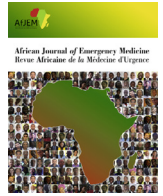




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ORIGINAL ARTICLE

Factors associated with unintentional injury among the paediatric age population in the hospitals of Amhara National Regional State, Ethiopia

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ABSTRACT

Background: Childhood unintentional injuries cause nearly 875,000 deaths each year. The aim of this study was to assess the prevalence and factors associated with unintentional injury of children presenting to the hospitals of Amhara Regional State, Ethiopia.**Methods:** In a hospital-based, cross-sectional study undertaken in one month, from April 1 to 30th 2016, 893 children less than 18 years of age were included. Data were collected using an interviewer-administered questionnaire. Training was given to all data collectors and supervisors. Data was entered into EPI info version 7 and then exported to SPSS version 20, for further analysis.**Results:** Unintentional injury caused 62% (554) of all injuries in attending children. Several factors affected the likelihood of injuries, namely the age of the child, age of the parents or guardians, sex of the child, and whether the child lived with the parents. Modifiable factors were the child's behaviour, awareness of danger, the child's level of educational, if the child's parent had received adequate injury counselling, and whether a child was left in the care of another child. The source of light in the house, and house floor material were also significant factors at $p < 0.05$.**Conclusion:** The prevalence of unintentional injury was high. Many of the factors associated with injuries are modifiable and safety issues for children need urgent attention.© 2017 Publishing services provided by Elsevier B.V. on behalf of African Federation for Emergency Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

African relevance

- In this study, unintentional injury caused 62% of all injuries in attending children.
- Several factors affected the likelihood of injuries, namely the age of the child and age of the parents.
- Modifiable factors were the child's behaviour, awareness of danger, and the child's level of education.

Background

Unintentional childhood injuries include road traffic injuries, burns, drowning, poisonings and falls. They are a growing problem in all parts of the world. Each year, around 875,000 children are killed on our planet [1]. In the United States, the fatality rate from

unintentional injury in children aged 14 years and under has declined by 45% since 1987. Despite this decline, it remains the leading cause of death among American children. In 2005, 5162 children <14 years of age died from unintentional injuries, and in the same year, there were 6,253,661 emergency room visits for unintentional injuries in this age group [2].

Of all the unintentional injury-related deaths that occur globally, more than 95% occur in low- and middle-income countries with physical, psychological, and economic consequences for those communities [1]. Despite recent estimates showing that the rate of unintentional injuries for children in sub-Saharan Africa reached 53.1 per 100,000 population (the highest in the world), the problem has received little attention because of the overwhelming problems of malnutrition and infectious diseases [3]. In sub-Saharan settings unintentional injuries rank third behind diarrhoea and malaria as causes of childhood death; with the most common form of unintentional injury caused by falls, followed by road traffic injuries, assaults, burns and poisoning [4].

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E-mail address: jeryfiker21@gmail.com (B.T. Tiruneh).<https://doi.org/10.1016/j.afjem.2017.08.008>2211–419X/© 2017 Publishing services provided by Elsevier B.V. on behalf of African Federation for Emergency Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Trauma in the paediatric population represents a major burden of disease in South Africa where it is now referred to as 'the neglected childhood killer disease'. Also injuries are often mismanaged and preventive strategies are scarce [5]. In Addis Ababa, Ethiopia, hospital-based data established that unintentional injury made up 77% of paediatric attendees [6]. In many countries, political and organizational structures with the required resources have not been allocated to injury prevention and management. Therefore evidence is required to raise public awareness of the problem [7]. With this in mind, this study was undertaken to identify the prevalence and factors associated with unintentional injury in the paediatric population attending the hospitals of Amhara regional state, Ethiopia.

Methods

An institution-based, prospective cross-sectional study was conducted in the hospitals of Amhara National Regional State, Ethiopia from April 1 to April 30, 2016. All injured children less than 18 years of age attending the emergency centres of Amhara National Regional State Hospitals were prospectively identified and the sample patients who attended because of injury were interviewed. Injured cases that needed immediate transfer to other hospitals as well as children that had previously attended with the same injury were excluded.

A single population proportion formula was used to determine the sample size and the following assumptions made: confidence level 95% and absolute precision or margin of error to be 3% and prevalence 70.5% [8]. Considering a 10% non-response rate a sample size of at least 963 children were settled on. Systematic, random sampling techniques were used to select participants to interview. Data were collected using an interviewer-administered questionnaire which was prepared by reviewing previous research done on the same topic. To maintain data quality, training was given to data collectors and supervisors. In addition, the questionnaire was pre-tested on 94 injured cases in Debark Hospital (Debark, Ethiopia) to identify potential problems. Data collection was supervised by the study team to check for completeness and consistency.

