



International Journal of Health Research and Medico-Legal Practice

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RESEARCH PAPER

Evolving autopsy trends and its role in preventive medicine- a 17 year analysis of autopsy deaths brought to STNM hospital, Gangtok

Manuscript ID: 587

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Article received: 12-12-2023

Received (revised):

Editorial approval:

Checked for plagiarism: Yes.

Peer-reviewed article: Yes.

Editor who approved: Prof. Putul Mahanta

ABSTRACT

Background and aims: Medico-legal autopsy cases are necessary to interpret the cause of death, and the retrospective study and analysis of such autopsy reports are necessary to understand the prevalence of the cause of death and to initiate corrective measures to prevent avoidable casualties in future, by conducting lifestyle and mental awareness amongst the different communities, schools and colleges.

Methods: This is a 17-year retrospective study of all autopsies conducted at the Mortuary, STNM Hospital, Sikkim, Gangtok, India, from 2006 to 2022. **Results:** Of the total 2,574 cases, the male-to-female ratio was 3.3:1. The males exhibited a pronounced prevalence, and most cases were within the age group of 21–30 age group, where 695 cases were recorded, with 543 males and 152 females. It was observed that February was the month with the fewest autopsies, while October witnessed the highest number of autopsies. Hanging with male preponderance was the most prevalent manner of death (29.99%), followed closely by fatalities resulting from falls from heights (13.20%) and sudden deaths (12.62%). Further analysis of the autopsy data to understand the trend indicated a noteworthy upward trajectory, notably escalating from 2006 to 2022. While 2007 witnessed a substantial decline in autopsy numbers, subsequent years showed a steady resurgence, peaking in 2010. **Conclusion:** This study provides valuable insights into the demographics, patterns, and common causes of death in Sikkim, offering a foundation for informed strategies in forensic medicine and public health initiatives.

Keywords: Medico-legal autopsies; cause of deaths; manner of deaths; sudden death.

Cite this article: Lepcha OT, Subba M, Rai CS, Sharma R. Evolving autopsy trends and its role in preventive medicine- a 17 year analysis of autopsy deaths brought to STNM hospital, Gangtok. *Int J Health Res Medico Leg Prae.* 2023 Jul-Dec;9(2):35-41. Doi: 10.31741/ijhrmlp.v9.i2.2023.5

INTRODUCTION

Sikkim is the smallest and the least populous state in India. The geographical terrain throughout Sikkim is

hilly, with elevations ranging from 920 feet to 28,000 feet. Mt. Khanchendzonga (the third highest mountain peak at 8,586 m (28,169 ft) is the revered mountain of

Sikkim. In 2003, the state banned the use of fertilisers and pesticides, and by 2016, the state was declared the first organic state in India.

The current retrospective study was conducted to look at and analyse the findings obtained from all the conducted autopsies in the last 17 years. The study, apart from finding the cause of death, also aims to obtain some valuable insights for state health officials with information related to the cause and manner of death and also to look for any specific pattern associated with the cause and manner of death. This insight into the cause and the manner of death over the period will benefit further health preventive initiatives and interventions. With proper analysis and interpretation of these autopsy records, the authorities can plan preventive measures to tackle ongoing health issues – linked with suicidal hanging deaths, sudden cardiac deaths, falls, road traffic accidents, and other causes of death. Health intervention could start after properly analysing yearly autopsy reports and the trend. Examining this stored information will also benefit any preventive health medicine. Policies and programmes to combat diseases and injuries should properly be based on current and timely information about the nature and extent of health problems, their determinants, and how the impact of such diseases and injuries is changing concerning magnitude and distribution in populations. As per the study conducted by Mathers CD et al.¹ The value of autopsy findings was found to be valuable to understand the definitive cause of death. In another retrospective study, it was found that the underlying cause of death estimated from clinical information alone was incorrect (18%) when compared with the autopsy report.² If correctly interpreted, the data can guide preventive medical measures, enabling authorities to address potential health concerns within communities and formulate public health strategies. This study of reliable cause-of-death data constitutes a crucial and significant resource for health planning and prioritisation.³

The current retrospective study aims to analyse annual post-mortem/autopsy cases to identify the most prevalent causes of death and to ascertain the most

affected gender and age groups. Additionally, it seeks to comprehend the evolving patterns of these autopsy cases over time.

