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Epidemiological Profile of Unnatural Female Deaths: A Three-Year Retrospective Autopsy-Based Study from Northeast India

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ABSTRACT
Background: Unnatural deaths among women represent a significant public health and medicolegal concern, reflecting the prevailing social, cultural, and healthcare circumstances of a community. Understanding the epidemiological profile and causes of such deaths is essential for formulating preventive strategies and strengthening women's safety. The present study aimed to evaluate the pattern, causes, and demographic characteristics of unnatural female deaths in Sonitpur district, Assam, India.
Methods: A retrospective cross-sectional study was conducted on all eligible female medicolegal autopsies performed at the Department of Forensic Medicine and Toxicology, Tezpur Medical College and Hospital, over a three-year period from **1 July 2019 to 30 June 2022**. Data were retrieved from autopsy reports, inquest reports, and police requisition forms. After applying the exclusion criteria, **424 cases** were included in the study. Data were analysed using descriptive statistics and expressed as frequencies and percentages.
Results: A total of **424** cases of unnatural female deaths were analysed, accounting for **36.61%** of all medicolegal autopsies conducted during the study period. Women aged **21–30 years (35.85%)** constituted the largest proportion of cases, followed by those aged **31–40 years (32.31%)**. Hanging was the most common cause of death (**40.56%**), followed by road traffic accidents (**26.42%**) and poisoning (**15.56%**). Suicide was the predominant manner of death, accounting for **63.68%** of cases. Married women constituted **77.36%** of the study population, with the highest number of deaths occurring among those who had been married for **7–14 years**.
Conclusion: Suicide, particularly by hanging, was the leading cause of unnatural female deaths in the present study, with young and middle-aged married women being the most affected. The findings highlight the need for strengthening mental health services, improving injury prevention measures, and implementing region-specific public health interventions aimed at reducing preventable female mortality. Further multicentric studies incorporating psychosocial and socioeconomic variables are recommended to better understand the determinants of unnatural female deaths.
Keywords: Female deaths; Unnatural deaths; Medicolegal autopsy; Suicide; Hanging; Northeast India

I. INTRODUCTION

Unnatural deaths among women constitute a major public health, social, and medicolegal concern worldwide. These deaths not only reflect the health and safety status of women but also serve as important indicators of the prevailing social, economic, and cultural environment of a community. The causes of unnatural female deaths are multifactorial and include suicide, road traffic injuries, poisoning, burns, drowning, homicide, and other accidental causes. Many of these deaths are preventable through timely public health interventions, improved mental healthcare, effective law enforcement, and strengthened social support systems. (**1,2)**

According to the World Health Organization, suicide remains one of the leading causes of death among young adults globally and contributes substantially to preventable mortality among women of reproductive age. In low- and middle-income countries, socioeconomic disparities, domestic violence, occupational hazards, and limited access to mental health services further increase the burden of unnatural female deaths. (**1,2)**

In India, crimes against women continue to represent a significant public health and societal challenge. The National Crime Records Bureau (NCRB) has consistently reported an increasing trend in crimes against women over the past decade. The Crime in India 2022 report

documented more than 445,000 cases of crimes against women nationwide, with Assam contributing substantially to this burden. Although not all such crimes result in death, many culminate in unnatural fatalities requiring medicolegal investigation. (**3)**

The epidemiological profile of unnatural female deaths varies considerably across different regions of India owing to differences in socioeconomic conditions, cultural practices, educational status, occupational profiles, healthcare accessibility, and prevailing legal and social frameworks. Previous studies have identified suicide, road traffic accidents, poisoning, burns, and dowry-related violence as the principal contributors to unnatural female mortality; however, the relative contribution of each cause differs substantially among populations.

Northeast India possesses unique demographic, cultural, and social characteristics that distinguish it from many other regions of the country. Traditional social practices in Assam differ considerably from states where dowry-related violence constitutes a major cause of unnatural female deaths. Furthermore, the predominantly agrarian economy, widespread availability of agricultural pesticides, diverse ethnic composition, and varying access to healthcare services may influence both the causes and manner of unnatural female deaths. Despite these distinctive characteristics, published autopsy-based studies specifically evaluating the epidemiological profile of unnatural female deaths from Northeast India remain limited.

