

# Profile of Deaths among Children Less than 5 Years of Age Due to Unintentional Injuries-An Autopsy-Based Cross-Sectional Study

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## ABSTRACT

**Background:** Unintentional injuries are a major cause of mortality among children under five years of age worldwide and represent a significant yet preventable public health problem. In India, injury-related deaths contribute substantially to under-five mortality, particularly in low- and middle-income settings. This study aimed to determine the profile and pattern of unintentional deaths among children below five years based on medicolegal autopsy findings at a tertiary care center in Thanjavur.

**Methods:** A five-year cross-sectional autopsy-based study was conducted from January 2019 to December 2023 at Thanjavur Medical College. Among 8,443 autopsies performed, 51 cases involved children under five years, of which 31 were classified as unintentional deaths. Data regarding age, sex, birth order, cause and manner of death were collected from autopsy records and analyzed using SPSS version 16.

**Results:** Unintentional deaths constituted 60.8% of all under-five autopsies and 0.36% of total autopsies during the study period. The highest proportion of deaths (41.2%) occurred in infants below one year of age. Females (52.9%) slightly outnumbered males (47.1%). Firstborn children accounted for 41.2% of cases. Road traffic accidents resulting in multiple injuries were the leading cause of death. Accidental manner of death was predominant (60.8%), followed by natural causes (29.4%).

**Conclusion:** Unintentional injuries, particularly road traffic accidents, remain a leading and preventable cause of mortality among children under five in this region. Strengthening parental supervision, road safety enforcement, and community-based preventive strategies is essential to reducing injury-related childhood deaths.

**Key-words:** Unintentional injuries, Childhood deaths, Children under five years old, Low and middle income countries, India

## INTRODUCTION

It is estimated that each year, unintentional injuries caused 279,000 deaths in children younger than 5 years of age worldwide.

Death due to unintentional injury among children under five is a major public health concern, often resulting from everyday hazards that could be prevented with proper awareness and safety measures<sup>[1]</sup>. These deaths typically occur when young children, due to their natural curiosity, limited motor skills, and lack of awareness of danger, encounter unsafe environments. Common causes of unintentional injury-related deaths in this age group include drowning, falls, burns, poisoning, suffocation, and road traffic accidents. Drowning is particularly common in areas with open bodies of water, as young children can slip into water unnoticed. Burns often result from exposure to hot liquids, fire, or

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electrical sources. Poisoning can occur when children accidentally ingest medications, household chemicals, or toxic substances. Suffocation may happen due to unsafe sleeping conditions, choking on small objects, or entrapment in confined spaces. Road accidents, either as pedestrians or passengers, also contribute significantly to fatal injuries [2].

The impact of such deaths extends beyond the immediate loss of life, deeply affecting families and communities. The emotional and psychological toll on parents and caregivers can be immense, often accompanied by feelings of guilt and grief. Economically, families may face financial burdens due to medical expenses, funeral costs, or lost income [3].

This is the first study to provide direct estimates of unintentional injury mortality in young children from a nationally representative sample in India. The study adds to our understanding of types of injury leading to death, which is vital for the development of injury prevention policy in the region. Drowning, falls, and road traffic injuries were found to be the leading causes of injury deaths in children younger than 5 years of age [4].

## MATERIALS AND METHODS

**Study Design and Setting-** This was a retrospective cross-sectional autopsy-based study conducted at the Department of Forensic Medicine and Toxicology, Thanjavur Medical College, Thanjavur, from January 2019 to December 2023.

**Study Population-** All medicolegal autopsies performed on children less than five years of age during the study period were included. Out of 8443 autopsies, 51 cases belonged to children under five years old, among which unintentional deaths were analyzed.

**Inclusion Criteria-** All autopsy cases of children below five years of age with complete records.

**Exclusion Criteria-** Cases with incomplete documentation or unclear cause of death were excluded where necessary.

**Data Collection-** Data were obtained from autopsy reports, inquest records, chemical analysis reports, and histopathology findings. Variables included age, sex, birth order, cause of death, and manner of death.

**Statistical Analysis-** The collected data were entered into MS Excel and analyzed using SPSS version 16. Descriptive statistics were used to summarize frequencies and percentages.

**Ethical Considerations-** The study protocol was reviewed and approved by the Institutional Ethical Committee (IEC) of Thanjavur Medical College (Certificate No: 1324/2024; Reg. No: EC/NEW/INST/2023/TN/0246) in accordance with the standard ethical guidelines for biomedical research.