MATERIAL AND METHOD

Institutional Ethics Committee approval was obtained for this 17-year (2006-2022) retrospective study. It was conducted in the Department of Forensic Medicine, STNM Hospital, Government of Sikkim, Gangtok. Only autopsies conducted by a medico-legal expert have been included in the study. All autopsy cases brought over by the police were autopsied, and proper autopsy findings were recorded. A comprehensive autopsy report is also handed over to the case investigating officer.

The autopsy data is stored in physical and digital formats for future reference. The collected data was compiled and analysed using the Microsoft Excel software for this study.

RESULTS

Male and female ratio

Between 2006 and 2022, a total of 2,574 autopsies were performed. Among these cases, 1,963 (76.26%) were males, while 611 (23.73%) were females, with the male-female ratio being 3.21:1, as illustrated in **Figure 1**.

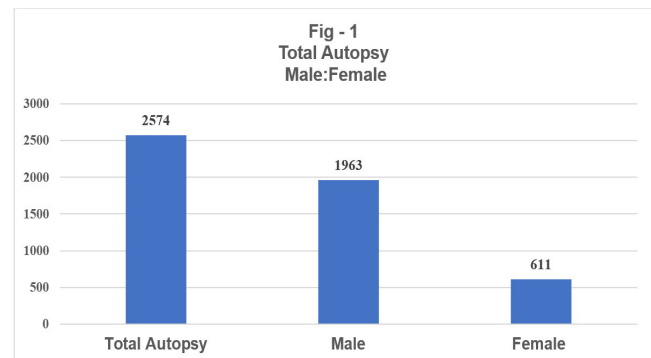


Figure 1 Showing total autopsy and male: female ratio

Yearly Male: Female autopsy trend (2006-2022)

There exists a dynamic and evolving gender distribution, with specific years displaying significant

deviation from the established pattern. The most noteworthy was a rise in 2021 when the M: F ratio surged to 5.5:1, as exhibited in **Figure 2**.

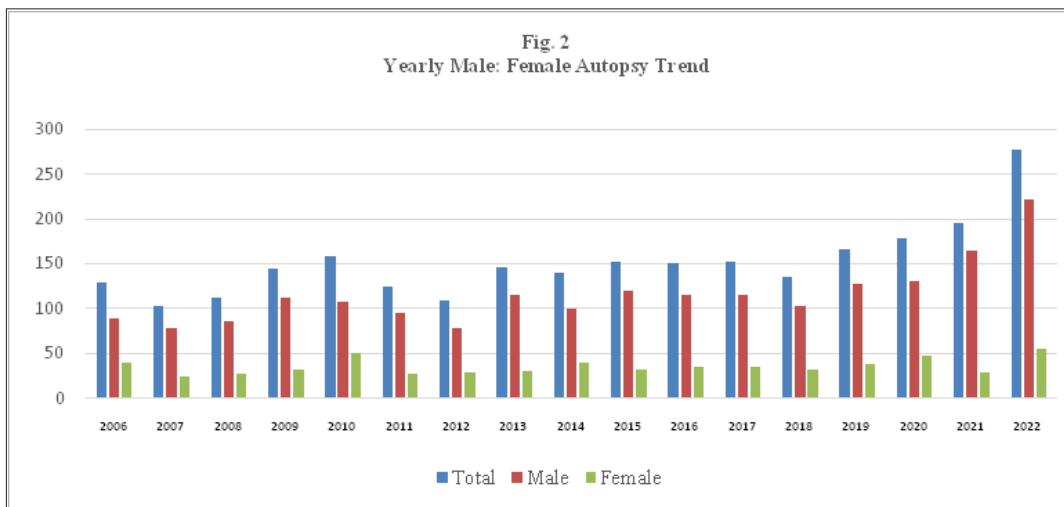


Figure 2 Showing Male: female autopsy trend

Age and Sex Distribution (2006 – 2022)

The analysis of age groups revealed the highest incidence in the age group of 21-30 yrs (695 cases), with males (543 cases) and females (152 cases). In the age group of 21-50 years (1373 cases) compared to the same age group in females (365 cases only), as shown in **Table 1**.

Table 1 Shows the sex and age difference

Age Range	Total	Male	Female
0-10	104	69	35
11 - 20yrs	292	168	124
21 -30yrs	695	543	152
31-40yrs	612	475	137
41 -50yrs	431	355	76
51 -60yrs	281	229	52
61-70 yrs	97	79	18
>70yrs	62	45	17
Total Autopsy	2574	1963	611

Month-wise distribution

It was observed that in February, 185 cases (7.18%) had the least recorded cases, while in October, 242 cases (9.40%) recorded the highest number of conducted autopsy cases over the study period.

