



EPIDEMIOLOGICAL PATTERNS OF UNNATURAL DEATHS AMONG WOMEN OF REPRODUCTIVE AGE: A MULTICENTER AUTOPSY STUDY

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ABSTRACT

Background

Unnatural deaths among women have always been a source of a great concern at community and national level in reproductive age group of women.

Objective

To determine the epidemiological patterns, causes, and manners of unnatural deaths among women of reproductive age through a multicenter autopsy-based retrospective cross-sectional study

Study Design & Setting:

A retrospective cross-sectional multicenter study conducted at the Postmortem Units of participating medical teaching hospitals in Pakistan.

Methodology: Data were retrieved from autopsy records, inquest papers, and First Information Reports (FIRs) over a three-year period (01 January 2018 to 31 December 2020). Out of 756 autopsies, 135 cases of women aged 12–49 years with unnatural deaths were included. Demographic, epidemiological, and forensic details were recorded. Data were analyzed using SPSS version 21. Categorical variables were expressed as n (%), and continuous variables as mean \pm SD. Associations between demographic characteristics and manner of death were assessed using the chi-square test, with $p < 0.05$ considered significant.

Results: The mean age of victims was 28.7 ± 8.7 years, with most cases in the 26–35 year group (38.5%). Married women constituted 63.0% of cases, and 57.8% were from urban areas. Firearm

injuries (22.9%) and road traffic accidents (14.8%) were the leading causes of death. Homicide was the most common manner (54.8%), followed by accidents (17.0%) and suicide (12.6%). Significant associations were found between unnatural deaths and marital status, residence, education level, and occupation ($p < 0.05$).

Conclusion: Unnatural deaths in women of reproductive age are predominantly homicidal, affecting married women and those in the 26–35 year age group. Multidimensional preventive strategies focusing on gender-based violence, road safety, and social support are urgently needed.

Keywords: Autopsy, Education, Epidemiology, Forensic, Marital status, Multicenter, Occupation, Unnatural deaths, Women

INTRODUCTION

Death is a harsh reality that cannot be denied by anyone as Allah says in Quran, “Every soul has to taste death”.^[1] Death may be natural or unnatural. According to Siegen’s Medical Dictionary, natural death is one which is caused by aging process or disease while unnatural death includes death caused by external causes e.g., death due to intentional injury, poisoning, suicide or homicide and deaths caused in an accidental manner by unintentional act.

Although Global trends show that unnatural deaths are more prevalent among males^[2], but death of females, especially mothers has serious social, economic and psychological consequences on the family members and community^[3,4]. Victimization of women physically, sexually and psychologically is something that is unfortunately seen as a norm in our society which was locally apparent from Rawalpindi-Pakistan in a retrospective study regarding pattern of unnatural death^[5]. According to the Global study of homicide 2019, “At world level 87,000 women were intentionally killed in aggregate during 2017. In Asia the number of killings was 20,000 at highest most, followed by killings in Africa with a number of 19,000, thereafter 8000 killings in America followed by 3000 killings in Europe and 300 in Oceania yearly.”

In Asian countries due to their specific environmental conditions, puberty in females usually begins at 12-13 years of age^[6]. After puberty, a girl is capable of bearing children but in most of the cases, physically and mentally she is not mature enough to cope with the responsibilities of family life. According to Child Marriage Restraint Act 1929 the minimum legal age of girls for marriage is 16 years in Pakistan. For the sake of research purposes, we have limited our study to include only women of reproductive age who stand as backbone of our society and preserving their lives is meant to preserve the family structure and thus strengthen the society. Reproductive age of a woman is the period of age between menarche and menopause, usually ranges from 12 to 49 years of age. These women comprise a significant fraction of each society^[7]. We included women of reproductive age 12-49 years because it is always neglected by local researchers.

