

Epidemiological Profile of Unintentional Childhood Injuries in Urban Area of Mangaluru Taluk, Dakshina Kannada District, Karnataka State, India

Abhay S Nirgude¹, Mubeena Haleema^{2*}

¹Yenepoya Medical College, Yenepoya (Deemed to be University), Mangalore, India

²Vydehi Institute of Medical Sciences and Research Centre, Bangalore, India

DOI: 10.55489/njcm.150220243434

ABSTRACT

Introduction: Worldwide injury & violence is most important cause of death in children, every year it causes death in approximately 950000 children under the age group of 18. This study was conducted to find out the magnitude & epidemiological factors associated with unintentional childhood injuries.

Methods: The study was conducted in urban field practice area of a Medical College, in Southern India. Community based cross sectional study was conducted by enrolling 500 children (0-18 years) during October 2018 to September 2020. Multistage simple random sampling method was followed to select the participants. Source of data was Mother/Father. Predesigned pretested validated structured questionnaire was used to collect the data.

Results: Period prevalence of unintentional childhood injury was 18.6%. Fall was reported as most common cause of injury among children. Fall, sharp injuries, burn was associated with certain environmental risk factors. Children were at risk of road traffic injuries, burns, sharp injuries, and fall. Protective factors against injury were children belonging to lower and middle socio-economic status, child with 1 sibling.

Conclusions: Period prevalence of unintentional childhood injury was 18.6%. Majority of them had fall as a cause of injury, with the risk factors for fall in the child's environment.

Key words: Unintentional injury, risk factors, Epidemiological study, childhood injuries

ARTICLE INFO

Financial Support: None declared

Conflict of Interest: None declared

Received: 06-10-2023, **Accepted:** 13-01-2024, **Published:** 01-02-2024

***Correspondence:** Dr. Mubeena Haleema (Email: mubeenahaleema@gmail.com)

How to cite this article: Nirgude AS, Haleema M. Epidemiological Profile of Unintentional Childhood Injuries in Urban Area of Mangaluru Taluk, Dakshina Kannada District, Karnataka State, India. Natl J Community Med 2024;15(2):121-126. DOI: 10.55489/njcm.150220243434

Copy Right: The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Share Alike (CC BY-SA) 4.0 License, which allows others to remix, adapt, and build upon the work commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.

www.njcmindia.com | pISSN09763325 | eISSN22296816 | Published by Medsci Publications

INTRODUCTION

Worldwide injury & violence is the most important cause of death in children. Every year it causes death in approximately 950000 children and youngsters who are under the age group of 18, ninety percent of it is caused by unintentional injuries.¹ It is estimated that 55% of global injury mortality burden, is seen in South East Asia and Western Pacific regions of World health organization (under the age group of 20).² World report on childhood injury prevention 2008 by WHO/UNICEF, Profile of child injuries in selected member states in the Asia-Pacific region 2010 by WHO addresses and summaries the childhood injury and prevention.^{1,2} Children are at risk of exposure to different hazards and are susceptible to such injuries everywhere; including drowning, transport related, burns, falls, poisoning etc.^{1,2}

There are several studies conducted in the Indian settings measuring the prevalence, injury profile, factors associated, including the environmental factors with the emphasis on developing preventive strategies.³⁻⁶ For each area of childhood injury there are proven ways to reduce both the likelihood and severity.^{1,5} For effective intervention and prevention there is a need to assess the burden, causes and consequences of unintentional injuries.^{6,7} This study was conducted to determine the magnitude and associated epidemiological factors of unintentional childhood injuries, which will help in developing preventive measures.

METHODOLOGY

The Medical school where the study was conducted provides preventive, promotive, curative and referral services to defined urban and rural areas within 30 km radius of the Institute as a part of the governing council regulations. Of the total 3 urban areas (Bunder, Kudroli and Bengre with the total population of 27,104), one urban area was selected by lottery method (Kudroli). Selected urban area had a total population of 6250 with 1148 households; population under 18 years was 2437.