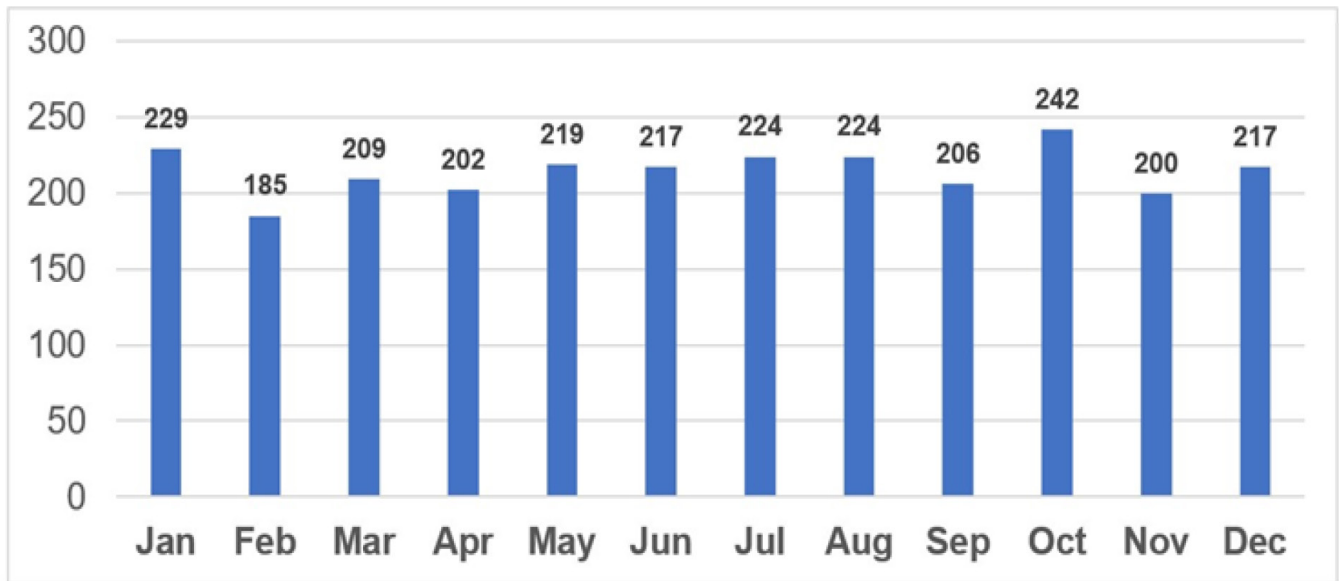


Figure 3 Showing month-wise autopsy cases

Manner of Death

Hanging cases 772 (29.99%) emerged as the predominant cause of death. Deaths due to fall from height 340 cases (13.20%) and sudden death cases 325 cases (12.62%) were the second and third common causes of death, as shown in Figure 4.