In Pakistan, many studies referring to women’s fatalities related to pregnancy and child birth complications have been done during recent years but the topic of unpredicted and sudden deaths among women of reproductive age is always being neglected by local researchers. In Sindh it is legal for those under 18 years of age to marry, whereas, according to national law, the legal minimum age is 16. Baluchistan awaits legislation on child marriages. Many social, behavioral and cultural factors are involved in such deaths like illiteracy, unemployment, poverty, rising population, male chauvinism, treachery, free availability of arms etc. This study aims to highlight medico-legal and socio-epidemiological aspects encompassed in such deaths. To analyze the epidemiological and social factors among women of reproductive age in Faisalabad. To create awareness in society about rising incidence of reproductive age deaths

Methodology:

A retrospective cross-sectional study was conducted at the Postmortem Unit of Faisalabad Medical University, Faisalabad, with data retrieved for the three-year period from 01 January 2018 to 31 December 2020. During this duration, a total of 756 autopsies were carried out, among which 135 autopsies of women of reproductive age (12–49 years) were identified as unnatural deaths and were

included in the study, while 621 cases were excluded. The annual distribution of unnatural deaths was 39 (28.9%) cases in 2018, 43 (31.9%) cases in 2019, and 53 (39.2%) cases in 2020, making a cumulative total of 135 (100%). Approval for the study was obtained from the Ethical Review Committee of Faisalabad Medical University (Approval No. 1076).

The study variables included demographic details such as age, residence (urban or rural), education level (illiterate, primary–middle, or secondary–higher), and occupation (housewife, student, employed, or unemployed/other). Marital status was categorized as married, unmarried, or widowed/divorced. Epidemiological characteristics were recorded in terms of the cause of death (firearm injury, blunt force injury, sharp weapon, hanging, strangulation, drowning, electrocution, poisoning, burns, road traffic accidents, or undetermined), the manner of death (homicidal, suicidal, accidental, or undetermined), and the anatomical region of the body most affected (head, neck, chest, abdomen, limbs, multiple sites).

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics were calculated, with categorical variables presented as frequency and percentage [n (%)] and continuous variables such as age expressed as mean \pm standard deviation (SD). Stratification of unnatural deaths was performed with respect to marital status, residence, education level, and occupation, and associations between variables were tested using the chi-square (χ^2) test. A p-value of less than 0.05 was considered statistically significant. To enhance clarity, results were presented in the form of tables and flowcharts, showing annual distribution, demographic characteristics, causes, manner of death, and body regions involved.

