al Madani OM, Kharoshah MA, Youssef MA, Moulana AA. Multiple suicidal firearm injuries: A case study. *Egyptian journal of forensic sciences*. 2011 Sep 1;1(3-4):140-3.
- EverytownResearch.org. (2019). Firearm Suicide in the United States - EverytownResearch.org. [online] Available at: <https://everytownresearch.org/firearm-suicide/> [Accessed 14 Oct. 2019].
- Kohlmeier RE, McMahan CA, DiMaio VJ. Suicide by firearms: a 15-year experience. *The American journal of forensic medicine and pathology*. 2001 Dec 1;22(4):337-40.
- Centers for Disease Control and Prevention. Web-based injury statistics query and reporting system (WISQARS). www.cdc.gov/ncipc/wisqars. 2002.
- Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. *The lancet*. 2002 Oct 5; 360(9339):1083-8.
- World Health Organization, Geneva 3. Moscicki E (1994) Gender differences in completed and attempted suicides. *Ann Epidemiol* 4:152-158.
- Moscicki EK. Gender differences in completed and attempted suicides. *Annals of epidemiology*. 1994 Mar 1;4(2):152-8.
- Canetto SS, Lester D. *The epidemiology of women's suicidal behavior*. Springer Publishing Co; 1995.
- Kushner HI. Women and suicide in historical perspective. *Signs: Journal of Women in Culture and Society*. 1985 Apr 1;10(3):537-52.
- Maris RW. *Pathways to suicide: A survey of self-destructive behaviors*. Johns Hopkins University Press; 1981.
- Callanan VJ, Davis MS. Gender differences in suicide methods. *Social psychiatry and psychiatric epidemiology*. 2012 Jun 1;47(6):857-69.
- American Foundation for Suicide Prevention. *Suicide Statistics; 2019* Available from: <https://afsp.org/about-suicide/suicide-statistics>
- Meehan PJ, Saltzman LE, Sattin RW. Suicides among older United States residents: epidemiologic characteristics and trends. *American Journal of Public Health*. 1991 Sep;81(9):1198-200.
- Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981-1997. *American Journal of Psychiatry*. 2003 Apr 1;160(4):765-72.
- Kposowa AJ. Marital status and suicide in the National Longitudinal Mortality Study. *Journal of Epidemiology & Community Health*. 2000 Apr 1;54(4):254-61.
- Smith JC, Mercy JA, Conn JM. Marital status and the risk of suicide. *American journal of public health*. 1988 Jan;78(1):78-80.
- Masocco M, Pompili M, Vichi M, Vanacore N, Lester D, Tatarelli R. Suicide and marital status in Italy. *Psychiatric Quarterly*. 2008 Dec 1;79(4):275-85.
- National Vital Statistics Reports, Vol. 65 No. 4, June

- 2016(https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf)
19. Brent DA, Johnson B, Bartle S, Bridge J, Rather C, Matta J, Connolly J, Constantine D. Personality disorder, tendency to impulsive violence, and suicidal behavior in adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1993 Jan 1;32(1):69-75.
 20. Gili-Planas M, Roca-Bennasar M, Ferrer-Perez V, Bernardo-Arroyo M. Suicidal ideation, psychiatric disorder, and medical illness in a community epidemiological study. *Suicide and Life-Threatening Behavior*. 2001 Jun 1;31(2):207-13.
 21. Maris RW, Berman AL, Maltzberger JT, Yufit RI. Assessment and prediction of suicide. In This volume is based on a workshop entitled "Assessment and Prediction of Suicide" held at the 1990 annual meeting of the American Association of Suicidology (ASS) in New Orleans, Louisiana. 1992. Guilford Press
 22. Karlsson T. Multivariate analysis ('Forensimetrics')-a new tool in forensic medicine. Differentiation between firearm-related homicides and suicides. *Forensic science international*. 1999 Apr 26;101(2):131-40.
 23. McDowell CP, Rothberg JM, Koshes RJ. Witnessed suicides. *Suicide and Life-Threatening Behavior*. 1994 Sep;24(3):213-23.
 24. Dorpat TL, Ripley HS. A study of suicide in the Seattle area. *Comprehensive psychiatry*. 1960.
 25. Selway R. Gunshot suicides in Victoria, Australia, 1988. *Medicine, Science and the Law*. 1991 Jan;31(1):76-80.
 26. Shiner B, Riblet N, Westgate CL, Young-Xu Y, Watts BV. Suicidal ideation is associated with all-cause mortality. *Military medicine*. 2016 Sep 1;181(9):1040-5.
 27. Kristóf I, Váradi K, Marcsa B, Vardi A, Kosztya S, Tóth K. Examination of the suicide characteristics based on the scene investigation in capital Budapest (2009-2011). *Journal of forensic sciences*. 2015 Sep;60(5):1229-33.