Community based cross sectional study was conducted during October 2018 to September 2020. Study population being children aged 0-18 years residing in the study area. Source of data was Mother/Father. Inclusion criteria were children aged 0-18 years, whose mother/father consent for study. Exclusion criteria were Intentional injuries, Injuries due to violence, children with epilepsy, fatal injuries.

Based on pilot study with 25 children it was found that prevalence of unintentional injuries was 25%. With the non-response rate of 10%, 5% absolute precision and 95% confidence, design effect of 1.5; sample size was calculated to be 476 (rounded to 500). Sample size was calculated using Open Epi.⁸ Unintentional injury was defined as Injury among

children (0-18 years) in the past one year, which resulted in seeking of medical care or absence of school or inability to do normal physical activity for a duration of minimum of one day.^{9,10}

Sampling method: Multistage simple random sampling method was used. Of the total 3 urban areas (total population of 27,104), one urban area was selected by lottery method (Stage 1). In order to collect data from 500 children a total of 250 households were selected by simple random sampling method (Stage 2).¹¹

Study tool: Internal reliability of the questionnaire was checked. The reliability was found to be good with Cronbach's alpha score of >0.7. The questionnaire was given to 5 subject expert for content and consensual validity. The agreement was more than 95 %. Predesigned pretested validated structured questionnaire was developed on the basis of similar studies,^{9,10,12} World injury report 2008,¹ Haddon matrix,¹³ pilot study and based on local cultural & social practice. Study questionnaire consisted of three parts: that is Socio-demographic profile, Injury profile, Epidemiological factors.

Institutional ethical committee approval was obtained (IRB number - YUEC/2016/216). Written informed consent was obtained from respondents after explaining the purpose and the nature of the study. Assent was obtained from children under the age group of 7-18 years

Method of data collection: Information was collected by one-to-one interview method from mother, if mother was not available father was the next respondent, if both were not available second visit was done. If on second visit, parents were not available then that child was not included in the study.

This study included injuries caused by sharp objects, falls, poisoning, road traffic injuries, burns/fire, injuries caused by animals, drowning, electric shocks, suffocation.¹

Statistical analysis: Data was analyzed using IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp. Descriptive statistic was reported as median and inter-quartile range for continuous variables; frequency and proportion for categorical variable. Multivariable logistic regression was performed to predict the unintentional childhood injuries based on the socio-demographic independent variables namely age, gender, type of family, occupation of parents and socio-economic status (Table 3). Bivariate logistic regression has been used to study the effect of defined environmental factors with respective type of unintentional childhood injury. (Table 4)

RESULTS

Socio-demographic profile: Median age of study participant was 9 (12-5) years, with 37% of them in the age group of 11- 15 years. More than half of study

participants were male (54.6%). Socio-economic status of study participant was middle (45.6%) and lower middle class (36%) (Table 1).

Brief description of Injury profile: Period prevalence of childhood injury was 18.6% (93). Amongst the injury event, most common cause of injury was fall (60.2%), followed by burn (15%), injury due to sharp objects (12.9%), road traffic injuries (9.6%) and animal bite (2.15%) (Table 2).

Majority of children (83.9%) with childhood injuries had parental/caregiver’s supervision at home. While half of the children (52.7%) had parental/ caregiver’s supervision at playground. Among the activity at the time of injury, Sports activity was present in almost half of the participants [43(46.15%)] and was majorly present in males [29(31.1%)] than females [14 (15.05%)].

Epidemiological factors: Association between Socio-demographic profile and unintentional injury is presented in Table 3. Middle class [Adjusted odds ratio: 0.29 (0.10-0.89) (p 0.03)] and lower class [Adjusted odds ratio: 0.32 (0.10-0.98) (p 0.04)] of socio-economic status were found to be protective factors against unintentional childhood injuries. Children with 1 sibling [Adjusted odds ratio: 0.53 (0.31-0.89) (p 0.01)] was also found to be protective factors against unintentional childhood injuries.

On assessing Environmental factors for unintentional injuries such as Road traffic injuries, Fall, Burn, Sharp injury; it was found that significant number of children were having these risk factors (Table 4). Animal injuries was found only in 2 children and other type of injury such as drowning, suffocation and electric shock was not reported hence it was not analyzed further.

