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Profile of Unintentional Injuries at the Household Level among Under-Five Children in Faridkot, India: An Urban-Rural Comparison

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ABSTRACT

Background: Unintentional injuries, caused by energy transfers, cause over 2 lakh deaths annually, with drowning and falls being top causes in India. In impoverished neighborhoods, inadequate preventive measures, unstable living, and poor educational conditions contribute to the risk. Hence, this study was conducted to estimate the proportion of under-five children having unintentional injuries along with injury profile at household level in urban and rural areas.

Methods: A cross-sectional study was conducted in an institution's field practice area from May 2019 to April 2020, focusing on households with under-five children. A total of 280 mother-child duos were included, with a 1:1.7 ratio for representation of both urban and rural populations. The study used a self-designed household survey questionnaire to assess injury profiles among under-five children. Chi-square analysis was used to assess the variation of variables across urban and rural areas.

Results: Out of 280 households, injury was present in 115 (100%) urban and 155 (93.9%) rural houses. Overall, 270 (96.43%) of households reported at least one child injury event. Majority i.e. 254 (90.71%) households reported falls with a 907.14 injury rate/1000/year.

Conclusions: Falls were the most common type of injury reported, with a high injury rate per 1000 children per year. Health education among adolescents, parents, school teachers, and district health authorities must address causes, severity, complications, and prevention of unintentional injury. Child injuries can be prevented through public health initiatives, requiring collaboration between international communities, governments, and civil society to create safer societies.

Key-words: Accidental injury, Child, Cross-sectional study, Household

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Introduction

Unintentional Injury is the damage caused to a person due to an acute transfer of energy (Mechanical, Chemical, Thermal, Electrical, and radiation) for which there is no predetermined intent(Sheriff et al., 2011). As mentioned by WHO, animal bites, poisoning, burns, drowning, falls, injuries (RTIs), and road traffic are the most common causes. 18000 children under the age of 15 are injured or die every year; the leading causes of these deaths are vehicle accidents (23%), drowning (21%), and fire-related deaths (8%)(W.H.O, 2008). Even though just a small proportion is harmed, it amounts to millions of deaths. Over 2 lakh children die worldwide each year from unintentional injuries, and at least half of these injuries happen at home, according to the Global Burden of Diseases report(Ma et al., 2022). According to World Health Organization lists, for both sexes in India in 2019, two of the top 10 causes of mortality for children in the 1-4 and 5-9 age groups were drowning and fall. India is one of the largest developing countries in the world, and for both sexes, daily injuries are among the top causes of death(falls) (2019)(W.H.O, 2020a, 2020b). An estimated 8% of all the years spent living with a disability are attributed to violence and injuries(W.H.O, 2022). Risk factors include less emphasis on preventive initiatives in impoverished neighbourhoods, more unstable living, working, traveling, and educational circumstances, and less access to high-quality emergency trauma care and rehabilitation programs. Since under-five children spend most of their days at home and are too young to assess potential risks, most injuries occur close to houses(India, 2011). In addition to increasing the risk of child mortality, unintentional injuries can also cause discomfort, distress, and traumatic psychological disorders. They can also increase the financial burden on families by necessitating hospital stays, emergency visits, acute care visits, general practitioner treatment, or nonformal medical care. Furthermore, unintentional injuries frequently result in temporary or permanent disability as well as the need for long-term care and rehabilitation in the areas of physical and mental health.

Child injuries are preventable, and coordinated public health initiatives have the enormous potential to save the lives of young people. The creation of societies free from the threat of injuries and violence is a major responsibility of the international community, national governments, and civil society. In many earlier studies, there are still certain shortcomings due to cultural and regional differences; studies conducted outside of India could not accurately reflect the unintentional injuries situation faced by Indian children and relationships between UI-related behaviours, supervision, and environmental risks have not yet been thoroughly investigated. Research indicates that India can considerably lower the number of fatalities and disabilities resulting from unintentional injury if more efficient preventive measures are explored and put into practice which is significantly influenced by injury perception (McKenzie et al., 2019). Younger children (0–6 years old), who lack sufficient self-defence skills and a thorough awareness of their environment, have more severe UIs than children in other age groups(Ma et al, 2022). Hence, this study was done to estimate the proportion of under-five children having unintentional injuries along with injury profile at the household level in urban and rural areas.

Methods

Study design: To study unintentional injuries among under-five children, a cross-sectional study design was adopted.

Study setting and participants: The study was conducted in the urban and rural field practice areas under the Department of Community Medicine of the tertiary care institute, Faridkot, India. Urban area consists of 23,069 people spread over 4 areas namely Bajigar Basti, Bhan Singh Colony, Shaheed Balwinder Singh Nagar, and Society Nagar which are catered by Urban-PHC with the number of households as 3598. The rural

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area consists of 6246 population, and it comes under Rural Health Training Centre with 1142 households.