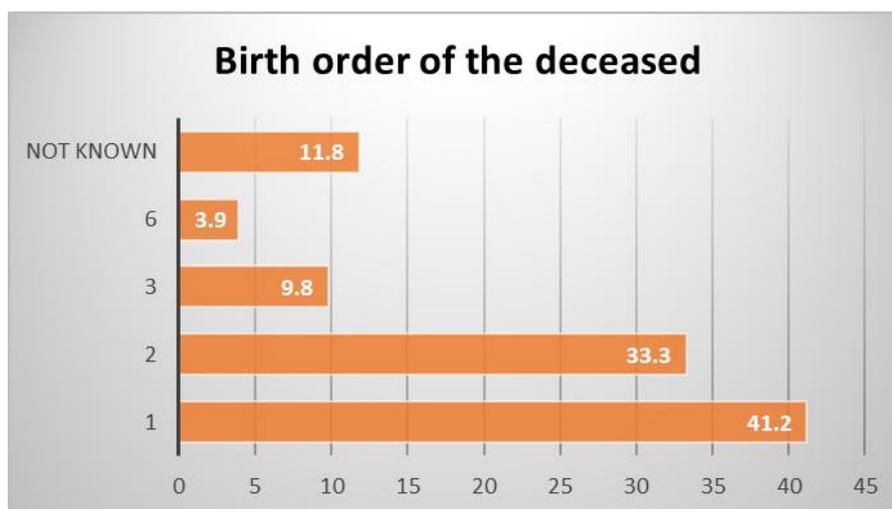
## RESULTS

The results of our study showed that, of the total 8443 autopsies performed at our institution, a total of 51 cases were under the age of 5 years, of which 31 cases were unintentional deaths. Thereby, 0.36% of all autopsies were due to unintentional deaths in under-5 children in the study period. The study results showed that the highest number of deaths occurred in children below one year of age (21; 41.2%). Females constituted most cases (27; 52.9%), slightly exceeding males (24; 47.1%), as shown in Table 1.

**Table 1:** Age and Gender Distribution of Under-Five Deaths (n = 51)

Variable	Category	Number (n)	Percentage (%)
Age Group	Under 1 year	21	41.2
	1–1.11 years	8	15.7
	2–2.11 years	11	21.6
	3–3.11 years	8	15.7
	4–4.11 years	1	2.0
	5–5.11 years	2	3.9
Gender	Female	27	52.9
	Male	24	47.1
	Total Cases	51	100

When the data regarding the birth order of the deceased children were analysed, the maximum deaths were noted in the 1<sup>st</sup> child in the birth order, 21 (41.2%), followed by the 2<sup>nd</sup> child, 17(33.3%). This is depicted in Fig. 1.



**Fig. 1:** Birth order distribution

The study results showed that there was only one case in which the chemical analysis and pathological results were positively correlated with the cause of death. The same has been depicted in Table 2.

**Table 2:** Distribution of Chemical Analysis and Histopathology Reports (n = 51)

Report Type	Finding	Number (n)	Percentage (%)
Chemical Analysis (CE)	Negative	50	98
	OPC Insecticide	1	2
Histopathology (HPE)	Negative	49	96
	Pneumonia	1	2
	Pneumonitis	1	2
	Total Cases	51	100

The most common final cause of death was multiple injuries, accounting for 16 cases (31.4%). Birth asphyxia was the next leading cause with 5 cases (9.8%), followed by pneumonia in 4 cases (7.8%). Drowning, poisoning, scalds, snake bite, and undetermined causes each accounted for 3 cases (5.9%). Burns, extreme low birth

weight with prematurity, neonatal sepsis, and strangulation were observed in 2 cases (3.9%) each. ARDS, head injury, and deadborn cases were the least common, each contributing 1 case (2%). The detailed distribution is presented in Table 3.

**Table 3:** Final Cause of death distribution

COD	Number	Percentage (%)
ARDS	1	2
Birth asphyxia	5	9.8
Burns	2	3.9
dead born	1	2
Drowning	3	5.9
Extreme LBW and preterm	2	3.9
Head injury	1	2
Multiple injury	16	31.4
Neonatal sepsis	2	3.9
Pneumonia	4	7.8
Poisoning	3	5.9

Scalds	3	5.9
Snake bite	3	5.9
Strangulation	2	3.9
Undetermined	3	5.9
Total	51	100

Accidental or unintentional deaths constituted most cases, accounting for 31 cases (60.8%). Natural deaths were observed in 15 cases (29.4%). An undetermined manner of death was recorded in 3 cases (5.8%), while homicidal deaths accounted for 2 cases (4%). The distribution of the manner of death is shown in Table 4.