Environmental factors namely storage of flammable substance at home, no separation of cooking area from living area, stove within reach of child were found to be associated with Burns. Environmental

factors such as unprotected roof/balcony/staircase, unsafe equipment/ deep ditches in playground were found to be associated with Fall. Sharp objects within child’s reach were found to be associated with Sharp injury. All the above association was statistically significant. Factors such as Protective gears by parents/driver/children was found to be protective factors and Child unattended while walking on road was found to be a risk factor for fall, but the association was not statistically significant (Table 4).

Table1: Socio-demographic profile of the study participants (N=500)

Socio demographic variables	Participants (%)
Age in years	
<5	148(29.6)
6-10	137(27.4)
11-15	186(37.2)
16-18	29(5.8)
Gender	
Male	273(54.6)
Female	227(45.4)
Type of family	
Nuclear	262(52.4)
Joint	190(38)
Three generation	48(9.6)
Occupation of Father	
Unemployed	16(3.2)
Skilled and Unskilled	401(80.2)
Semi-professional, Professional	83(16.6)
Occupation of Mother	
Home maker	422(84.4)
Skilled and unskilled	68(13.6)
Semi-professional and Professional	10(2)
Socio-Economic Status	
Upper class	6(1.2)
Upper middle	43(8.6)
Middle class	228(45.6)
Lower middle class	180(36)
Lower class	43(8.6)

Table 2: Profile of unintentional injury based on cause of injury among study participants

Cause of injury	No. of injury event	Proportion of Cause specific injury	Cause Specific Injury Rate in % (N=500)
Road traffic injuries	9	9.6	1.8
Burn	14	15.0	2.8
Fall	56	60.2	11.2
Injury due to sharp objects	12	12.9	2.4
Animal bite	2	2.15	0.4
Total	93	100	18.6

DISCUSSION

Brief description on injury profile:

The period prevalence of injury in the present study was 18.6%. Studies conducted in different settings reported the prevalence in the range of 7% to 25%.¹⁴⁻¹⁶ Fall was most common cause of injury re-

ported in the present study. Similar finding was reported in studies conducted in different parts of India.¹⁵⁻¹⁷ Children engage themselves in sports, outdoor and indoor activities, most of their free time, which sometimes lead onto fall injury. Sports was the most common activity noted during injury among males than females, similar findings were also seen in a study conducted in China.¹⁸

Table 3: Association between Socio-demographic factors and unintentional childhood injuries

Factor	Injury category		OR (95% CI)	Adjusted OR (95% CI)	p value
	Yes (%)	No (%)			
Age					
<5	30(20.3)	118(79.7)	1.026(0.384-2.74)	1.125(0.40-3.13)	0.82
6-10	24(17.5)	113(82.5)	1.22(0.45-3.34)	1.40(0.49-3.96)	0.51
11-15	33(17.7)	153(82.3)	1.20(0.45-3.20)	1.22(0.45-3.36)	0.69
16-18	6(20.7)	23(79.3)	1	1	
Gender					
Male	56(20.5)	217(79.5)	0.75(0.47-1.19)	0.77(0.48-1.24)	0.28
Female	37(16.3)	190(83.7)	1	1	
Type of family					
Nuclear	44(16.8)	218(83.2)	1.28(0.81-2.01)	1.45(0.89-2.36)	0.13
Non-Nuclear*	49(20.6)	189(79.4)	1	1	
Occupation of father					
Unemployed	2(12.5)	14(87.5)	1.67(0.34-8.10)	1.87(0.36-9.62)	0.45
Skilled& unskilled	75(18.7)	326(81.3)	1.03(0.56-1.89)	0.96(0.51-1.81)	0.91
Profession	16(19.3)	67(80.7)	1	1	
Occupation of Mother					
Homemaker	79(18.7)	343(81.3)	1	1	
Others	14(17.9)	64(82.1)	1.05(0.56-1.97)	0.97(0.50-1.87)	0.94
Socio-economic status					
Upper class	4(8.2)	45(91.8)	1	1	
Middle class	48(21.1)	180(78.9)	2.53(0.86-7.44)	0.29(0.10-0.89)	0.03
Lower class	41(18.4)	182(81.6)	0.84(0.53-1.34)	0.32(0.10-0.98)	0.04
Sibling					
No	12(16)	63(84)	1(0.49-2.02)	0.97(0.47-2.03)	0.95
1	41(23.4)	134(76.6)	0.623(0.38-1.01)	0.53(0.31-0.89)	0.01
≥2	40(16)	210(84)	1	1	