Data were entered and cleaned using EPI-INFO and analysed using IBM SPSS Statistics version 20. Frequency distributions and percentages were calculated to describe socio-demographic characteristics. Simple and multiple logistic regression analyses were used to explore associations between unintentional injury and dependent variables of the study. Odds ratios and 95% confidence intervals were used as measures of association. In an effort to identify characteristics independently associated with unintentional injury, an exploratory multivariable logistic model was fitted with the characteristics that were individually associated with unintentional injury at 0.2 significance level. Predictors with $p < 0.05$ in the model were accepted as statistically significant.

Ethical clearance was obtained from the Institutional Review Board of the University of Gondar, prior to the commencement of the data collection and participants of the study were informed about the purpose of the study and written consent was obtained before conducting the data collection.

Result

Socio-demographic characteristics of respondents: A total of 963 cases were invited to take part in this study of whom 893 (92.7%) were willing to do so. Of these, 60.5% ($n = 540$) were male, the majority 51.4% ($n = 459$) were in school, 77.8% ($n = 695$) were above the age of 5 years and 44.5% ($n = 400$) were accompanied to the hospital by their mothers. More than 44% ($n = 395$) of

children lived with their mother while 17.5% ($n = 157$) of them were living with guardians. Most of the parents or guardians were married ($n = 708$, 79% and 716, 80% respectively) and 61% ($n = 543$) of the children's families were in a middle-income bracket; 48.6% ($n = 434$) of the parents/guardian were literate. In addition, 62% ($n = 412$) of mothers and 46% ($n = 551$) of fathers of children were housewives and farmers respectively. This data is described in detail in Table 1.

Prevalence of unintentional injury: The prevalence of unintentional injury among all the injured children attending the emergency department was found to be 62% ($n = 554$). Burns and traffic injuries were the commonest injury types while poisoning and drowning, or near drowning, were rare.

Falls caused 247 (28%) of the injuries. The majority (61.3%, $n = 547$) of these children had fallen on level ground (Fig. 1).

The number of road traffic injuries was 173 (19.5%). Reviewing the activity of the children at the time of the road traffic injuries revealed that 53% ($n = 92$) of the injuries occurred while going to or from school, over 30% ($n = 54$) of the children were injured while playing with their peers and the remaining 16% ($n = 28$) were

Table 1

Socio-demographic characteristics of children with unintentional injuries and their carers presenting to Amhara National, Regional State Referral Hospitals Ethiopia, April 1 to 30th, 2016 ($n = 893$).

Variables		Frequency (%)
Age of parents/guardians in years	18–24 years	47(5)
	25–34 years	255(29)
	35–49 years	451(50.5)
	50–64 years	140(16)
Sex of children	Male	540(60.5)
	Female	353(39.5)
Age of children	<=5 years	198(22)
	>5 years	695(78)
Marital status of the mother	Married	708(79)
	Widowed	76(8.5)
	Single	57(6)
	Separated	29(3)
	Divorced	23(3)
Marital status of the father	Married	716(80)
	Single	60(7)
	Widow	49(5.5)
	Separated	43(5)
	Divorced	25(3)
Educational status of the parents/guardians	No education	434(49)
	Primary education	194(22)
	Second education	163(18)
	College education	102(11)
Child educational statuses	In school	459(51)
	Preschool	434(49)
Occupation of the mother	Employ	135(15)
	Petty trader	174(19.5)
	House wife	551(62)
	Day laborer	33(4)
Occupation of the father	Farmer	412(46)
	Employ	262(29)
	Petty trader	93(10)
	Day laborer	126(14)
Living with	Father	340(38)
	Mother	397(44.5)
	Guardian	156(17.5)
Income description of the parents/guardians	Middle	543(61)
	Low	292(34)
	Wealthy	58(6.5)

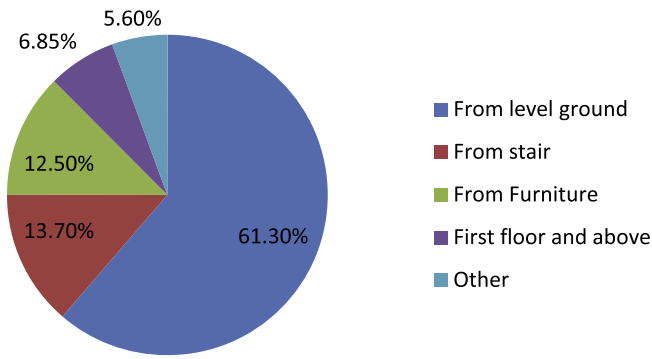


Fig. 1. Injuries due to a falling children attending the hospitals of Amhara Regional State, Ethiopia (n = 247).

injured as pedestrians. Furthermore, Tri-motorcycles were involved in a significant number (74%, n = 129) of children’s injuries, while other forms of cars caused 26% (n = 45) of the road traffic injuries cases.