Most available studies have focused either on specific causes of death or on female mortality in general without comprehensively evaluating the demographic characteristics, causes, and manner of unnatural female deaths in this region. Contemporary regional data are therefore required to facilitate evidence-based public health planning, strengthen medicolegal practice, and assist policymakers in developing targeted preventive strategies.

The present study was undertaken to evaluate the epidemiological profile of unnatural female deaths subjected to medicolegal autopsy at a tertiary care referral centre in Sonitpur district, Assam, over a three-year period. The study also aimed to analyse the demographic characteristics, causes, manner of death, and marital profile of the deceased women and to compare the findings with those reported in previous national and international studies.

II. MATERIALS AND METHODS

Study Design and Setting

A retrospective cross-sectional descriptive study was conducted in the Department of Forensic Medicine and Toxicology, Tezpur Medical College and Hospital, Sonitpur, Assam, India, a tertiary care referral centre catering to medicolegal cases from Sonitpur and adjoining districts. The study evaluated all eligible female medicolegal autopsies performed over a three-year period from **1 July 2019 to 30 June 2022**.

Study Population

The study population comprised all female deceased individuals who underwent medicolegal autopsy during the study period. A **census sampling technique** was employed, wherein all eligible cases satisfying the inclusion criteria were included for analysis.

Inclusion Criteria

- Female deceased subjected to medicolegal autopsy during the study period.
- Deaths classified as **unnatural** following completion of medicolegal investigation and post-mortem examination.

Exclusion Criteria

- Decomposed bodies in which interpretation of findings was significantly compromised.
- Cases in which the final cause of death was established as **natural** after post-mortem examination.
- Cases with incomplete medicolegal records that precluded meaningful analysis.

Data Collection

Data were collected retrospectively from the departmental medicolegal records, including autopsy reports, police inquest reports, and dead body challans. Information was extracted using a predesigned structured data collection proforma.

All data were anonymised before analysis to ensure confidentiality of the deceased individuals.

Statistical Analysis

The collected data were entered into **Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA)** for analysis. Descriptive statistical methods were used, and the results were expressed as frequencies and percentages. The findings were presented using tables and subsequently compared with observations reported in previously published literature.

No inferential statistical analysis was performed because the primary objective of the study was to describe the epidemiological profile of unnatural female deaths in the study population.

Ethical Considerations

The study was conducted after obtaining approval from the **Institutional Ethics Committee of Tezpur Medical College and Hospital** .Since the

investigation was based exclusively on retrospective analysis of anonymised medicolegal records, informed consent was not applicable. Confidentiality of all study participants was maintained throughout the study.

III. RESULTS

A total of **1,158 medicolegal autopsies** were performed during the study period, of which **466 (40.24%)** were conducted on female decedents. Following application of the predefined exclusion criteria, **424 cases** of unnatural female deaths were included in the final analysis, representing **36.61%** of all medicolegal autopsies performed during the study period.

Age Distribution

The age distribution of the deceased women is presented in **Table 1**. The majority of cases belonged to the **21–30 years** age group (**152 cases; 35.85%**), followed by the **31–40 years** age group (**137 cases; 32.31%**). Females aged **41–50 years** accounted for **64 cases (15.10%)**, whereas women aged **11–20 years** constituted **34 cases (8.02%)**. The lowest frequencies were observed among children aged **0–10 years (1.41%)** and women aged **above 60 years (1.65%)**.

Table 1 showing age distribution of cases

Age of the deceased(in years)	Number	Percent
0-10	6	1.41
11-20	34	8.02
21-30	152	35.85
31-40	137	32.31
41-50	64	15.10
51-60	24	5.66
Above 60	7	1.65
Total	424	100

Distribution According to Cause of Death

The distribution of cases according to the medical cause of death is shown in **Table 2**. Hanging was the most frequent cause of death, accounting for **172 cases (40.56%)**, followed by **road traffic accidents (112 cases; 26.42%)** and **poisoning (66 cases; 15.56%)**. Poisoning deaths predominantly resulted from ingestion of agricultural chemicals, including insecticides, rodenticides, herbicides, and fungicides.

Other causes included burns (**32 cases; 7.56%**), drowning (**21 cases; 4.95%**), elephant attacks (**6 cases; 1.42%**), railway accidents (**4 cases; 0.94%**), and other causes including homicide (**11 cases; 2.59%**).

