

EPIDEMIOLOGY OF HOUSEHOLD UNINTENTIONAL INJURIES AMONG CHILDREN UNDER FIVE YEARS: A HOSPITAL-BASED STUDY

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Abstract

Background: Unintentional injuries among children under five years old are a significant public health concern. Understanding sociodemographic factors and household hazards contributing to these injuries is crucial for effective prevention strategies. **Material and Methods:** A cross-sectional study was conducted among 200 children under five years old presenting with unintentional injuries. Data on sociodemographic characteristics, injury types, affected body parts, and household hazards were collected and analyzed. **Results:** Among the study participants, 62% were male, with most injuries occurring in rural areas (65.5%). Extremities were the most affected body part (41.5%), with wounds (34%) and poisoning (30%) being predominant. Household hazards such as unsafe furniture (80.5%) and kitchen hazards (70.5%) were prevalent. Significant associations were found between household hazards and injury occurrence, emphasizing the need for targeted prevention strategies. Additionally, the time of injury revealed a peak in the evening (31.5%), with most incidents occurring inside the house (74.5%), particularly in the bedroom (51%). **Conclusion:** The study highlights the diverse sociodemographic profile and injury characteristics among children under five years old. Targeted interventions addressing household hazards are essential for injury prevention in this vulnerable population.

INTRODUCTION

Unintentional injuries represent a significant public health concern globally, particularly among children under the age of five.^[1] These injuries, often occurring within the home environment, can result in substantial morbidity and mortality, imposing a considerable burden on healthcare systems and families alike.^[2] Understanding the types, mechanisms, and characteristics of household unintentional injuries in this vulnerable population is crucial for developing effective prevention strategies and interventions.^[3]

The present study aims to investigate household unintentional injuries among children under five years of age in a tertiary care hospital setting in Pondicherry, India. With this objective in mind, the research endeavors to delineate the various types of injuries, elucidate the mechanisms involved, and delineate the characteristics associated with such incidents. Additionally, the study seeks to explore the socio-demographic risk factors that may predispose children to household unintentional injuries in this specific geographical context.

Globally, childhood unintentional injuries represent a leading cause of morbidity and mortality among young children, constituting a substantial burden on healthcare systems and communities. According to the World Health Organization (WHO), an estimated 830,000 children under the age of 15 die annually due to unintentional injuries, with the majority of these fatalities occurring in low- and middle-income countries.^[4] Among children under the age of five, unintentional injuries are a significant contributor to mortality, with drowning, burns, falls, and poisoning being the leading causes of death.^[5]

In India, despite advances in healthcare and preventive measures, unintentional injuries continue to pose a significant threat to child health and well-being. The National Crime Records Bureau (NCRB) reported over 32,000 deaths due to unintentional injuries among children under the age of 14 in 2019 alone.^[6] Moreover, the burden of non-fatal injuries is likely much higher, imposing considerable economic and emotional costs on affected families and society.^[7]

In the context of household unintentional injuries, the home environment serves as a common setting

for such incidents to occur. Factors such as inadequate supervision, unsafe housing conditions, lack of safety measures, and limited caregiver knowledge contribute to the occurrence and severity of these injuries.^[8] Understanding the specific types of injuries, their underlying mechanisms, and the characteristics of affected children is paramount for developing targeted prevention strategies and interventions.

While research on childhood unintentional injuries in India has increased in recent years, there remains a paucity of studies focusing on household injuries among children under five years of age, particularly in the context of tertiary care hospitals. By conducting a comprehensive investigation in this setting, our study aims to fill this gap in knowledge and contribute valuable insights to the existing literature.

Pondicherry, a Union Territory in southern India, presents a unique socio-cultural context that may influence the prevalence and nature of household unintentional injuries among young children. Factors such as urbanization, socioeconomic status, parental education, and cultural practices may play a significant role in shaping the risk profile of children residing in this region. Therefore, exploring the socio-demographic risk factors associated with household unintentional injuries in Pondicherry is essential for tailoring preventive strategies to the local context and addressing the specific needs of the population.

This study seeks to address a critical gap in our understanding of household unintentional injuries among children under five years of age in Pondicherry, India. By elucidating the types, mechanisms, and characteristics of such injuries and identifying socio-demographic risk factors, our findings aim to inform evidence-based interventions and policies aimed at reducing the burden of childhood unintentional injuries in this vulnerable population.