The third most common cause of childhood unintentional injuries was burns which caused 10% (n = 89) of accidents. Hot liquids and open fires were responsible for 58% (n = 52) and 36% (n = 32) of the burns respectively while hot food and other items such as steam caused the remaining burns. In 59% (n = 53) the burned child was with guardian at the time of the accident, in 36% (n = 32) it occurred in the presence of another child and nearly 5% (n = 4) occurred when the child was alone.

Poisoning 3% (n = 28) and drowning or near drowning 2% (n = 17) were the least common causes of unintentional injury reported.

The places where accidents occurred were primarily in the home 40% (n = 221), followed by play areas 29% (n = 160), roads 21% (n = 134) and schools 11% (n = 60). Among the accidents that took place in the home, 19% (n = 42) happened in the garden or yard. Only 12% (n = 26) happened inside the home of which 7.8% were in the kitchen and 1.2% in other rooms of the house.

Factors associated with unintentional injury: Multivariate analysis showed that age of the child (p = 0.001), age of the parents or guardians (p = 0.003), sex of the child (p = 0.004), living with a parent or guardian (p = 0.004), the occupation of the father (p = 0.001), and of the mother (p = 0.001), the child’s behaviour (p = 0.001), and level of awareness of danger (p = 0.001), whether a child was left with another child (p = 0.004), the source of light in the house (p = 0.004), the house floor material (p = 0.001), the child’s educational level (p = 0.001) and getting adequate counselling (p = 0.001), were all factors that were statistically significant in unintentional injury (Table 2).

Discussion

In this study, undertaken over a one-month period in Amhara Regional State Hospitals, the prevalence of unintentional injury was fairly high. Overall prevalence of unintentional injuries was 62%, much higher than the prevalence cited regarding unintended injuries in the United States (44%) [12]. This is most likely due to

Table 2

Simple and multiple logistic regression analysis of factors associated with unintentional injury among the paediatric age population in the Referral Hospitals of Amhara Regional State, Ethiopia. 2015 (n = 893). UI, unintentional injury; COR, crude odds ratio; AOR, adjusted odds ratio; Gov, government.

Variable	UI		Odds Ratio with 95%CI		P value	
	Yes	No	COR	AOR		
Age	<=5	161	37	3.40 (2.31–5.01)	0.377 (0.24–0.60)	0.001
	>5	390	305	1	1	
Age of the parents guardians	18–24	13	34	1	1	0.003
	25–34	169	86	5.13 (0.10–0.39)	0.290 (0.13–0.66)	
	35–49	280	171	4.28 (0.12–0.46)	0.211 (0.09–0.48)	
	>50	89	51	4.56 (0.11–0.45)	0.158 (0.07–0.38)	
Sex of the child	Male	306	108	2.70 (1.31–2.30)	1.627 (1.17–2.27)	0.004
	Female	245	234	1	1	
Living with	Father	183	157	1	1	0.004
	Mother	286	111	2.21 (0.33–0.61)	0.549 (0.36–0.83)	
	Guardian	82	74	0.95 (0.72–1.54)	0.591 (0.36–0.98)	
Occupation of the father	Farmer	220	192	0.56 (0.35–0.67)	3.251 (1.90–5.57)	0.001
	Gov. employed	184	78	1.15 (0.40–0.79)	1.616 (0.94–2.77)	
	Day labourer	147	72	1	1	
Occupation of the mother	Gov. employed	96	39	1.53 (1.22–3.07)	1.079 (0.58–2.00)	0.809
	Petty trader	116	91	0.79 (1.02–2.32)	3.415 (2.05–5.70)	
	House wife	339	212	1	1	
Behaviour of the child	More active	474	245	2.43 (1.74–3.41)	2.987 (2.01–4.44)	0.001
	More calm	77	97	1	1	
Level of awareness about unintentional injury of parents or guardians	Low	275	127	0.99 (0.45–0.78)	3.230 (2.14–4.87)	0.001
	High	276	215	1	1	
Left a child with other child	No	225	194	1	1	0.014
	Yes	326	148	1.89 (0.40–0.69)	1.541 (1.09–2.17)	
Source of light in the house	Electricity	321	154	1.70 (0.45–0.77)	0.459 (0.27–0.78)	0.004
	Non electrical	230	188	1	1	
House floor material	Soil	403	296	0.42 (0.29–0.61)	2.542 (1.47–4.39)	0.001
	Cemented	148	46	1	1	
Child educational level	No education	268	166	1	1	0.008
	In school	283	176	0.99 (0.76–1.31)	0.569 (0.38–0.86)	
Getting inadequate counselling	No	320	183	1	1	0.001
	Yes	231	159	0.83 (0.63–1.09)	0.373 (0.25–0.56)	

the huge socioeconomic differences between the two settings – seemingly parents in the United States are likely more aware of childhood injury risks compared to parents in Ethiopia. In addition, United States authorities have described injury prevention strategies for children and young people, evaluating its effectiveness regularly. Sadly, these are still lacking in Ethiopia.