Data collection: Data for the present study was collected over one year (May 2019- April 2020).

Sampling: The households having under-five children in the urban and rural field practice areas comprise the sampling frame with a household with under-five children as the sampling unit. A total of 280 mother-child duos were included in the study. The total sample size of 269 was calculated which was rounded off to 280. Taking the prevalence of unintentional injury among under-five children as 16.6% (Atak et al., 2010), a Confidence limit of 95%, a margin of sampling error of 5% and a non-response rate of 20%, sample size came to 280. So, for true representation of both urban and rural populations, the study sample was taken in the ratio of 1:1.7(India, 2011). As more population lives in rural areas, the sample was divided into 115 urban children and 165 rural children.

Data Collection Tools: A self-designed pre-tested household survey questionnaire was used for the injury profile.

Methods

A list of all under-five children residing in the study area was prepared from the survey register of the respective ANMs of urban and rural health centers. The participants (under-five children) were selected randomly (using random numbers) from the prepared list. Moreover, house to house survey was conducted in the selected field practice areas. For the code of ethics, informed written consent was taken from the caregiver before the beginning of a one-to-one interview with her. Training of interviewers were performed before the actual interview process. The relevant information about the demographic profile of the family, unintentional injuries and injury profile was collected. If the selected household failed to give informed consent for participation in the study, the household was locked; no family member above the age of 18 was present in the household at the time of the interview; children who had a physical and sensory disability or a significant developmental delay, and had injury as a result of interpersonal violence were excluded. Then, immediate next house with an under-five child was included in the study.

Data analysis: The collected data was compiled and tabulated by using manual tables, Microsoft Excel, and suitable statistical software. For categorical data, descriptive statistics were computed as frequencies or proportions, and for continuous variables, the mean, standard deviation, and range were determined. Tables were used to display the data for ease of interpretation. A chi-square analysis was done to evaluate how variables varied between different places (rural and urban). Finally, P-values of less than 0.05 were regarded as statistically significant.

Results

Tables

A total of 280 households with under-five children were surveyed, and overall, 270(96.43%) of households reported at least one child injury event.

Table 1 presents the distribution of subjects according to history of injury and area of residence which is statistically significant. Out of 280 subjects, injury was present in 115 (100%) subjects in urban areas and 155 (93.9%) subjects in rural areas. On applying test of significance, it was found highly significant (Table 1).

Table 1. Distribution of subjects according to history of injury and area of residence(n=280)

History of injury	Area of residence			p- value
	Urban	Rural	Total	
Present	115(100%)	155(93.9%)	270(96.43%)	0.006*
Absent	0(0%)	10(6.1%)	10(3.57%)	Significant

*On applying Fisher's Exact test

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Table 2 depicts the distribution of subjects according to severity of injury and area of residence which is statistically significant. Most of subjects i.e. 105 (91.3%) in urban areas and 141 (85.4%) in rural areas underwent mild injury. Most (87.9%) of under-five children had mild injury, 6.4% had moderate and 2.1% had a severe injury (Table 2).

Table 2. Distribution of subjects according to severity of injury and area of residence(n=270)

Severity of injury	Area of residence			p-value
	Urban	Rural	Total	
Mild	105(91.3%)	141(85.4%)	246(87.9%)	
Moderate	9(7.8%)	9(5.5%)	18(6.4%)	0.014*
Severe	1(0.9%)	5(3.0%)	6(2.1%)	
Total	115(100%)	165(100%)	280(100%)	

*On applying Fisher's Exact test

Table 3 shows distribution of subjects according to number and type of injury mechanism. Overall, 270 (96.43%) of households reported at least one child injury event. Majority i.e. 254 (90.71%) households reported fall with 907.14 injury rate/1000/year. Cuts happened in 6 subjects, burns/scalds in 4 subjects, crush injury in 4 subjects and suffocation/choking in 2 subjects (Table 3).

Table 3. Distribution of subjects according to number and type of injury mechanism(overall) (n=280)

Injury mechanism	Injured	Total children	Injuries/1000/year	95% CI
Fall	254	280	907.14	(873.1-941.1)
Burns/Scalds	4	280	14.28	(4-28.2)
Cuts	6	280	21.42	(4.5-38.4)
Poisoning/Electric shock	0	280	0	(0-0)
Suffocation/Choking	2	280	7.14	(0-17)
Drowning/Animal related injury	0	280	0	(0-0)
Crush injury	4	280	14.28	(4-28.2)

Table 4 presents distribution of subjects according to area of residence (n=280) and number and mechanism of injury. The injury rate for under-five children was 964.3 per 1000. The injury rate amongst children in the urban (1000 per 1000 children) was higher than the rural area (939.4 per 1000 children). Drowning, animal-related injury, poisoning and electric shock were not reported in both urban and rural areas (Table 4).