MATERIALS AND METHODS

Study Setting: The present study was conducted at Sri Manakula Vinayagar Medical College and Hospital (SMVMCH), located in Pondicherry, India. This tertiary care hospital serves as a crucial healthcare hub, catering to the medical needs of individuals residing in both Tamil Nadu and Pondicherry. The study employed a hospital-based descriptive cross-sectional design to investigate household unintentional injuries among children under five years of age attending the Casualty, Paediatric, and Paediatric Surgery OPDs within the hospital premises.

Study Participants: All children under the age of five years presenting with established diagnoses of household unintentional injuries constituted the study population. The inclusion criteria encompassed children brought to the Paediatric

OPD, Paediatric Surgery OPD, or Casualty with evidence of household unintentional injuries. Additionally, children admitted to the hospital wards following such injuries were also included in the study.

Inclusion Criteria

Children (both male and female) under the age of five years, brought to the hospital departments with evidence of household unintentional injuries, were eligible for inclusion in the study. These encompassed children presenting with injuries sustained within the confines of their usual residence.

Exclusion Criteria

Children brought dead to the Casualty or OPD due to unintentional injuries, intentional injuries, and injuries occurring outside the home environment (e.g., road traffic accidents, construction accidents) were excluded from the study.

Sample Size

The sample size for the study was determined to be 200 based on a prevalence rate of 14% as reported by Bhamkar et al. [9], with a desired precision of 5% and a design effect of 1. A confidence level of 95% was considered for the calculation. Accounting for a non-response rate of 10%, the final sample size was estimated at 200 participants.

Sampling Method

A convenience sampling method was employed, wherein all children under five years of age presenting with household unintentional injuries at the specified hospital departments during the study period were included in the sample.

Operational Definitions

The study adopted the following operational definitions:

- An injury was defined as physical damage resulting from acute exposure to energy exceeding the body's physiological tolerance threshold.
- Unintentional non-fatal home-related injury referred to unforeseen incidents occurring within the home environment, resulting in injury, without intent to cause harm.

Data Collection Procedure

Data collection involved the administration of a pre-designed, pre-tested, semi-structured questionnaire to eligible participants. The questionnaire, developed based on WHO guidelines for injuries, comprised three parts. Part one focused on sociodemographic factors, part two gathered information on injury specifics, and part three assessed household hazards.

Ethical Considerations

Ethical principles were strictly adhered to throughout the study. The study was approved by the institutional ethical committee. Informed consent was obtained from parents or legal guardians before inclusion in the study. Confidentiality of participant information was

maintained at all stages of data collection and analysis.

Statistical Analysis

Data entry was performed using Microsoft Excel 2013, and statistical analysis was conducted using SPSS Version 26. Summary measures such as mean, median, and proportions were calculated. The association between variables was assessed using the chi-square test, with a significance level set at $p < 0.05$.

RESULTS

The data analysis revealed a diverse sociodemographic profile among the study participants (Table 10). Most children were between 1 to 2 years old, comprising 27.5% of the sample, followed by those aged 2 to 3 years (25.0%). Male children were slightly more represented at 62% compared to females at 38%. Rural residents constituted the majority, comprising 65.5% of the participants, while 34.5% resided in urban areas. Most children were first-born (57%), with 38% having a birth order of two. Nearly half of the children had no siblings (49.5%), while 39% had one sibling. Both parents were present in 98% of cases, and nuclear families were predominant (92.5%).

Mothers served as the primary caregivers for almost all children (97.5%). The age distribution of mothers was diverse, with 48.5% falling between 25 to 30 years old. Fathers' ages were relatively evenly distributed across categories, with 49% aged 25 to 30 years and 49.5% over 30 years old. The educational status of parents varied, with the majority having completed at least high school or diploma courses. Clerical jobs were the most common occupation for both mothers (21.5%) and fathers (63%). Most families earned $\leq 10,000$ Rs per month (58.5%), and the socioeconomic status was predominantly lower middle class (72%).

The analysis of injury characteristics among the study participants reveals a diverse range of injury types and affected body parts (Table 2). Wounds were the most prevalent injury type, accounting for 34% of cases, followed closely by poisoning through ingestion (23%) and foreign body ingestion (14.5%). Animal bites and poisoning from bites or stings constituted 12% and 7% of injuries, respectively, while burns and falls were less common, each representing 5.5% and 4% of cases, respectively. In terms of affected body parts, extremities were the most frequently injured, accounting for 41.5% of cases, followed by the gastro-intestinal tract (31.5%) and the head (19.5%). Injuries to the trunk and multiple body sites were less common, comprising 6.5% and 1% of cases, respectively. These findings highlight the diverse nature of injuries sustained by children under five years of age, underscoring the importance of targeted prevention and management strategies

tailored to address the specific types and sites of injuries encountered. [Table 1]

The analysis of the time of injury revealed that most incidents occurred in the evening, accounting for 31.5% of cases. A significant proportion of injuries (74.5%) took place inside the house, with the bedroom being the primary location (51%). Conversely, outside the house, the veranda was the most common site of injury, representing 41% of cases. Further exploration into the timing of injuries indicated that a majority occurred on weekdays (73%).