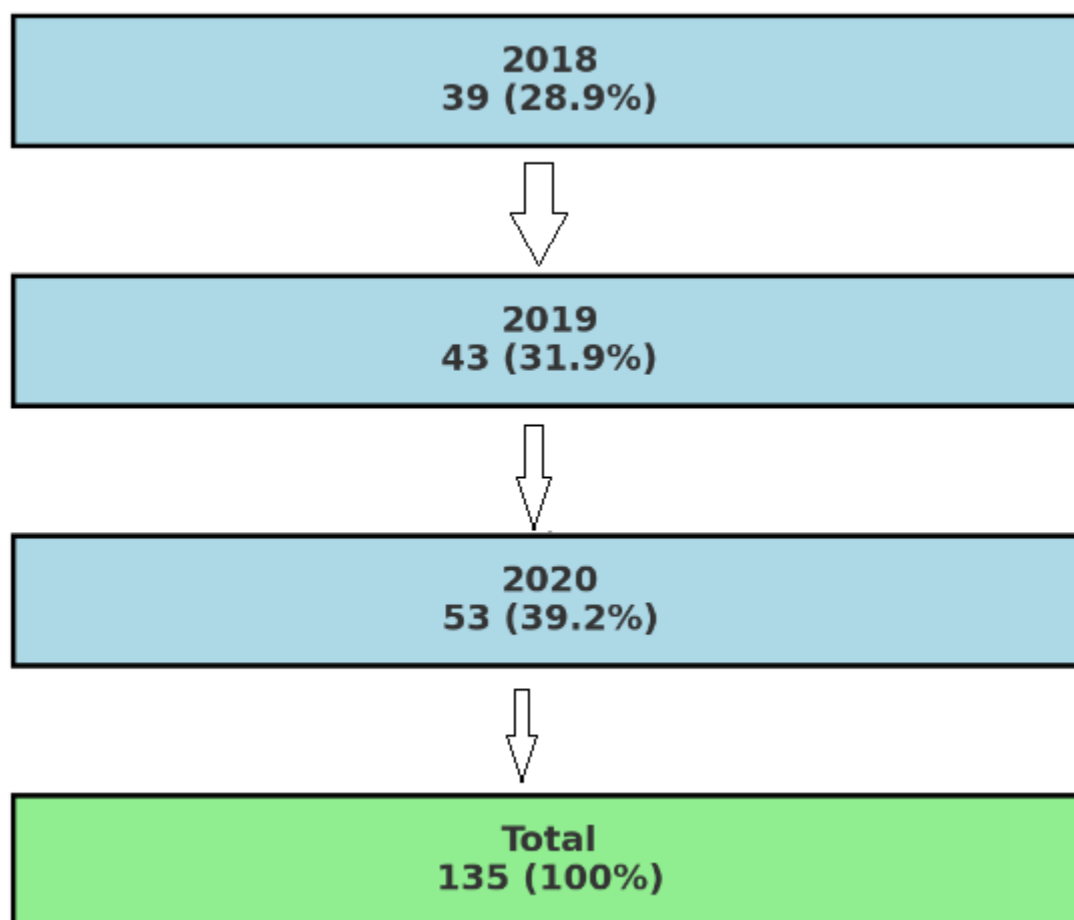


Figure 1: Flowchart showing the annual distribution of unnatural deaths among women of reproductive age in Faisalabad during 2018–2020

RESULTS

The mean age of women who experienced unnatural deaths was 28.7 ± 8.7 years, with the largest proportion falling in the 26–35 year age group (38.5%), followed by 16–25 years (35.6%), while the least affected were in the 46–49 year group (1.5%). Most victims were married (63.0%), and more than half resided in urban areas (57.8%). Regarding education, 41.5% had secondary or higher education, 28.1% had primary to middle-level education, while 30.4% were illiterate. In terms of occupation, the majority were housewives (54.8%), followed by students (19.3%) and formally employed women (15.6%) as given in Table 1.

When stratified by age and marital status, 35.6% of the victims were in the 16–25 year group with a mean age of 21.6 ± 2.5 years, while 38.5% were aged 26–35 years with a mean of 30.2 ± 2.8 years. In the younger group (12–15 years), most were unmarried (5.9%), whereas in the 26–35 year group the majority were married (30.4%). Widowed or divorced victims were found predominantly in the 26–45 year age range (6.0%). Overall, across all age groups, 63.0% of the deceased women were married, 35.6% unmarried, and 8.1% widowed or divorced, as given in Table 2.

The leading causes of unnatural deaths were firearm injuries (22.9%), followed by road traffic accidents (14.8%), blunt force injuries (12.6%), and hanging (10.4%). Strangulation accounted for 8.9% of deaths, poisoning 6.7%, and burns 5.2%, while fewer cases were due to sharp weapon injuries (8.1%), drowning (3.0%), and electrocution (3.7%). A small proportion (3.7%) remained undetermined as given in Table 3.

On stratification by demographic factors, marital status showed a statistically significant association with unnatural deaths ($p = 0.045$), with most victims being married (63.0%). Residence was also significant ($p = 0.050$), with more than half of the cases occurring among urban women (57.8%). Education level showed a strong association ($p = 0.010$), with the highest proportion among those with secondary or higher education (41.5%), followed by illiterate women (30.4%). Occupation was also significant ($p = 0.044$), as more than half of the victims were housewives (54.8%), followed by students (19.3%) and employed women (15.6%). These findings highlight that social and demographic factors were significantly associated with unnatural deaths, as given in Table 4.