Table 4. Distribution of subjects according to area of residence (n=280) and number and mechanism of injury

Injury mechanism	Area of residence			
	Urban (n=115)		Rural (n=165)	
	Injured	Injuries/1000/year	Injured	Injuries/1000/year
Fall	113	982.6	141	854.54
Burns/Scalds	1	8.7	3	18.18
Cut	1	8.7	5	30.3
Poisoning/Electric shock	0	0	0	0
Suffocation/Choking	0	0	2	12.12
Drowning/Animal related injury	0	0	0	0
Crush injury	0	0	4	24.24
Overall	115	1000	155	939.4

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It was found that first-aid materials were present in 50.4% of urban houses and 26.1% of rural houses for the treatment of mild and moderate injuries. The distribution of the presence of first-aid material and area of residence is found to be highly significant. In the case of mild injuries, about two-thirds i.e. 65% of children with injury, no treatment was required, followed by 24% in which home treatment was required.

Discussion

The purpose of the present study was to estimate the proportion of under-five children having unintentional injuries along with injury profiles at the household level in urban and rural areas. However, it was challenging to analyse the situation because there were no extensive epidemiological studies conducted in hospitals or the general community. Furthermore, it was challenging to compare studies due to differences in research design and methods. However, together with the findings of this study, the available data from other studies has been presented below.

Domestic accidents as per age and gender

In this study, 96.43% of households reported at least one child injury event (270 out of 280) whereas in the study done in 2012 by Poorolajal J in Iran, almost 22.59% (131 out of 580) of mothers reported at least one injury in their under-five children(Poorolajal et al., 2013) . The community-based study conducted in urban Delhi by Parmeswaran et al. in 2013 including 1639 children showed that the prevalences of childhood injuries in the past one year was 7.1%, and it was more in boys than girls(Parmeswaran et al., 2017).

A study conducted by Shriyan P et al. in 2014 in coastal Karnataka among mothers of under-five children showed that the frequency of unintentional injuries in children attending the Anganwadi was 46.3%, and the commonest cause of the injuriy was due to falls followed by burns and animal bites. Nearly half of the respondents (50.5%) were not aware about how to provide first-aid for unintentional injury among children (Shriyan et al., 2014).

In the present study, overall, 270(96.43%) of households reported at least one child injury event which is much higher than the one found by a study conducted by Bhatta et al (23.2%) in Nepal in Makwanpur(Bhatta, 2017) and in Bhuvaneshvari N in 2015; it was conducted in a ward of Mehrauli and showed that 39.7% of people had experienced a home injury in the previous 12 months, with the prevalence being much greater among those aged 1-3 (54.3%)(Bhuvaneswari et al., 2018). The primary cause of the disparity in incidence was that the previous study only documented more serious injuries (those that prevented the child from engaging in regular activities for three or more days) and employed a 12-month time frame for recall, which suggests that by the time the survey was administered, some families may have forgotten about injury episodes.

Yu et al. in 2023 in China showed that the unintentional injury-related deaths of all the under-five children rose from 15.2% in 2010 to 23.8% in 2020(Yu et al., 2023). Ma et al. in 2017 (2022) in Changsha also showed that 33.58% reported unintentional injuries. (Ma et al., 2022).

The age of the children under research, the different approaches taken, the different recall times, the study locations, and the socioeconomic circumstances of the households could all be contributing factors to the discrepancy between these studies and the current one. The injury incidence rate seems to be lower in studies with longer recollection periods. Rates are more comparable in cases where recall periods are comparable to the current study. Despite certain differences in study techniques, the rates' consistency across groups and situations provides confidence in the validity of the current study's findings. An underestimation of the actual rate may result from some injury incidents being overlooked, and thus, not reported due to the prolonged recall period.

Domestic accidents as per the category of injury

The majority (87.9%) of under-five children had mild injury, 6.4% had moderate, and 2.1% had a severe injury. A study on Non-Fatal Injuries in US

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Children and Youth revealed that the percentage of serious injuries was lowest among the youngest children (17.7%) while adolescents had a higher proportion of serious injuries (38.7%) (Scheidt et al., 1995).