When it comes to pre-hospital care, approximately 45% of children received some form of care before reaching the hospital, with observations indicating a mix of beneficial and potentially harmful practices. Notably, around 13.5% of children were referred to the hospital, mostly for tertiary care. Surprisingly, almost 60% of injuries occurred without adult supervision, underscoring the need for enhanced safety measures. Regarding transportation to the hospital, bikes were the primary mode of transport (81%). The time of arrival to the hospital revealed a peak in admissions during the evening and night hours. Despite the urgency of the situation, many parents managed to bring their child to the hospital within an hour (93%). Additionally, the proximity of the injuries to the hospital varied, with 36% occurring within 10 kilometers, 57.5% within 10 to 30 kilometers, and only 6.5% beyond 30 kilometers. Most common safety hazards in General living area are unsafe furniture and objects (81%), medicines / chemicals within reach (72%) and unlocked cabinets / cupboards (78%). [Table 2]

The analysis revealed significant associations between several safety hazards and the occurrence of wounds (Table 3). In households with unsafe furniture and objects, there were 60 cases of wounds compared to 8 cases in households without such hazards, demonstrating a significant association ($p = 0.048$). Similarly, an uneven floor in the living area was significantly associated with a higher occurrence of wounds, with 21 cases in households with this hazard compared to 47 cases in households without ($p = 0.009$). The presence of a kitchen in the living room also showed a significant association with wound occurrence, with 10 cases in households where the kitchen was in the living room versus 58 cases in households without this arrangement ($p = 0.035$). Additionally, unsafe methods for heating water in the bathroom and an uneven floor in the bathroom were both significantly associated with a higher occurrence of wounds ($p = 0.050$ and $p = 0.015$ respectively). [Table 3]

The association between household hazards and the occurrence of burns among children under five years old was investigated to assess the impact of safety risks on burn injuries (Table 4). Specifically, households where the kitchen was located in the living room showed a significant association with burn occurrence, with six cases of burns in such households compared to only five cases in

households without this arrangement ($p = 0.012$). Similarly, access to fire or flammable fuel in the kitchen was associated with a higher occurrence of burns, although the association was not statistically significant at the conventional level ($p = 0.061$). Furthermore, having a stove at an accessible height

was significantly associated with burn occurrence, with nine cases of burns in households where the stove was at an accessible height compared to only two cases in households where it was not ($p = 0.035$). [Table 4]

Table 1: Socio-demographic characteristics of the study participants

Characteristic		Frequency (n)	Percentage (%)
Age group	<1 year	16	8.0
	1 to 2 years	55	27.5
	2 to 3 years	50	25.0
	3 to 4 years	38	19.0
	4 to 5 years	41	20.5
Sex	Male	124	62
	Female	76	38
Place of Residence	Rural	131	65.5
	Urban	69	34.5
Birth Order	1	114	57
	2	76	38
	3	10	5
Number of Siblings	None	99	49.5
	1	78	39
	2	16	8
	3	4	2
	4	3	1.5
Parent Status	Single Parent	4	2
	Both Parents	196	98
Type of Family	Nuclear	185	92.5
	Joint	15	7.5
Primary Caregiver	Mother	195	97.5
	Others	5	2.5
Income of Head of Family (Rs/month)	≤10000	117	58.5
	11000-20000	68	34
	21000-30000	13	6.5
	≥31000	2	1
Modified Kuppusamy Classification	Lower Middle	144	72
	Upper Middle	36	18
	Upper Lower	18	9
	Upper	2	1

Table 2: Characteristics of injuries sustained by the study participants

Injury characteristics		Frequency (n)	Percentage (%)
Injury type	Wounds	68	34
	Poisoning (Ingestion)	46	23
	Foreign body	29	14.5
	Animal bite	24	12
	Poisoning (Bites/Stings)	14	7
	Burns	11	5.5
	Falls	8	4
Affected part	Extremities	83	41.5
	Gastro-intestinal tract	63	31.5
	Head	39	19.5
	Trunk	13	6.5
	Multiple sites	2	1