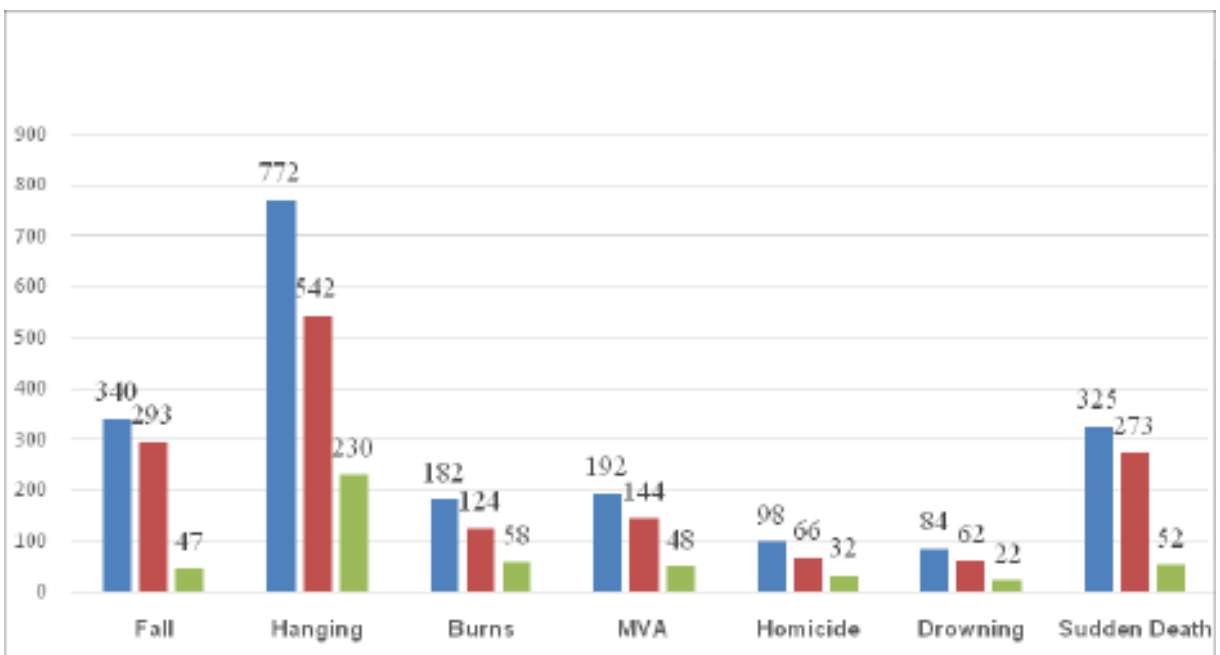


Figure 4 Shows the manner of death

Autopsy Trend

The total number of autopsies shows a notable increase over the years, with a distinct rise from 2006 to 2022. In 2007, there was a significant dip in the number of autopsies conducted, followed by a steady increase until 2010. In 2020, 2021, and 2022, the autopsy rate peaked, as shown in **Figure 5**.

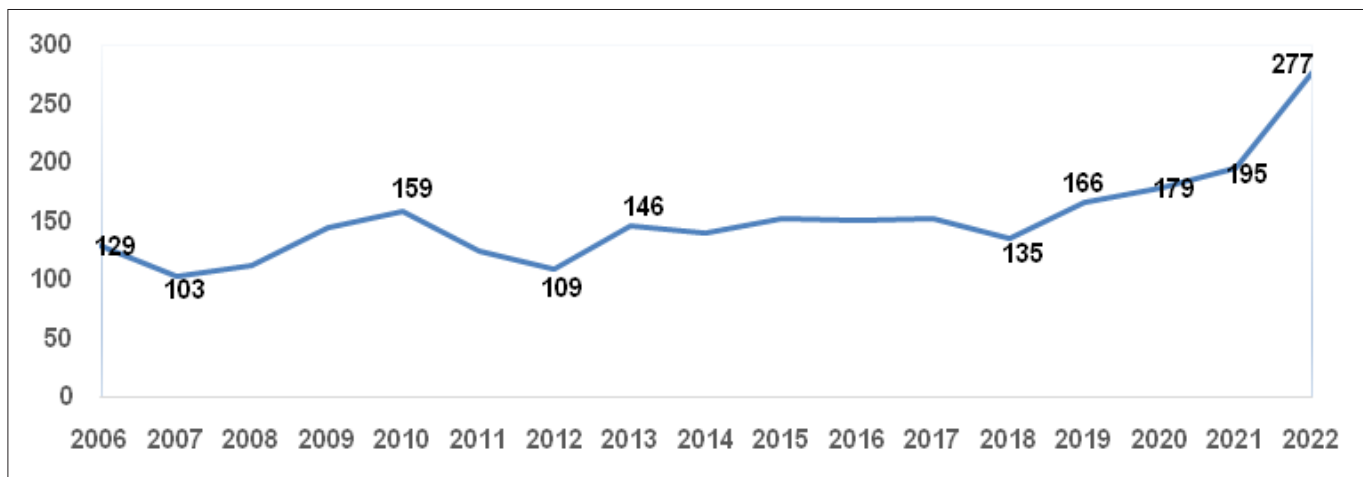


Figure 5 Shows the 17-year autopsy trend

DISCUSSION

The present study comprises 2574 autopsies from 2006-2022 found to be low compared to other studies done in other states and countries. The reason for this could be attributed to the fact that the state of Sikkim has a smaller population than other places.