Table 1: Demographic Characteristics of Women of Reproductive Age with Unnatural Deaths (n=135)

Characteristic	Category	n (%)
Age (yrs)	Mean \pm SD	28.7 ± 8.7
	12–15	9 (6.7%)
	16–25	48 (35.6%)
	26–35	52 (38.5%)
	36–45	24 (17.8%)
	46–49	2 (1.5%)
Marital Status	Married	85 (63.0%)
	Unmarried	39 (28.9%)
	Widowed/Divorced	11 (8.1%)
Residence	Urban	78 (57.8%)
	Rural	57 (42.2%)
Education Level	Illiterate	41 (30.4%)
	Primary–Middle	38 (28.1%)
	Secondary–Higher	56 (41.5%)
Occupation	Housewife	74 (54.8%)
	Student	26 (19.3%)
	Employed (formal)	21 (15.6%)

	Unemployed/Other	14 (10.3%)
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Table 2. Age-wise Distribution of Unnatural Deaths with by Marital Status by Age Group (n=135)

Age Group (yrs)	n (%)	Mean \pm SD	Married	Unmarried	Widowed/Divorced
12–15	9 (6.7)	13.9 \pm 1.1	1 (0.7)	8 (5.9)	0 (0.0)
16–25	48 (35.6)	21.6 \pm 2.5	18 (13.3)	27 (20.0)	3 (2.2)
26–35	52 (38.5)	30.2 \pm 2.8	41 (30.4)	7 (5.2)	4 (3.0)
36–45	24 (17.8)	40.1 \pm 2.4	23 (17.0)	5 (3.7)	4 (3.0)
46–49	2 (1.5)	47.0 \pm 1.4	2 (1.5)	1 (0.7)	0 (0.0)
Total	135 (100.0)	28.7 \pm 8.7	85 (63.0)	48 (35.6)	11 (8.1)

Table 3: Causes of Unnatural Deaths (n=135)

Cause of Death	n (%)
Firearm injuries	31 (22.9)
Blunt force injuries	17 (12.6)
Sharp weapon injuries	11 (8.1)
Hanging	14 (10.4)
Strangulation	12 (8.9)
Drowning	4 (3.0)
Electrocution	5 (3.7)
Poisoning	9 (6.7)
Burns	7 (5.2)
Road traffic accidents	20 (14.8)
Undetermined	5 (3.7)
Total	135 (100.0)