Table 2 showing distribution of cause of death

Cause of death	Number	Percent
Hanging	172	40.56
Burns	32	7.56
Poisoning	66	15.56
Road traffic accident	112	26.42
Drowning	21	4.95
Railway accident	4	0.94
Elephant attack	6	1.42
Others including homicide	11	2.59
Total	424	100

Distribution According to Manner of Death

The manner of death is summarised in **Table 3**. Suicide was the predominant manner of death, accounting for **270 cases (63.68%)**, followed by accidental deaths (**143 cases; 33.73%**) and homicide (**11 cases; 2.59%**).

Among women aged **21–30 years** and **31–40 years**, suicide was the most frequent manner of death. Homicidal deaths were comparatively more common in the **21–30 years** age group. Of the **11 homicide cases**, **six** involved injuries inflicted by sharp-edged weapons, while the remaining **five** resulted from blunt force trauma.

Among the suicide cases, hanging was the most frequently employed method, followed by poisoning. Burn-related deaths included both accidental and suicidal cases, with accidental burns occurring predominantly in domestic kitchen settings.

Table 3 showing manner of death by age distribution

Age	Suicide	Accident	Homicide	Total
0-10	0	5	1	6
11-20	22	11	1	34
21-30	96	52	4	152
31-40	96	39	2	137
41-50	38	25	1	64
51-60	15	8	1	24
Above 60	3	3	1	7
Total	270	143	11	424

Marital Status and Duration of Marriage

Of the **424 deceased women**, **328 (77.36%)** were married at the time of death. Analysis of marital duration demonstrated that the highest number of deaths occurred among women who had been married for **7–14 years (154 cases)**, followed by those married for **3–7 years (78 cases)**. Deaths among women married for **more than 14 years** accounted for **62 cases**, whereas **34 cases** occurred within the first three years of marriage.

Table 4. Distribution according to duration of marriage

Duration of marriage in years	Number
0-3	34
3-7	78
7-14	154
Above 14 years	62
Total	328

IV. DISCUSSION

The present retrospective autopsy-based study evaluated the epidemiological profile of unnatural female deaths in Sonitpur district, Assam, over a three-year period. A total of **424 cases** were included after applying the exclusion criteria, representing more than one-third of all medicolegal autopsies conducted during the study period. The findings provide valuable information regarding the demographic characteristics, causes, and manner of unnatural female deaths in a region from which published forensic data remain limited.

Female medicolegal autopsies constituted **40.24%** of all autopsies performed during the study period. Similar observations have been reported by **Sharma et al.**[4] and **Pawar et al.**[5], who also found that female autopsies constituted a smaller proportion of the overall medicolegal workload. This predominance of male autopsies has consistently been attributed to greater occupational exposure, increased outdoor activities, risk-taking behaviour, and higher involvement of males in interpersonal violence and road traffic incidents. Although females accounted for a smaller proportion of autopsies, the social consequences of unnatural female deaths are often profound because they primarily affect women during their economically productive and reproductive years.

The highest proportion of deaths in the present study occurred among women aged **21–30 years**, followed by those aged **31–40 years**. Comparable findings have been documented by **Pawar et al.**[5], **Guntheti and Singh.**[6], and **Sane and Ananda.**[7] This age group represents the most socially and economically active phase of life, during which women are frequently exposed to multiple stressors, including marital responsibilities, childcare, employment, financial insecurity, and interpersonal conflicts. The coexistence of these factors may contribute to the increased vulnerability observed in this age group.

However, **Kumar et al.**[8] and **Mohanty et al.**[9] reported different age distributions, with a greater contribution of dowry-related deaths among younger married women. The discrepancy between these studies and the present investigation is likely attributable to regional sociocultural differences. Assam differs from many northern Indian states with respect to traditional marriage practices, and dowry-related deaths are comparatively less frequent. Consequently, the epidemiological profile observed in the present study appears to be influenced by factors other than dowry-related violence.

The present study identified **hanging (40.56%)** as the leading cause of death, followed by **road traffic accidents (26.42%)** and **poisoning (15.56%)**. Similar findings were reported by **Padubidri et al.**[10], who also observed hanging as the most common cause of unnatural female death. In contrast, several Indian investigators have reported road traffic accidents as the predominant cause of death.[6–9] These differences probably reflect regional variations in transportation infrastructure, occupational patterns, healthcare accessibility, and social behaviour.