In our study, falls, road traffic accidents and burns were the leading causes of unintentional injury, whilst poisoning and drowning (or near drowning) were rarely reported. These findings are consistent with previous studies conducted in a low- and middle-income settings that revealed that of all injuries observed, falls, road traffic injuries, burns were the most common forms of unintentional injury; poisoning and drowning (or near drowning) were also less common [9–11]. Compared to similar work done in East Africa, our findings differ slightly from a study conducted at Bugando Medical Centre in North-western Tanzania which documented road traffic accident as the most common cause of unintentional injury [13]. This could be due to subtle environmental and geographical differences between the settings of the two study sites. Importantly, both studies reiterated the high prevalence of unintended injury.

Adequate supervision and experience appeared to be major factors, highlighted in many of the variables tested. Our findings compared well with studies done in other low- and middle-income settings such as India and Sri Lanka [14,15]. Injuries were more commonly associated with younger parents, most likely due to less experience in child-related risks than older parents. Sutcliffe, et al. independently confirmed that increasing maternal age is associated with improved health and development of their children [16]. Similarly, children whose caregivers had a low level of accident awareness had more injuries than children whose caregivers were more aware of risks. Primary paternal responsibility also showed a higher association with unintentional injury than children under maternal responsibility. This is an interesting finding as it suggests that paternal attention to risks, perhaps even parental engagement, is inferior to that of the mother. Including fathers in child safety drives can have a desirable impact on injury reduction. This variable certainly needs more exploring. Not surprisingly, unintentional injuries were also associated with children being left unattended, or under the supervision of another child. The risk of an unintentional injury to a working mother's child was three times more likely than children whose mothers were housewives; likewise, the risk of an unintentional injury to a farmer's child was three times more likely than a child of a self-employed father. Children who were left with another child were nearly twice as likely to sustain unintentional injuries as those who were supervised by their parents. As is the case with young mothers, children are simply not good caregivers.

The fact that accidents occurred less commonly in houses with electricity than in those without it likely reflects wealthier households, which would likely be associated with a higher level of education, and with it a better understanding of potential risks. No doubt the absence of open fires and paraffin lamps due to the presence of electricity also play a substantial role in reducing risk. The presence of a mud floor in the house increased unintentional injuries of children who lived in the house nearly three times compared to children living in houses with a cement floor. Notwithstanding that when a mud floor is wet it becomes slippery predisposing to accidents, less formal building allowances are more likely a marker of a bigger socio-economic problem. Poor housing will more likely be associated with the situations that result in lower child supervision discussed earlier.

More active children were nearly three times more likely to sustain unintended accidents than calmer children. This may be because active children are less inhibited by danger, predisposing them to injury. This finding is similar to that of the Sri Lankan

study [15]. Interestingly, children under five showed a lower risk of unintentional injury. We suspect that children under five were included in the safer cohort as they tend to have more supervision from family members compared to older children. Children in school were less likely to sustain unintentional injury. This seems common sense, as schools are more likely to provide continuous supervision and on a micro-level showcase the benefits of active injury risk management.

This study had the following limitations; the data was collected for a short period of times so the result may be affected by some seasonal occurrences of injury like burn and others, the study design was a cross-sectional so that it does not show a cause-and-effect relationship.

Conclusions

These findings suggest that advocating for responsible parenting, improving living standards (electricity, decent structure) and education (of both parents, as well as children in education) can have a significant effect on reducing unintentional injury. These findings are complex and although separated out for the study are likely intertwined. The prevalence of unintentional injury is high and safety issues for local children need urgent attention. Interventions should be comprehensive and maximise healthy growth of children with substantial supervision for all preschool children. Homes should be safe, with adequate lighting and a cement floor. Care providers, particularly young mothers, should get adequate counselling during the postnatal period in how to prevent unintentional injury. Employed mothers and farmers should confirm the safety of their children before leaving the house for work especially when leaving a child with other children. Moreover, to increase the awareness of the public about childhood accidents, health education should be given particularly to parents and caregivers and to the general public via the mass media.

Conflict of interests

The study was funded by a grant from the University of Gondar, Gondar, Ethiopia. The authors declare no further conflicts of interest.

Authors' contributions

BT devised the study, wrote the proposal for the ethics committee, and supervised the data collection, analysis and interpretation of data and drafting of the manuscript. BA participated in data analysis and interpretation of the finding. BB participated in a critical revision of the manuscript for important intellectual content. DZ participated in critical review of the manuscript. YS participated in data analysis and interpretation of the finding. All authors contributed to the final draft.

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