The findings of M: F were similar to many other studies. In the present study, the male-to-female ratios exhibited a dynamic and evolving gender distribution. Amongst the different age groups, the age of 21-30 years was the most affected at 28.02%, with males at 79.47% and females at 20.52%, closely followed by 31-40 years (24.25% cases), with the males at 77.56% and females 22.43%, which is similar to the study done by Gopal Das N S et al.,⁹ and Chhikara P et al.¹⁰ In the study it was also observed that there was an increase in the number of suicide cases per year along with rise in the male; female ratio. The distribution of cases in different age groups had a preponderance of the younger age groups of 21-30 years. The reason for the maximum involvement is the age group of 21-30

years and 31-40 years. The reason may be due to the reckless attitude of the present younger generation, increased expectations from life, social disorganisation, increasing job instability, study and other work-related competitions. It is also true that frustrations and breakdown in this age group are more commonly seen due to lack of patience, failures at jobs, financial instability, love affairs and domestic disputes.

As per Kuruvilla and Venkoba Rao, the rate of suicidal deaths is very high in Australia and Germany, whereas it is low in Nigeria and the Gulf countries. India ranks 10th in the Figure.¹¹ In the present study, hanging deaths were highest, unlike some other studies done where suicidal poisoning was found to be the highest cause of death. The reason for poisoning not being an ideal choice, in the present study, could be the fact that the government has strictly banned the use and procurement of harmful agricultural fertilisers and pesticides as the state of Sikkim practices 'no use of pesticides and fertilisers' and is a certified organic state. The findings of high cases of hanging deaths are similar to the study done by BG Chikhalkar et al.¹²

In the present study, fall from height and sudden death were found to be the second and the third highest cause of death. Deaths due to falls from height mainly occurred in the districts and the highly remote villages. There was a severe preponderance of male deaths over female deaths, with M: F being 6.2: 1, which is slightly lower than 6.5: 1 in the study done by Jagannatha SR.¹³⁻¹⁵ The reason for the findings of death due to falls from height in males can be due to the males being the sole bread-earners are the ones who mainly venture out of the houses into higher grounds for their daily agricultural chores, cattle grazing, firewood collection into the jungle and other daily work. Further, most of the males also indulge in the consumption of alcohol to keep themselves warm in cold climates, which could also be the cause of their accidental fall and death.

Sudden Deaths occupied the third highest cause of death in the present study, where the majority of the victims were males and were mostly among the city dwellers. The majority of sudden deaths were found to be due to cardiac causes and usually consisted of some history of the treatment of high blood pressure hypertriglyceridemia followed by atherosclerosis, with high findings of coronary artery blockage, which is similar to the other studies done.¹⁶⁻¹⁸ These cases of increase in sudden death in the city dwellers could be related to multiple factors such as work stress, improper diet like fatty foods, fast food, alcohol consumption and lower physical activity, among many other reasons.

In the present study, the autopsy trend observed over the study period exhibited notable variations over the years. It was noted that from 2006 to 2008, the number of autopsies ranged between 103 and 129 cases annually. A gradual increase was subsequently observed, which reached a peak of 166 cases in 2019. However, the most striking surge occurred in 2020 and 2021, with a substantial rise to 179 and 195 cases,

respectively. A similar kind of increase over the years was also observed in studies conducted by Chikhalkar BG et al.¹⁹

In the present study, in the year 2022, we witnessed a significant spike, recording 277 autopsies. This upward trajectory could suggest a heightened demand for post-mortem examinations, potentially indicative of evolving epidemiological patterns or increased awareness of forensic processes. The data underscores the importance of ongoing monitoring and analysis to discern the underlying factors contributing to the fluctuating trends in autopsy cases over the years.

The year-to-year variation suggests a potential shift in certain factors influencing mortality rates among males and females, which could indicate health disparities or varying susceptibilities to certain conditions across genders. Understanding such gender-specific mortality rates can have a severe implication on framing public health policy. The policymakers may consider targeted interventions to address specific health challenges males or females face.

CONCLUSION

The study of autopsy data and understanding the changing trends in autopsies provides a fascinating glimpse into the evolving dynamics of the death trends over the years. Factors such as societal shifts, mental health issues, technological advancements and global events like the COVID pandemic all collectively shape the death trend in society. A clear understanding of the autopsy trends and their interpretation would surely benefit health administrators to focus on the affected areas of health concerns and help in mitigating the evolving issue to curb and prevent unnecessary deaths in vulnerable populations.

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