*Non-Nuclear family includes Joint family and Three generation family

Table 4: Environmental factors and their association with type of unintentional injuries among study participants

Environmental factors	Injury category Frequency		Odds Ratio (95% CI)	p value
	Yes (%)	No (%)		
Road traffic injuries				
Protective gears by parents/driver/children				
Yes	4(1.7)	230(98.2)	0.423(0.093-1.935)	0.267
No	3(4)	72(96)	1	
Usage of mobile while driving				
Yes	1(1.26)	78(98.7)	0.468(0.055-3.948)	0.485
No	6(2.66)	219(97.33)	1	
Drunk drive by parent/driver				
Yes	0	34(100)	-	-
No	7(2.4)	279(97.6)	1	
Child unattended while walking on road				
Yes	3(5.4)	53(94.6)	3.311(0.804-13.640)	0.097
No	6(1.7)	351(98.3)	1	
Burn				
Storage of flammable substance at home				
Yes	9(6.4)	132(93.6)	4.705(1.548-14.296)	0.006
No	5(1.4)	345(98.6)	1	
No separation of cooking area from living area				
Yes	9(8.4)	98(91.6)	7.016(2.300-21.408)	<0.001
No	5(1.3)	382(98.7)	1	
Stove within reach of child				
Yes	12(8.1)	137(91.9)	29.168(3.756-226.499)	0.001
No	1(0.3)	333(99.7)	1	
Open fire/fire place within reach of child				
Yes	2(8.3)	22(91.7)	4.515(0.920-22.160)	0.063
No	9(2)	447(98)	1	
Fall				
Unprotected roof/balcony/stair case				
Yes	19(17.6)	89(82.4)	2.002(1.099-3.649)	0.023
No	37(9.6)	347(90.4)	1	
Unsafe equipment/deep ditches in playground				
Yes	23(32.4)	48(67.6)	5.561(3.018-10.247)	0.001
No	33(7.9)	383(92.1)	1	
Sharp injury				
Sharp objects within child's reach				
Yes	6(7.8)	71(92.21)	5.732(1.798-18.274)	0.003
No	6(1.5)	407(98.5)	1	

Majority of children (83.9%) with childhood injuries had parental/caregiver's supervision at home. Similar finding was reported in studies conducted in Manipal and Darjeeling.^{5,6} Though parents/caregivers' supervision is present for majority of injured children, it could be possible that parents are not aware of potential injuries and its prevention methods.

Epidemiological factors associated with injuries:

Children belonging to middle and low class of socioeconomic status and those children with one sibling had lesser possibility of getting injured. However according to some studies children belonging to low socioeconomic class have more chance of getting injured than upper class.¹⁹⁻²¹ While another study found to have no association.²² Socio-economic status might influence the occurrence of injury, but it might also depend on how hazardous is child's immediate environment, whether there is adequate supervision by parents/caregiver, how risky is the child's behavior.

With regard to presence of one sibling, a study reported that injury was less common with children with one sibling.⁶ This was contrast to a study conducted in Manipal, where injury was more common among children with one sibling.⁵ And few other studies reported as the presence of more than 3 siblings were found to have more injuries.^{20,21} Presence of sibling might have outcome on both the sides that is occurrence of injury or not. But it can be influenced by the factors such as how the elder sibling, or in that case how children are being taught on hazards of injuries, its prevention etc. Additionally small family size with better attention by parents could be protective factors.