 28. Ahmedani BK, Peterson EL, Hu Y, Rossom RC, Lynch F, Lu CY, Waitzfelder BE, Owen-Smith AA, Hubley S, Prabhakar D, Williams LK. Major physical health conditions and risk of suicide. *American journal of preventive medicine*. 2017 Sep 1;53(3):308-15.
 29. McDowell AK, Lineberry TW, Bostwick JM. Practical suicide-risk management for the busy primary care physician. In *Mayo Clinic Proceedings* 2011 Aug 1 (Vol. 86, No. 8, pp. 792-800). Elsevier.
 30. Ilgen MA, Bohnert AS, Ignacio RV, McCarthy JF, Valenstein MM, Kim HM, Blow FC. Psychiatric diagnoses and risk of suicide in veterans. *Archives of general psychiatry*. 2010 Nov 1;67(11):1152-8.
 31. Ahmedani BK, Vannoy S. National pathways for suicide prevention and health services research. *American journal of preventive medicine*. 2014 Sep 1;47(3):S222-8.
 32. Ahmedani BK, Simon GE, Stewart C, Beck A, Waitzfelder BE, Rossom R, Lynch F, Owen-Smith A, Hunkeler EM, Whiteside U, Operskalski BH. Health care contacts in the year before suicide death. *Journal of general internal medicine*. 2014 Jun 1;29(6):870-7.
 33. Webb RT, Kontopantelis E, Doran T, Qin P, Creed F, Kapur N. Suicide risk in primary care patients with major physical diseases: a case-control study. *Archives of General Psychiatry*. 2012 Mar 5;69(3):256-64.
 34. Juurlink DN, Herrmann N, Szalai JP, Kopp A, Redelmeier DA. Medical illness and the risk of suicide in the elderly. *Archives of internal medicine*. 2004 Jun 14;164(11):1179-84.
 35. Robson A, Scrutton F, Wilkinson L, MacLeod F. The risk of suicide in cancer patients: a review of the literature. *Psycho-Oncology*. 2010 Dec;19(12):1250-8.
 36. Kuo CJ, Chen VC, Lee WC, Chen WJ, Ferri CP, Stewart R, Lai TJ, Chen CC, Wang TN, Ko YC. Asthma and suicide mortality in young people: a 12-year follow-up study. *American journal of psychiatry*. 2010 Sep;167(9):1092-9.
 37. Ilgen MA, Kleinberg F, Ignacio RV, Bohnert AS, Valenstein M, McCarthy JF, Blow FC, Katz IR. Noncancer pain conditions and risk of suicide. *JAMA psychiatry*. 2013 Jul 1;70(7):692-7.
 38. Shenassa ED, Catlin SN, Buka SL. Gun availability, psychopathology, and risk of death from suicide attempt by gun. *Annals of epidemiology*. 2000 Oct 1;10(7):482.
 39. Miller M. Mortal allies: Guns and suicide. 2005.
 40. Sarchiapone M, Mandelli L, Iosue M, Andrisano C, Roy A. Controlling access to suicide means. *International journal of environmental research and public health*. 2011 Dec;8(12):4550-62.
 41. HAVARD PUBLIC HEALTH, Guns & Suicide; 2019 Available from: https://www.hsph.harvard.edu/magazine/magazine_article/guns-suicide/
 42. Vyrostek SB, Annett JL, Ryan GW. Surveillance for fatal and nonfatal injuries-United States, 2001. *MMWR SurveillSumm*. 2004 Sep 3;53(7):1-57.
 43. Miller M, Azrael D, Barber C. Suicide mortality in the United States: the importance of attending to method in understanding population-level

- disparities in the burden of suicide. Annual review of public health. 2012 Apr 21;33:393-408.
44. Peterson LG, Peterson M, O'Shanick GJ, Swann A. Self-inflicted gunshot wounds: lethality of method versus intent. The American journal of psychiatry. 1985 Feb.
 45. Deisenhammer EA, Ing CM, Strauss R, Kemmler G, Hinterhuber H, Weiss EM. The duration of the suicidal process: how much time is left for intervention between consideration and accomplishment of a suicide attempt?. Journal of Clinical Psychiatry. 2009 Jan 1;70(1):19.
 46. Simon TR, Swann AC, Powell KE, Potter LB, Kresnow MJ, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. Suicide and Life-Threatening Behavior. 2001 Dec 1;32(Supplement to Issue 1):49-59.
 47. Psicothema. 2018 Feb;30(1):33-38. doi: 10.7334/psicothema2016.318. Are previous suicide attempts a risk factor for completed suicide? Goñi-Sarriena AI, Blanco M, Azcarate L, Peinado R, Lopez-Goni JJ.
 48. Hirsch JK, Duberstein PR, Untch J. Chronic medical problems and distressful thoughts of suicide in primary care patients: mitigating role of happiness. International Journal of Geriatric Psychiatry: A journal of the psychiatry of late life and allied sciences. 2009 Jul;24(7):671-9.