Poisoning accounted for **15.56%** of all deaths, with the majority involving agricultural pesticides such as insecticides, rodenticides, herbicides, and fungicides. Assam is predominantly an agrarian state where pesticides are readily available, potentially facilitating their use in suicidal poisoning. Similar observations have been reported in studies from other agricultural regions of India and Sri Lanka.[6,13] Easy accessibility of highly toxic agricultural chemicals continues to pose a significant public health challenge in rural communities.

Suicide constituted **63.68%** of all unnatural female deaths, making it the predominant manner of death in the present study. Hanging was the preferred method, followed by poisoning. These findings differ from those of **Guntheti and Singh.**[6] and **Kitulwatte et al.**[13], who reported poisoning as the leading method of suicide among women. Such regional differences likely reflect variations in the availability of lethal means, cultural preferences, and emergency medical services.

The high proportion of suicides observed in the present study deserves particular attention from both public health and forensic perspectives. Although the present investigation was not designed to identify psychosocial determinants, previous studies have consistently demonstrated strong associations between female suicide and mental illness, marital discord, domestic violence, financial stress, and social isolation. Furthermore, a substantial portion of the present study period coincided with the **COVID-19 pandemic**, during which movement restrictions, economic uncertainty, reduced access to healthcare, and psychological distress may have contributed to an increase in suicidal behaviour. While no causal relationship can be established from the present study, these contextual factors should be considered when interpreting the findings.

Road traffic accidents constituted the second most common cause of death. This finding is consistent with the growing burden of road traffic injuries reported throughout India. Increasing motorisation, inadequate road safety practices, delayed trauma care, and poor compliance with traffic regulations continue to contribute significantly to preventable mortality among women. Strengthening road safety measures and improving emergency trauma services remain important priorities for reducing such deaths.

Homicide accounted for only **2.59%** of cases and occurred predominantly among women aged **21–30 years**. This observation differs from the findings of **Padubidri et al.**[10] and **Zohlupuii et al.**[11], who reported a relatively higher frequency of homicidal deaths among older women. These differences may reflect regional variation in interpersonal violence, demographic characteristics, and social practices.

More than three-fourths (**77.36%**) of the deceased women were married at the time of death. Interestingly, the highest number of deaths occurred among women who had been married for **7–14 years**, rather than during the first seven years of marriage. This finding contrasts with observations made by **Guntheti and Singh.**[6] and **Sane and Ananda.**[7], who reported a greater concentration of deaths during the early years of marriage. The present findings suggest that factors contributing to unnatural female deaths in Assam extend beyond the conventional focus on early marital disputes and dowry-related offences. Long-term marital stress, chronic illness, financial obligations, caregiving responsibilities, and evolving family dynamics may also contribute to female mortality during later years of marriage. Further qualitative research is required to explore these associations.

The findings of the present study are consistent with recent Indian literature indicating that the epidemiological profile of unnatural female deaths varies substantially across different regions of the country. Recent autopsy-based studies have similarly emphasised the predominance of young married women among victims while demonstrating considerable regional variation in the underlying causes of death.[14,15] These observations reinforce the importance of generating local epidemiological evidence to support region-specific preventive strategies rather than relying solely on national trends.

Strengths of the Study

The present study possesses several strengths. It is one of the few autopsy-based investigations specifically evaluating the epidemiological profile of unnatural female deaths from Northeast India. All cases underwent medicolegal autopsy at a single tertiary referral centre, ensuring uniformity in post-mortem examination and cause-of-death certification. The three-year study period and inclusion of all eligible cases minimised selection bias and provided a comprehensive overview of the regional pattern of unnatural female mortality.

Limitations

Certain limitations should be acknowledged. The retrospective nature of the study restricted analysis to variables available in medicolegal records. Information regarding socioeconomic status, educational attainment, occupation, psychiatric illness, substance abuse, and family circumstances was not consistently available and therefore could not be evaluated. Similarly, police investigation outcomes and judicial records were beyond the scope of the present study. As the investigation was conducted at a single tertiary care centre, the findings may not be fully generalisable to the entire population of Assam or Northeast India.

Public Health Implications

The predominance of suicide among young and middle-aged women underscores the urgent need to strengthen community-based mental health services, improve early identification of women at risk, and promote accessible psychological counselling. Restricting access to highly hazardous agricultural pesticides, enhancing road safety measures, and improving public awareness regarding injury prevention may further reduce preventable female mortality. Collaboration between healthcare providers, forensic specialists, law enforcement agencies, mental health professionals, and social welfare organisations is essential for addressing the multifactorial determinants of unnatural female deaths.