It was found that majority of children/parents/ driver, followed usage of protective gears while driving. Studies has shown that usage of protective gears have reduced the occurrence of road traffic injuries.^{23,24}

Almost one third of the children had risk factors for burn such as storage of flammable substance at home, No separation of cooking area from living area, Stove within the reach of child at their immediate environment. These Environmental risk factors were found to be associated with Burns. A study reported that risk factors for burns were, access to active fire (19.3%), access to fuel containers (16.25%) unsafe system for warming water (86%).¹⁷ Burns/scalds was associated with unsafe kitchen and access to fuel.¹⁷ Risk factors for sharp injury were present in 15.7% of the participants. Sharp objects within child's reach were found to be associated with Sharp injury A study reported that access to Sharps was reported in 29.3% of study participants and was associated with Sharps injuries.¹⁷

In the present study risk factors for fall at home, such as unsafe balcony/ staircase/ roof and risk factors for fall at play ground such as unsafe equipment, deep ditches at playground were present, in a range

of 14.6-22% of the participants. A study reported the risk factors for fall at home which were seen in majority of participants were unsafe staircase, unsafe balcony.¹⁷ Environmental risk factors such as flooring, roofing, safety environment, etc. determines occurrence of fall.²⁵ The above said environmental risk factors were significantly associated with fall. However, a study reported that there was no significant association between unprotected stair cases with fall.¹⁷ Risk factors present in the environment of the child both at home and outside have its effect on occurrence of injury. Fall is an important and most common form of unintentional injury during childhood.

STRENGTHS AND LIMITATIONS

Strengths: Questionnaire used was recommended by World health organization, which was later modified based on local needs. **Limitation:** This was a cross sectional study design, thus association observed may not infer causality. This study includes the self-reporting design, which may lead to recall bias.

CONCLUSION

The period prevalence of unintentional injury in the present study was 18.6%. Fall was a most common cause of injury. Children were found to be at risk of road traffic injuries, burns, sharp injuries. Epidemiological factors included the environmental risk factors (for fall, sharp injuries and burns), Socio-economic status and small family size norms. Injury prevention, risk reduction should be part of school curriculum and school health programme. Parents should be sensitized about the common type of injury, risk factors and its prevention.

ACKNOWLEDGEMENT

We would like to acknowledge Dr. Poonam R Naik, Professor; Dr. Akshay KM, Professor and HOD; Ms. Jyothika KS, JRF; Faculty and Staff of the Department of Community Medicine, Yenepoya Medical College for their scholarly suggestions and all-round encouragement in conduct of the study.

REFERENCES

1. Peden M, Oyegbite K, Smith O J, Hyder AA, Branche C, Rahman AKM F. World Report on Child Injury Prevention. World Health Organisation; 2008
2. World Health Organization. Profile of child injuries: selected member states in the Asia-Pacific region. WHO Regional Office for South-East Asia; 2010.
3. 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 Journal of Community Medicine: Official