 49. McLaughlin J, O'carroll RE, O'connor RC. Intimate partner abuse and suicidality: a systematic review. Clinical psychology review. 2012 Dec 1;32(8):677-89.
 50. Kumar S, Jeyaseelan L, Suresh S, Ahuja RC. Domestic violence and its mental health correlates in Indian women. the British journal Of psychiatry. 2005 Jul;187(1):62-7.
 51. Reimer F. Alcoholism and suicide in sailors. Öffentliche Gesundheitsdienst. 1964;26:423-6.
 52. James IP. Blood alcohol levels following successful suicide. Quarterly journal of studies on alcohol. 1966 Mar;27(1):23.
 53. Bernal M, Haro JM, Bernert S, Brugha T, de Graaf R, Bruffaerts R, Lopez JP, de Girolamo G, Vilagut G, Gasquet I, Torres JV. Risk factors for suicidality in Europe: results from the ESEMED study. Journal of affective disorders. 2007 Aug 1;101(1-3):27-34.
 54. Roy A, Linnoila M. Alcoholism and suicide. Suicide Life Threat Behav. 1986 Summer; 16(2):244-73.
 55. Cina SJ, Ward ME, Hopkins MA, Nichols CA. Multifactorial analysis of firearm wounds to the head with attention to anatomic location. The American journal of forensic medicine and pathology. 1999 Jun 1;20(2):109-15.
 56. Aufferdizer M, Cantürk G, Cantürk N, Yavuz MS, Sarf H. Analyses of suicidal deaths with shotguns in Istanbul, 1998-2007.
 57. Karger B, Billeb E, Koops E, Brinkmann B. Autopsy features relevant for discrimination between suicidal and homicidal gunshot injuries. International journal of legal medicine. 2002 Oct 1;116(5):273-8.
 58. Thomsen JL, Albrektsen SB. An investigation of the pattern of firearms fatalities before and after the introduction of new legislation in Denmark. Medicine, Science and the Law. 1991 Apr;31(2):162-6.
 59. Molina DK, DiMaio V, Cave R. Gunshot wounds: a review of firearm type, range, and location as pertaining to manner of death. The American journal of forensic medicine and pathology. 2013 Dec 1;34(4):366-71.
 60. Grandmaison GL, Fermanian C, Aegerter P, Durigon M. Influence of ballistic and autopsy parameters on the manner of death in case of long firearms fatalities. Forensic science international. 2008 May 20;177(2-3):207-13.
 61. Avis SP. Suicidal gunshot wounds. Forensic science international. 1994 Jun 28;67(1):41-7.
 62. Betz P, Peschel O, Eisenmenger W. Suizidale Schussbeibringung - Lokalisation und Besonderheiten. Arch Kriminol. 1993;193:65-71.
 63. Chapman J, Milroy CM. Firearm deaths in Yorkshire and Humberside. Forensic science international. 1992 Dec 1;57(2):181-91.
 64. Druid H. Site of entrance wound and direction of bullet path in firearm fatalities as indicators of homicide versus suicide. Forensic science international. 1997 Aug 4;88(2):147-62.
 65. Eisele JW, Reay DT, Cook A. Sites of suicidal gunshot wounds. Journal of Forensic Science. 1981 Jul 1;26(3):480-5.
 66. Rouse D, Dunn L. Firearm fatalities. Forensic science international. 1992 Sep 1;56(1):59-64.
 67. Kohlmeier RE, McMahan CA, DiMaio VJ. Suicide by firearms: a 15-year experience. The American journal of forensic medicine and pathology. 2001 Dec 1;22(4):337-40.
 68. Balci Y, Canogullari G, Ulupinar E. Characterization of the gunshot suicides. Journal of forensic and legal medicine. 2007 May 1;14(4):203-8.
 69. Azmak D, Altun G, Köksal S, Yorulmaz C, Ozaslan A. Intra-and perioral shooting fatalities. Forensic science international. 1999 May 17;101(3):217-27.
 70. Frei A, Han A, Weiss MG, Dittmann V, Ajdacic-Gross V. Use of army weapons and private firearms for suicide and homicide in the region of Basel, Switzerland. Crisis. 2006 Jan;27(3):140-6.

71. Fedakar R, Gundogmuş N, Turkmen N. Firearm-related deaths in two industrial cities of Turkey and their province. *Legal medicine*. 2007 Jan 1;9(1):14-21.
72. Dorado-Fernández E, Andreu-Tena E, Magana-Loarte C, Fernández ER, Caceres-Monllor D, López-Mosquera JL, Santiago-Saez A. Deaths by firearm and intraoral gunshot: Medicolegal etiology. *Spanish journal of legal medicine*. 2017 Apr 1;43(2):70-8.
73. Blumenthal R. Suicidal gunshot wounds to the head: a retrospective review of 406 cases. *The American journal of forensic medicine and pathology*. 2007 Dec 1;28(4):288-91.