Domestic accidents as per mode of injury

Amongst all the children (n=280) of surveyed households, the overall rate of injuries among under-five children was 964.3 per 1000 children including both urban and rural area. Falls were reported in 982.6 per 1000 children in urban area and 854.54 per 1000 children in rural area. Drowning, animal-related injury, poisoning and electric shock were not reported in any area.

A study conducted by Sheriff A, Rahim A et al. in 2009 in North Kerala showed that unintended injuries were primarily caused by mechanical injuries, which included road traffic accidents and unintended falls (36%), with poisoning being next (22.3%). Children of younger moms, overactive children, children from extended or joint households, children who are left alone or with friends, preschoolers, boys, and children from urban areas were found to have a greater percentage of unintentional injuries(Sheriff et al., 2011).

In a study conducted by Atak N et al. in 2010 in Malatya, the most common cause of injuries in accidents was found to be falling (65.3%), followed by burns from hot water and stove/oven (33.6%), cuts from sharp items (5.6%), poisoning and choking (2.2%), and injuries from other objects (1.1%). Additionally, it was discovered that 65.1% of the children had an accident while their mother was around(Atak et al., 2010).

In 2023 in China, Jin et al. i showed that 738 individuals (62.4%) experienced at least one unintended injury. The most frequent injuries observed were sprains (757, 27.2%) and falls (827, 29.7%), followed by burns and scalds (565, 20.3%)(Jin et al., 2023).

In 2017 in Iran, Nouhjah et al. showed that from birth until the research period, 827 (30.7%) of the cases had a history of at least one home injury incident. Injuries were most frequently caused by burning (291 cases, 38.4%), falling (214 cases, 28.3%), poisoning (66 cases, 8.7%), swallowing (47 cases, 6.2%), biting (32 cases, 4.2%), and choking (29 cases, 3.8%)(Nouhjah et al., 2017).

According to a 2015 study by Tang et al. in Hong Kong, 14.5% of respondents said they had experienced an unintentional injury occurrence or episodes in the preceding 12 months. Sprains (24.0%), falls (19.9%), and being hit or struck (19.6%) were the primary causes of the top three most severe unintentional injuries(Eric Ho Man Tang & Laura Elizabeth Bedford, 2021).

Domestic accidents as per the place of an accident

In this study, about two-thirds of injuries in both urban (64.3%) and rural (62.4%) areas occurred in the courtyard followed by the bedroom. In a study by Aggarwal et al., children in the 0-5 age group met with maximum accidents in the courtyard (50.6%) and room (29.9%)(Ramnika et al., 2009). This is because young children fall frequently while playing and also fall from the bed while sleeping. The way the host and surroundings interacted showed a lot of similarities to the kinds of activities carried out at a given age and location.

Mittal BN et al. found that the most frequent sites of accidents were the bed/living room and kitchen. However, in a study carried out in Perlis (1998), maximum injuries were seen in the house compound within age range of 4-12 and in the kitchen in < 4 year-old children(Indrayan et al., 1975).

Limitation

This study suffers from some of the following limitations- (i) One of the major limitations was being a cross-sectional study which restricts examining causal association. (ii) Being cross-sectional study there was chances of recall bias.

Conclusion

Unintentional injuries among under-five children are a significant public health concern with a high prevalence in both urban and rural areas. Falls were the most common type of injury reported, with a high injury rate per 1000 children

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per year. The study highlighted the importance of health education among adolescents, parents, school teachers, and district health authority to address the causes, severity, complications, and preventions of unintentional injuries. The distribution of injuries varied between urban and rural areas, with differences in the severity and types of injuries reported. The presence of first-aid materials in households was found to be significantly different between urban and rural areas. The study emphasized the need for further research and interventions to prevent unintentional injuries among under-five children, considering the limitations of the current study design. This study was a preliminary exploration; further verification of populations of different regions and prospective studies may be required.

Key Message

Unintentional injuries in children especially under-5 children are a serious concern in our society. The parents and family members of the children should be educated to avoid any type of unintentional injuries in the children. This can happen with the help of healthcare staffs in both rural and urban area. This study was conducted to see the types and area of injury and compare their occurrences. More researches on this serious topic are required to enlighten us with the different hidden aspects of unintentional injuries in children.

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Conflict of Interest

There were no conflict of interest in this study

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Ethical Considerations

The institution's ethical committee granted ethical approval.

Code of ethics

BFUHS/2K19p-TH/9703

Authors' contributions

Conceptualization was done by Singla P. Data curation was conducted by Agarwal R. : Sanchaya S did formal analysis. There was no funding acquisition. Methodology was devised by Devgan S. Project administration was carried out by Singla P. Visualization was done bySingla P. Writing original draft was carried out by Singla P. , and review and editing was the work of Sanchaya S, Bhatia R.

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