**Table 4:** Manner of death

Manner of death	Number	Percentage (%)
Accidental or unintentional	31	60.8
Natural	15	29.4
Undetermined	3	5.8
Homicide	2	4
Total	51	100

## DISCUSSION

This study analyzed the pattern of unintentional deaths among children under five years based on medicolegal autopsy records in Thanjavur. Of the 8,443 autopsies conducted during the study period, 31 cases (0.36%) involved unintentional deaths in this age group, underscoring an important yet underrecognized public health concern. Most of the deaths (41.2%) occurred in infants below one year of age, which is consistent with findings from other Indian studies. Infant vulnerability is well-documented due to factors like underdeveloped motor skills, inability to escape dangerous situations, and a greater physiological susceptibility to trauma. A study by Ram *et al.* in Karnataka similarly reported a high concentration of accidental deaths in children below one year, attributing it to poor supervision and unsafe home environments [3].

In terms of gender distribution, female children (52.9%) marginally outnumbered males (47.1%). This contrasts with national trends, where typically male children are reported to have higher mortality due to unintentional injuries [4]. However, this variation may be regional or due to specific socio-cultural factors in Thanjavur that merit further exploration. Other studies, such as that of Jagnoor *et al.* from Eastern India, have also reported

varying male-to-female ratios, underscoring the need for more granular gender-based data [5].

First-born children accounted for the highest proportion of deaths (41.2%), followed by second-born (33.3%). These findings align with global literature suggesting that first-born children are at increased risk due to inexperienced parenting or overprotection, leading to a lack of exposure to risk assessment [6]. However, in the Indian context, joint family systems might sometimes offset this trend, making this an interesting area for further behavioural and sociological research.

The predominant cause of death was multiple injuries sustained in road traffic accidents (RTAs), consistent with studies from various Indian regions identifying RTAs as a leading cause of pediatric unintentional deaths, particularly in urban and peri-urban areas [7]. As a rapidly developing urban center, Thanjavur may face similar challenges, including increased traffic density, poor enforcement of child safety measures, unsafe pillion riding, lack of pedestrian infrastructure, and inadequate traffic discipline.

Notably, only one case demonstrated positive findings on both chemical analysis and histopathology, indicating limited diagnostic concordance. This may reflect underutilization of ancillary investigations or infrastructural constraints in forensic evaluation. Previous studies have emphasized the importance of comprehensive toxicological screening in unexplained pediatric deaths to exclude poisoning and metabolic causes [8].

This study presents an important analysis of deaths among children under five years of age (Total 51 cases), of which a significant 60% (n=31) were due to unintentional death, reinforcing that accidents constitute the leading cause of preventable deaths in this age group. The predominance of accidental deaths (60%) in the present study aligns with findings from other Indian and international studies. For instance, Nath *et al.*, in a retrospective study from Chandigarh, found that over 60% of under-five deaths reviewed in medicolegal autopsies were accidental, with the most common

causes being road traffic accidents, falls, and burns [9]. Similarly, Khan *et al.* reported that 66% of pediatric medicolegal deaths in their study in West Bengal were due to accidental causes, highlighting the magnitude of accidental trauma in early childhood [10]. As noted by Yadav *et al.*, infants under 12 months are particularly susceptible due to motor incoordination, unsafe sleeping practices, and accidental suffocation [11].

These findings suggest that accidental deaths in early childhood reflect a broader systemic problem, particularly in low- and middle-income regions with inadequate home and public safety measures. Although unintentional deaths form a small proportion of total autopsies, they are largely preventable. The results underscore the need for greater community awareness, stricter road safety enforcement, improved forensic practices, and targeted policy interventions for vulnerable age groups.

National Crime Records Bureau (NCRB) data [12] indicate that unintentional injuries, especially road traffic accidents and falls, remain the leading causes of accidental deaths among children in India, with regional variations. While under-five mortality is often attributed to infectious diseases and malnutrition, preventable injuries remain a neglected contributor. WHO estimates that nearly one in four child deaths globally result from preventable injuries [13], highlighting the need to prioritise injury prevention in child health policies.

## LIMITATIONS

While the study provides critical insights, it is limited by its reliance on autopsy data alone, which may not capture all unintentional deaths, especially those not referred for medicolegal examination. Also, a lack of detailed socioeconomic data limits analysis of risk factors such as parental education, income, and living conditions.