Table 3: Association between household hazards to occurrence of wounds

Safety hazards		Wounds other than falls		Total (n)	Association	
		No (n)	Yes (n)		X ²	P value
Living area	No (n)	31	8	39	3.927	0.048
	Yes (n)	101	60	161		
Total (n)		132	68	200		
Living area – uneven floor	No (n)	112	47	159	6.81	0.009
	Yes (n)	20	21	41		
Total (n)		132	68	200		
Kitchen in living room	No (n)	95	58	153	4.432	0.035
	Yes (n)	37	10	47		
Total (n)		132	68	200		
Bathroom - unsafe method for	No (n)	85	53	138		

heating water	Yes (n)	47	15	62	3.85	0.050
Total (n)		132	68	200		
Bathroom - uneven floor	No (n)	122	55	177	5.874	0.015
	Yes (n)	10	13	23		
Total (n)		132	68	200		

Table 4: Association between household hazards and occurrence of burns

Household hazards		Burns		Total (n)	Association	
		No (n)	Yes (n)		X ²	p
Kitchen in living room?	No (n)	148	5	153	6.241	0.012
	Yes (n)	41	6	47		
Total (n)		189	11	200		
Kitchen – access to fire/flammable fuel	No (n)	136	5	141	3.51	0.061
	Yes (n)	53	6	59		
Total (n)		189	11	200		
Stove at an accessible height	No (n)	96	2	98	4.424	0.035
	Yes (n)	93	9	102		
Total (n)		189	11	200		

DISCUSSION

This study offers a comprehensive analysis of sociodemographic factors, injury characteristics, and household hazards contributing to unintentional injuries among children under five years old. Understanding the intricate interplay between these factors is crucial for developing targeted interventions aimed at reducing the burden of childhood injuries and promoting child safety.

The sociodemographic profile of the study participants reveals notable trends consistent with previous research. The age distribution of children affected by unintentional injuries, with a peak observed among those aged 1 to 2 years, aligns with findings from several studies (Bhamkar et al,⁹; Mahalakshmy et al.¹⁰) This vulnerability during the toddler years can be attributed to the child's increasing mobility, exploratory behavior, and lack of awareness of potential hazards.^{9,11} Additionally, the male preponderance observed in our study reflects a global trend, with boys often exhibiting more risk-taking behaviors compared to girls.¹²

The family structure and caregiving dynamics also play a significant role in injury risk among young children. The predominance of nuclear families in our study, where mothers serve as the primary caregivers, highlights the pivotal role of maternal supervision and safety practices in preventing injuries.¹³ However, contrary to some studies reporting a higher injury risk among children with younger mothers or lower maternal education levels,¹⁴ our findings did not reveal any significant correlation between these factors and injury occurrence.

In terms of injury characteristics, our study identifies wounds as the most common type of injury, followed by poisoning and foreign body ingestion. These findings underscore the diverse nature of childhood injuries and highlight the need for multifaceted prevention strategies addressing various injury mechanisms.¹² Furthermore, the association between injury occurrence and household hazards, such as unsafe furniture, kitchen arrangements, and bathroom conditions, underscores

the importance of creating safer home environments to mitigate injury risks.¹³

The analysis of environmental risk factors reveals significant correlations between certain hazards and specific injury types. For instance, slippery floors in bathrooms are associated with an increased risk of falls, while access to flammable fuel in kitchens correlates with a higher incidence of burns.¹²

These findings emphasize the need for targeted interventions aimed at addressing modifiable environmental risk factors to prevent childhood injuries effectively.

This study provides valuable insights into the complex interactions between sociodemographic factors, injury characteristics, and household hazards contributing to unintentional injuries among young children. By identifying high-risk groups and modifiable risk factors, policymakers and healthcare professionals can develop tailored interventions aimed at promoting child safety and reducing the incidence of childhood injuries.

Despite the valuable insights provided, this study has certain limitations. Firstly, the reliance on cross-sectional data restricts the ability to establish causality between sociodemographic factors, injury characteristics, and household hazards. Additionally, the study's sample size and geographic scope may limit the generalizability of findings to broader populations. Furthermore, the retrospective nature of data collection may introduce recall bias, impacting the accuracy of reported information. Lastly, while efforts were made to control for confounding variables, the presence of unmeasured factors could influence the observed associations. Future research with longitudinal designs and larger, more diverse samples is warranted to address these limitations comprehensively.