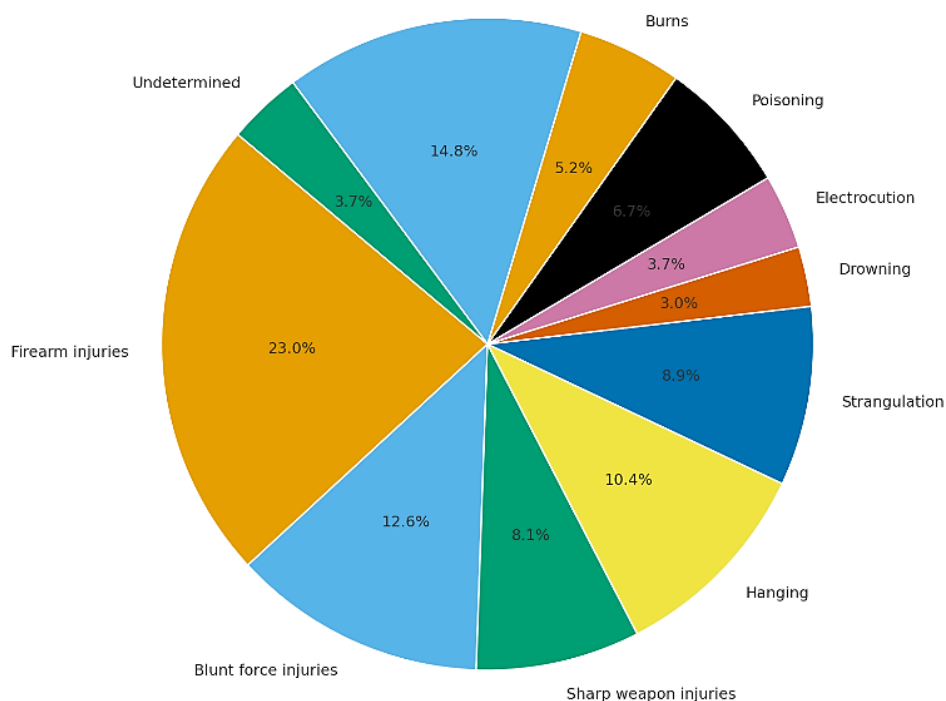


Figure 2. Pie chart showing the distribution of causes of unnatural deaths among women of reproductive age (n=135)

Table 4: Stratification of Unnatural Deaths by Demographic Characteristics (n=135)

Variable	Category	n (%)	p-value
Marital Status	Married	85 (63.0)	0.045*
	Unmarried	39 (28.9)	
	Widowed/Divorced	11 (8.1)	
Residence	Urban	78 (57.8)	0.050*
	Rural	57 (42.2)	
Education Level	Illiterate	41 (30.4)	0.010*
	Primary–Middle	38 (28.1)	
	Secondary–Higher	56 (41.5)	
Occupation	Housewife	74 (54.8)	0.044*
	Student	26 (19.3)	
	Employed (formal)	21 (15.6)	
	Unemployed/Other	14 (10.3)	

DISCUSSION:

The total percentage of female autopsies belonging to the defined reproductive age group in this study was 17.86% showing that males are more prone to unnatural deaths as compared to females in our region. (33.7%) females died in Ghana due to unnatural deaths, again showing male predominance.^[8] This ratio is nearly the same to our study, conducted in India in 2018, probing the incidence of unnatural deaths in women of reproductive age which was 17% as well ^[9]. Similarly, 11.4% of the victims of unnatural deaths were females in a retrospective study conducted in the city of Warri.^[10] Unnatural deaths are more common in males as compared to females in general as supported by this study and other similar studies. In Nigeria the study concluded that violence against women has strongly influence on the peace and security issues many provinces of the state ^[4]. Further in an international study regarding sudden and unexpected deaths elaborated that there are high risk of homicidal and suicidal deaths among Women of Reproductive age prevail in India.^[7] In south Bangalore Unnatural deaths of adult females is more in the age of 13 to 35 years due to homicidal and suicidal. ^[11] In a local study pattern of unnatural deaths identify that homicidal deaths are more than other patterns. ^[5]

In most of the cases the prevailing manner was homicide (54.81%) followed by accident (17.04%) and suicide (9.63%) consecutively for unnatural deaths among the women of reproductive age. Majority of the females who died due to unnatural circumstances in India were from age group 20-35 years i.e. 52%^[12]. In our study the age group most commonly effected was 26-35 years (38%) followed by 16-25 years (36%); collectively giving a major chunk of 74% belonging to age group 16-35 years. The 3rd decade of life was also the major group of females effected by unnatural deaths in Niger Delta, as well as in Cairo, Egypt^[13,14].

57.78% females were married while status of 10.3% was not known in our study. This ratio is 64% in a study conducted in India ^[12]. The incidence of unnatural deaths is more in married females as compared to unmarried females in South-Asian region countries like Pakistan, India and Bangladesh.