V. CONCLUSION

The present study demonstrated that **suicide was the predominant manner of unnatural female death**, with **hanging** being the leading cause of mortality among women undergoing medicolegal autopsy in the study population. Females in the **21–40-year age group** constituted the majority of cases, and most deaths occurred among **married women**, particularly those with a marital duration of **7–14 years**. Unlike reports from several other parts of India, deaths occurring during the early years of marriage were comparatively less frequent, reflecting regional sociocultural differences.

The findings emphasise the need for strengthening community-based mental health services, improving early identification of women at risk of self-harm, enhancing road safety measures, and promoting safe handling and regulation of agricultural pesticides. Region-specific preventive

strategies involving healthcare professionals, forensic experts, mental health specialists, law enforcement agencies, and policymakers are essential to reduce the burden of preventable unnatural female deaths.

Further multicentric prospective studies incorporating psychosocial, socioeconomic, educational, and psychiatric variables are recommended to better understand the determinants of unnatural female mortality in Northeast India.

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Conflict of Interest

The authors declare that **there are no conflicts of interest** related to this study.

REFERENCES

[1]. World Health Organization. **Suicide** [Internet]. Geneva: World Health Organization; 2025 [cited 2026 Jul 16]. Available from: https://www.who.int/news-room/fact-sheets/detail/suicide

[2]. World Health Organization. **Injuries and violence** [Internet]. Geneva: World Health Organization; 2024 [cited 2026 Jul 16]. Available from: https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence

[3]. National Crime Records Bureau. **Crime in India 2022. Vol. I** [Internet]. New Delhi: Ministry of Home Affairs, Government of India; 2023 [cited 2026 Jul 16]. Available from: https://ncrb.gov.in

[4]. Sharma BR, Singh VP, Sharma R, Sumedha B. Unnatural deaths in northern India: a profile. **J Indian Acad Forensic Med.** 2004;26(4):321-326.

[5]. Pawar CK, Bhullar DS, Oberoi SS, Aggarwal KK. Profile of unnatural deaths in females: a retrospective study. **J Indian Acad Forensic Med.** 2014;36(2):122-124.

[6]. Guntheti BK, Singh UP. A study of unnatural female deaths reported to a tertiary care hospital in Khammam, Telangana. **J Indian Acad Forensic Med.** 2016;38(4):460-464.

[7]. Sane MR, Ananda K. Unnatural deaths of adult females in South Bangalore: an autopsy study. **J Indian Acad Forensic Med.** 2014;36(2):130-132.

[8]. Kumar S, Verma AK, Ali W, Pandey A, Ahmad I, Singh US. A study of unnatural female death profile in Lucknow, India. **Am J Forensic Med Pathol.** 2013;34(4):352-356.

[9]. Mohanty S, Sen M, Sahu G. Analysis of risk factors of dowry death: a South Indian study. **J Forensic Leg Med.** 2013;20(4):316-320.

[10]. Padubidri JR, Menezes RG, Pant S, Shetty SB. Deaths among women of reproductive age: a forensic autopsy study. **J Forensic Leg Med.** 2013;20(6):651-654.

[11]. Zohlupuii BL, Sungoh JDW, Meera T. Pattern of female deaths in Manipur: an autopsy-based cross-sectional study. **Indian J Forensic Community Med.** 2020;7(4):183-186.

[12]. Zaghloul NM, Megahed HM. A descriptive medico-legal study of female deaths in Cairo Governorate, Egypt. **J Forensic Leg Med.** 2019;66:25-32.

[13]. Kitulwatte IDG, Edirisinghe PAS, Mendis HP, Wijesinghe PR, Fernando A, Abeyrathne A. Study on the pattern of unnatural deaths of women brought for medico-legal autopsy. **Sri Lanka J Forensic Med Sci Law.** 2017;8(1):13-22.

[14]. Parmar PB, Rathod GB, Bansal P, Maru AM, Pandya B, Bansal AK. Pattern of suspicious deaths of married females brought for medico-legal autopsy at a teaching institute in India. **J Fam Med Prim Care.** 2023;12(9):2110-2113.

[15]. Pathak HM, Kaur A, Chaudhary N, Paul AS. Analysis of deaths due to gender-based violence: an autopsy-based cross-sectional study from Mumbai. **J Postgrad Med.** 2024;70(4):204-208.