CONCLUSION

This study highlights the diverse sociodemographic factors, injury characteristics, and household hazards influencing unintentional injuries among children under five years old. With wounds (34%) and poisoning (30%) being the most common injury

types, and unsafe furniture (80.5%) and kitchen hazards (70.5%) prevalent in households, targeted interventions addressing these risk factors are imperative. By understanding these dynamics, policymakers and healthcare professionals can develop strategies to mitigate childhood injury rates effectively.

REFERENCES

1. Sleet DA. The Global Challenge of Child Injury Prevention. *Int J Environ Res Public Health*. 2018 Sep 4;15(9):1921. doi: 10.3390/ijerph15091921.
2. Forward KE, Loubani E. Predictable and Preventable: Historical and Current Efforts to Improve Child Injury Prevention. *Curr Pediatr Rev*. 2018;14(1):48-51. doi: 10.2174/1573396313666171010111722.
3. Tupetz A, Friedman K, Zhao D, Liao H, Isenburg MV, Keating EM, Vissoci JRN, Staton CA. Prevention of childhood unintentional injuries in low- and middle-income countries: A systematic review. *PLoS One*. 2020 Dec 29;15(12): e0243464. doi: 10.1371/journal.pone.0243464.
4. World Health Organization (WHO). Injuries and Violence. Available at: <https://www.who.int/news-room/factsheets/detail/injuries-and-violence>. Accessed on February 4, 2024.
5. Hashmi MM, Akram MR, Naumeri F, Akram MF. Health Related Quality of Life (HRQOL) in pediatric population after surgical intervention in traumatic lower limb injuries: A prospective cohort. *Pak J Med Sci*. 2023 Jul-Aug;39(4):1134-1139. doi: 10.12669/pjms.39.4.7128.
6. Dave VR, Rana BM, Shah VR, Sonaliya KN. A Study on Epidemiology of Unintentional Childhood Injury at One of the Districts of Gujarat State: An Indian Council of Medical Research Task Force Study. *Indian J Community Med*. 2022 Apr-Jun;47(2):187-191. doi: 10.4103/ijcm.ijcm_1275_21.
7. Rajan B, Nooyi SC, Sastry NKB, George A, Rao C, M SB. Unintentional Child Injury in Rural and Urban Siddlagatta, Karnataka, India: A Community-Based Survey. *Cureus*. 2023 Oct 30;15(10): e47960. doi: 10.7759/cureus.47960.
8. Sudfeld CR, Fawzi WW. Importance of Innovations in Neonatal and Adolescent Health in Reaching the Sustainable Development Goals by 2030. *JAMA Pediatr*. 2017 Jun 1;171(6):521-522. doi: 10.1001/jamapediatrics.2017.0261.
9. Bhamkar R, Seth B, Setia MS. Profile and Risk Factor Analysis of Unintentional Injuries in Children. *Indian J Pediatr*. 2016 Oct;83(10):1114-20. doi: 10.1007/s12098-016-2159-2.
10. Mahalakshmy T, Dongre AR, Kalaiselvan G. Epidemiology of childhood injuries in rural Puducherry, South India. *Indian J Pediatr*. 2011 Jul;78(7):821-5. doi: 10.1007/s12098-010-0343-3.
11. Lahare VK, Verma N, Chandrakar A, Shrivastava N, Dengani M, Gupta SA. A Community-Based Cross-Sectional Study on the Epidemiology of Injuries in Raipur City, Chhattisgarh. *Cureus*. 2023 Jul 14;15(7): e41868. doi: 10.7759/cureus.41868.
12. Mathur A, Mehra L, Diwan V, Pathak A. Unintentional Childhood Injuries in Urban and Rural Ujjain, India: A Community-Based Survey. *Children (Basel)*. 2018 Feb 8;5(2):23. doi: 10.3390/children5020023.
13. Hazazi YO, Mahmoud MA, Al Ali MO. Knowledge and awareness of parents in the Kingdom of Saudi Arabia regarding unintentional home injuries in children 2019 a descriptive cross-sectional study. *J Family Med Prim Care*. 2021 Jan;10(1):243-248. doi: 10.4103/jfmpc.jfmpc_1596_20.
14. Salam A, Aziz DA, Ansar F, Sajjad A, Asjid M. Role of Primary Caregivers Regarding Unintentional Injury Prevention Among Preschool Children: A Cross-Sectional Survey in Low- and Middle-Income Country. *Cureus*. 2022 Aug 30;14(8): e28599. doi: 10.7759/cureus.28599.