In a study conducted in India, suicide accounts for 81% of unnatural death in females ^[8] while in our study only 9.63% unnatural deaths were due to suicides and in 54% cases homicide was the main reason of unnatural death. On the other hand, Kailash in another study in India reported 53.7% accidental deaths, 40.4% suicides and only 5% homicides in females ^[15]. In another study, accidental deaths were most frequent i.e. 40% followed by suicides i.e. 37.14% and third was homicides accounting for 22.86% of unnatural deaths in female population. ^[9] In a study it is found that 56 (40%) deaths were due to accident, 45 (32%) were due to suicide in Srilanka.^[10]

Vehicular accident injuries (37.14%), followed by hanging (20%), strangulation (17%) and poisoning (14%) were the main causes of accidental injuries in females in Uttar Pradesh during last 7 years^[9] while in our study, firearm accounted for the majority of deaths i.e. 25.93 followed by strangulation and hanging which had a share of 11.1% each. In Srilanka, the commonest method

was poisoning with a (31%) lagged by hanging with an amounting of 12 (26%) and 13 (39%) by sharp injuries.^[10] Burning was the major cause of unnatural deaths in females' death in Hubballi i.e. 37.92%. In a recent study being held in India, it is identified that (13.04%) deaths were due to unnatural patterns of deaths in adult females in a sample of 204 casualties^[16]. In a study it is concluded that women in Northern Finnish have substantially lower risk than men in all-cause mortality regarding unnatural deaths^[17]. Similar results were found in an Indian and Egyptian study that also support the arguments that the deaths of women in reproductive age are due to unnatural patterns^[18,19]

Our study empirically elaborated that high homicidal deaths have high variation than accidental and suicidal but high negative correlation with high age. However, the age among 12 to 35 is highly sensitive for women in reproductive age.

Conclusion:

Hence it is concluded that in Faisalabad, females in their second and third decade of life were majorly affected by unnatural deaths. However, Homicide was the most common manner of female death and firearm was the commonest cause of inflicting unnatural deaths in females. Secondly the objective was to create awareness in society about rising incidence of these deaths with each succeeding year. This study reveals that a detailed campaign should be raised to create awareness about female violence in our society in general population initially at academic institutions and then at mass level. Our study reflects that by the proper implementation of law in sale and purchase and use of firearm, dangerous drugs and conducting awareness programs at mass level through seminars, electric and print media. To increase in literacy rate, focus on ethical values, resource creation and creation of employment in the society is the need of hour.

REFERENCES

1. Bahadur P. Rituals and beliefs surrounding death in Islam. *Journal of Adventist Mission Studies*. 2020;16(1):173-92. <https://digitalcommons.andrews.edu/>
2. Sorenson SB. Gender disparities in injury mortality: Consistent, persistent, and larger than you'd think. *Am J Public Health* 2011;101 Suppl 1:S353-8. DOI: 10.2105/AJPH.2010.300029
3. Miller S, Belizán JM. The true cost of maternal death: Individual tragedy impacts family, community and nations. *Reprod Health* 2015;12:56. DOI 10.1186/s12978-015-0046-3
4. Haaga PT, Elechi FA, Okoye AC. Violence against women and its implication for peace and security in Nigeria. *Int J Pharmacol Clin Sci* 2015;2:27-40. <https://www.citefactor.org/article/index/67333/violence-against-women-and-its-implications-for-peace-and-security-in-nigeria>
5. Malik R, Chughtai BR, Khursheed R. Pattern of Unnatural Deaths -An Audit of Autopsies. *Journal of Rawalpindi Medical College (JPMC)*. 2017;21(1): 97-99. <https://openurl.ebsco.com/EPDB%3Aagcd%3A15%3A25961743/detailv2?bquery=IS%201683-3562%20AND%20VI%2021%20AND%20IP%201%20AND%20DT%202017&page=1&sid=ebsco:ocu:record>
6. Patnaik KK, Panigrahi, Das S. Sudden and Unexpected Deaths among Women of Reproductive age – Qualitative Analysis of Risk Factors. *Journal of Clinical and Diagnostic Research*. 2017 Oct;11(10): HC01-HC05 DOI:10.7860/JCDR/2017/30796.10790
6. Kumar A, Pandey SK. Prevalence of unnatural death among reproductive aged females in Varanasi area India. *Int J of Science and Research*. 2014;3(6):2144-47. <https://www.ijsr.net/archive/v3i6/MDIwMTQ3MDI=.pdf>
7. Sampene OP, Eric AD. Trend of Medicolegal Manner of Deaths in Ghana: A Forensic Autopsy-Based Study. *Annals of International Medical and Dental Research*. 2017;3(4):56. DOI:10.21276/aimdr.2017.3.4.PT15
4. 9.RK S. A Prospective Study of Unnatural Deaths in Married Women within Seven Years of Marriage in Hapur District of Western Uttar Pradesh. *Medico-Legal Update*. 2019 Jan 1;19(1). <https://doi.org/10.37506/mlu.v19i1.877>