- Publication of Indian Association of Preventive & Social Medicine. 2022 Apr;47(2):187.
4. Sharma SL, Reddy N S, Ramanujam K, Jennifer MS, Gunasekaran A, Rose A, John SM, Bose A, Mohan VR. Unintentional injuries among children aged 1-5 years: understanding the burden, risk factors and severity in urban slums of southern India. *Injury epidemiology*. 2018 Dec;5(1):1-0.
 5. Shriyan P, Prabhu V, Aithal KS, Yadav UN, Orgochukwu MJ. Profile of unintentional injury among under-five children in coastal Karnataka, India: a cross-sectional study 2014. *International Journal of Medical Science and Public Health*. 2014; 3(11):1317-1319
 6. Ray K, Bhattacharjee S, Akbar F, Biswas R, Banerjee R, Chakborty M. Physical injury: A profile among the municipal primary school children of Siliguri, Darjeeling District. *Indian J Public Health* 2012;56(1):49-52
 7. Alamgir M, Mahboob S, Ahmed K S, Islam SM, Gazi S, Ahmed A. Pattern of Injuries among Children of Urban Slum Dwellers in Dhaka City: J. Dhaka National Med. Coll. Hos. 2012; 18(01): 24-28
 8. Open source epidemiological statistics for public health. Sample Size for Frequency in a Population. <https://www.openepi.com/SampleSize/SSPropor.htm>. Accessed on 10 Jan 2024
 9. Rahman A, Rahman AKMF, Shafinaz S, Linnan M. Bangladesh Health and Injury Survey Report on Children. Government of the People's Republic of Bangladesh : 2005
 10. Chowdhury SM, Rahman A, Mashreky SR, Giashuddin SM, Svanström L, Hörte LG, Rahman F. The horizon of unintentional injuries among children in low-income setting: an overview from Bangladesh health and injury survey. *Journal of environmental and public health*. 2009
 11. India. Department of Health and Family Welfare. National family health Survey [document on internet]. <http://rchiips.org/nfhs/>. Accessed on 22 Feb 2017.
 12. World health organisation. Training for the health sector: unintentional childhood injuries. *Children's health and environment*:2010
 13. Simon RM. Using the Haddon matrix to identify strategies to prevent playground injuries. Institute of Public Health of Slovenia. https://nanopdf.com/download/using-the-haddon-matrix-for-preventing-the-injuries_pdf. Accessed 26 Jan 2022.
 14. Ahmed A, Arif A, Patti J, Tyrone F, Syed M. The Epidemiology of Unintentional Non-fatal Injuries Among Children in the South Plains/Panhandle Region of Texas. *Texas J Rural Health*. 2003;21:2.
 15. Mahalakshmy T, Dongre AR, Kalaiselvan G. Epidemiology of childhood injuries in rural Puducherry, South India. *The Indian Journal of Pediatrics*. 2011 Jul;78(7):821-5
 16. Parmeswaran GG, Kalaivani M, Gupta SK, Goswami AK, Nongkynrih B. Unintentional childhood injuries in urban delhi: A community-based study. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2017 Jan;42(1):8.
 17. Bhuvanawari N, Prasuna JG, Goel MK, Rasania SK. An epidemiological study on home injuries among children of 0-14 years in South Delhi. *Indian Journal of Public Health*. 2018 Jan 1;62(1):4
 18. Gong H, Lu G, Ma J, Zheng J, Hu F, Liu J, Song J, Hu S, Sun L, Chen Y, Xie L. Causes and characteristics of children unintentional injuries in emergency department and its implications for prevention. *Frontiers in public health*. 2021;9.
 19. Hippisley-Cox J, Groom L, Kendrick D, Coupland C, Webber E, Savelyich B. Cross sectional survey of socioeconomic variations in severity and mechanism of childhood injuries in Trent 1992-7. *BMJ*. 2002 May;324(7346):1-6
 20. Laursen B, Nielsen JW. Influence of sociodemographic factors on the risk of unintentional childhood home injuries. *European Journal of public health*. 2008 May 31;18(4):366-70.
 21. Otters H, Schellevis FG, Damen J, van der Wouden JC, van Suijlekom-Smit LW, Koes BW. Epidemiology of unintentional injuries in childhood: a population based survey in general practice. *Br J Gen Pract*. 2005 Aug 1;55(517):630-3.
 22. Sato N, Hagiwara Y, Ishikawa J, Akazawa K. Association of socioeconomic factors and the risk for unintentional injuries among children in Japan: a cross-sectional study. *BMJ open*. 2018 Aug 1;8(8):e021621
 23. McAdams RJ, Swidarski K, Clark RM, Roberts KJ, Yang J, McKenzie LB. Bicycle-related injuries among children treated in US emergency departments, 2006-2015. *Accident Analysis & Prevention*. 2018 Sep 30;118:11-7.
 24. Soori H, Royanian M, Zali AR, Movahedinejad A. Road traffic injuries in Iran: the role of interventions implemented by traffic police. *Traffic injury prevention*. 2009 Jul 14;10(4):375-8
 25. Gururaj G. Injuries in India: A national perspective. *Background Papers: Burden of Disease in India Equitable Development-Healthy Future*. New Delhi: National Commission on Macroeconomics and Health, Ministry of Health & Family Welfare, Government of India. 2005 Sep:325-47