## CONCLUSIONS

Preventing these tragedies requires a combination of parental supervision, environmental modifications, and policy interventions. Childproofing homes, using protective equipment like car seats and helmets, enforcing safety regulations, and educating caregivers about risks can help reduce these deaths. Additionally, community-wide initiatives such as drowning prevention programs, safer road infrastructure, and emergency

medical response improvements play a crucial role in minimizing the risk of unintentional injury-related deaths in young children. This study highlights that unintentional deaths among children under five, particularly due to RTAs and other accidental causes, remain a persistent and preventable cause of mortality in our area. Firstborn children and infants appear to be disproportionately affected. Efforts to improve road safety, parental awareness, and forensic diagnostics are urgently needed. Future multicentre studies with broader epidemiological frameworks could offer a more comprehensive understanding of this neglected public health issue in India.

## CONTRIBUTION OF AUTHORS

**Research concept-** Arulmathikannan M, Balamurale R

**Research design-** Arulmathikannan M, Balamurale R

**Supervision-** Shanmugam K

**Materials-** Arulmathikannan M, Balamurale R

**Data collection-** Arulmathikannan M, Balamurale R

**Data analysis and interpretation-** Shanmugam K

**Literature search-** Arulmathikannan M, Balamurale R

**Writing article-** Arulmathikannan M, Balamurale R

**Critical review-** Shanmugam K

**Article editing-** Arulmathikannan M, Balamurale R

**Final approval-** Shanmugam K

## REFERENCES

- [1] Black RE, Cousens S, Johnson HL, et al. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet*, 2010; 375(9730): 1969–87.
- [2] Linnan M, Le Vu A, Rahman F, et al. Child mortality and injury in Asia: an overview. Florence: UNICEF; 2007. Available at: [https://archive.crin.org/en/docs/iwp\\_2007\\_07.pdf](https://archive.crin.org/en/docs/iwp_2007_07.pdf).
- [3] Ram P, Kanchan T, Unnikrishnan B. Pattern of acute poisonings in children below 15 years—a study from Mangalore, South India. *J Forensic Leg Med.*, 2014; 25: 26–29.
- [4] UNICEF report “Levels and trends in child mortality 2020”— *Official UNICEF page for the report*. Available at: <https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2020>.
- [5] Jagnoor J, Bassani DG, Keay L, Ivers RQ, Thakur JS, Gururaj G, Million Death Study Collaborators. Unintentional injury deaths among children younger

- than 5 years of age in India: a nationally representative study. *Inj Prev.*, 2011; 17(3): 151–55.
- [6] World Health Organisation. World report on child injury prevention. Geneva: WHO; 2008. Available at: <https://www.who.int/publications/i/item/9789241563574>.
- [7] Parmeswaran GG, Kalaivani M, Gupta SK, Goswami AK, Nongkynrih B. Unintentional childhood injuries in urban Delhi: a community-based study. *Indian J Community Med.*, 2017; 42(1): 36–40.
- [8] Giovannini E, Santelli S, Pelletti G, Bonasoni MP, Cornacchia A, et al. Pediatric motor vehicle crashes injuries: A systematic review for forensic evaluation. *Int J Legal Med.*, 2024; 138(4): 1329–41. doi: 10.1007/s00414-024-03174-7.
- [9] Nath A, Naik V. Accidents in children less than five years of age belonging to rural community in Belgaum district. *Indian J Community Med.*, 2007; 32(2): 116–18.
- [10] Khan S, Tauheed N, Nawab S, Afzal S, Khalique N. Domestic accidents among under-5 year children: a study on the modern day epidemic. *Int J Community Med Public Health*, 2019; 6(4): 1529–35.
- [11] Yadav SS, Shrivastava A, Mishra P, Prabhakar A. Socio-demographic patterns and epidemiological correlates of unintentional injuries among 1–5 year children in Moradabad. *Int J Community Med Public Health*, 2015; 2(3): 410–14.
- [12] National Crime Records Bureau. *Accidental Deaths & Suicides in India 2020*. Ministry of Home Affairs, Government of India; 2021. Available at: <https://www.cag.org.in/sites/default/files/database/ncrb2020.pdf>.
- [13] World Health Organization. Preventing injuries in children and adolescents: the need for action. Geneva: WHO; 2022. Available at: <https://www.who.int/publications/i/item/9789240047136>.

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