6. 10.Kitulwatte ID, Edirisinghe PA, Pratheepa Mendis HK, Wijesinghe PR, Fernando A, Abeyrathna AA. Study on the pattern of unnatural deaths of women brought for medico-legal autopsy. *Sri Lanka Journal of Forensic Medicine Science & Law*. 2017 May ; 8(1) : 13-2 <https://doi.org/10.4038/sljfmsl.v8i1.7789>
7. 11. Sane MR, Ananda K. Unnatural deaths of adult females in south Bangalore- an autopsy study. *J Indian Acad Forensic Med*. 2014;36(2):130-32. DOI:<https://doi.org/10.48165/>
8. 12.Shivaji A, Harish S, Girish Chandra YP, Shetty AR, Kishanchand C. Study of Pattern of Unnatural Deaths in Women of Reproductive Age Group. 2018 Jul;12(3):103. DOI:10.5958/0973-9130.2018.00140.8
9. 13.Ijomone EA, Uchendu OJ, Nwachokor NF. Pattern of unnatural death among females in Niger Delta: A retrospective medicolegal study. *Annals of Tropical Pathology*. 2019 Jan 1;10(1):6. DOI:10.4103/atp.atp_54_18
10. 14.Zaghloul NM, Megahed HM. A descriptive medico-legal study of female deaths in cairo governorate, Egypt. *Journal of forensic and legal medicine*. 2019 Aug 1;66:25-32. DOI: 10.1016/j.jflm.2019.05.018
11. 15.Nayak M, Merchant S, Shah K. Trends & Pattern in Unnatural Female Death Cases Due to Burn: A One Year Retrospective Study. *Indian Journal of Forensic Medicine & Toxicology*. 2020 Apr 1;14(2). <https://doi.org/10.37506/ijfmt.v14i2.2696>
12. 16. Rajindran R, Sharma G, Yadav V, Saini H, Lamba R. Profile of unnatural deaths in adult females – A retrospective study conducted at a tertiary care hospital in Haryana. *Indian J Forensic Community Med* 2024;11(2):56-59. <https://doi.org/10.18231/j.ijfcm.2024.014>.
13. 17. Junno A, Lasse P, Petteri O, Unnatural-cause mortality patterns of Northern Finnish men and women diverge in adolescence – A 52-year follow-up, *Preventive Med Reports*, 2021; 22(1): 101329-37 <https://doi.org/10.1016/j.pmedr.2021.101337>
14. 18. Parmar, Pragnesh B, Rathod, Gunvanti B, Bansal, Perna, Maru, Alpeshkumar M, Pandya, Binita, Bansal, Anupam K., Pattern of suspicious deaths of married females brought for medico-legal autopsy at teaching institute of India. *Journal of Family Medicine and Primary Care*, 2023 12(9);2110-2113, <https://DOI:10.4103/jfmipc.jfmipc.11923>
15. 19. Basyoni AH , Sayed ABH, Ghamry HAM, Hassan AA, Alsaed SA, Medico-legal study of Egyptian unnatural female deaths in the childbearing period during 2019–2020, *Legal Med*. 2024 67(3): <https://doi.org/10.1016/j.legalmed.2023.102371.20>