

Serious Injury and its Correlates among School Going Adolescents in Nepal: A cross-sectional study

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ABSTRACT

Background: Injury-related mortality and morbidity, a leading cause of death and disability worldwide, is common among adolescents. However, there is insufficient information on the status and factors responsible for injury among adolescents in Nepal. Hence, the paper estimates the injury prevalence and identify the factors associated with it among adolescent Nepalese students.

Methods: This study used national representative cross-sectional data of the Global School-based Student Health Survey 2015. Complex sample analysis was performed after adjusting the selection probability of each sample participants to identify the correlates of injury among 6529 students of 68 schools in Nepal.

Results: Out of 6529 study participants, 62.79% reported severe injury. The most common injury type was cut or stab wound (67.61%) followed by broken bone/dislocated joints (11.03%) and the most common cause of injury was fall (56.40%). Serious injury was significantly associated with a physical attack (AOR=1.54, CI=1.17-2.04), being involved in a physical fight (AOR=1.62, CI=1.2-2.2), being bullied (AOR=2.73, CI=2.25-3.31), feeling unsafe at school (AOR=1.53, CI=1.23-1.91), helmet use(never/rarely/sometimes) while driving a motorbike (AOR=1.69, CI=1.21-2.38) and drink and drive(AOR=2.28, CI=1.05-4.96).

Conclusions: This study reported the injury as a significant public health concern in Nepal associated with several factors like physical attack, being involved in a physical fight, being bullied, feeling unsafe at school, helmet use while driving motorbike and drink and drive. The high prevalence of injury in Nepal suggests the application of appropriate prevention strategies.

Keywords: Adolescents; injury; Nepal

INTRODUCTION

In Nepal, a third of the total deaths (29.75%) among adolescents of age 10-14 years, while about a half of all deaths (47.39%) among 15-19 years are due to injuries. Injuries are indeed the major contributor to the deaths and disease burden among adolescents.¹⁻⁴ Similarly, 11.53% of Disability Adjusted Life Years (DALY) loss among 10-14 year olds and 23.55% of DALY loss among 15-19 year age group is attributable to injuries. Unintentional injuries alone attributed 14.49% of total deaths among 10-14 years and 11.31% of total deaths among 15-19 years adolescents in 2017 in Nepal. It is an increase of 36.95% among adolescents of 10-14 years (10.58% in 1990) and 19.24% among adolescents of 15-

19 years (9.49% in 1990) from 1990.⁵ Apart from deaths, the injuries also lead to disabilities in adolescents that affects adolescents throughout the life leading to financial and economic burden to family.⁶

The best way to deal with injuries is to have an effective strategy that prevents them in the first place.⁷ Designing a preventive measure demands a clear understanding of the underlying causes. However, it is a little understood entity and also tends to differ across countries.⁸ In this context, this analysis from a nationally representative data has attempted to identify the determinants of serious injuries among adolescents in Nepal.

METHODS

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This paper is a further analysis of the Global School-based Student Health Survey (GSHS) conducted in 2015 using two-stage cluster sampling. The study population comprised of school-going adolescents studying from grade 7 to 11 at the time of the study. First, 74 schools representing all three ecological belts (mountain, hill and terai) were selected based on probability proportional to school enrolment. Intact classrooms were then randomly selected from each of the selected school. All the students in the selected intact classroom were approached for participation in the study. Out of 74 schools selected for the study, 68 schools (92%) took part in the study. A total of 6529 out of 8670 (75%) students from these 68 schools participated in the study. This analysis is performed among 4111 participants who had a complete response in injury and related variables considered in this study.

Data collection involves self-administration of standardised GSHS questionnaire that covered

demographic characteristics, dietary behaviours, violence and unintentional injury, hygiene, tobacco use, alcohol and drug use, mental health, physical activity, and sexual behaviours. Details of the methodology have been mentioned elsewhere.⁹

Participants were asked about the number of times they were seriously injured in the past 12 months. Participants were considered as injured if they had at least one incidence of serious injury in the past 12 months preceding the survey. Definitions of relevant variables used in this study are presented in table 1.

All analyses were performed in Stata version 15. Descriptive analysis and inferential analysis (chi-square test and multivariable analysis) were performed using complex sample analysis adjusting selection probability at each stage of the sampling procedure. All the estimated presented in the results section are weighted within of 95% confidence interval.

Table 1. Definition of variables used in the study.

Variable	Survey question	Coding
Age	How old are you?	1=12 years or younger, 2=13 years, 3=14 years, 4=15 years, 5=16 years or older
Gender	What is your sex?	1=Male, 2=female
Grade	In what grade are you?	1=grade 7 2=grade 8 3=grade 9 4=10 and above
Serious injury	During the past 12 months, how many times were you seriously injured?	0= 0 times 1= One or more times
Physically attacked	During the past 12 months, how many times were you physically attacked?	0=0 times, 1=1 or more times
Physical fighting	During the past 12 months, how many times were you in a physical fight?	0=0 times, 1=1 or more times
Bullied	During the past 30 days, on how many days were you bullied?	0=0 times, 1=1 or more times
Current alcohol use	During the past 30 days, on how many days did you have at least one drink containing alcohol?	0=0 times, 1=1 or more times
Felt unsafe at school	During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?	0=0 days 1= 2 or more days
Helmet use	During the past 30 days, how often did you use a helmet when driving a motor bike?	1= Do not drive motorbike 2= Never/rarely/ sometimes 3=Most of times/always
Drink driving	During the past 30 days, how many times did you drive a motor bike when you had been drinking alcohol?	0=No (did not drive/did not use alcohol) 1=Yes (One or more times)
Types of injury	During the past 12 months, what was the most serious injury that happened to you?	1=Broken bone/dislocated joints 2=Cut/stab wound 3=Concussion/head injury 4=Burn 5=Gunshot/poisoned 6=Others

Causes of injury	During the past 12 months, what was the major cause of the most serious injury that happened to you?	1=Motor vehicle accident 2=falls 3=Something fell on me/hit me 4=was attacked 5=others (including fire/breathed something bad)
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RESULTS

The study finds that close to two-thirds (62.79%) of all the participants had sustained a serious injury in the past 12 months. The prevalence of serious injury was 64.87% among the 12-year olds, which is the highest for an age category. . Similarly, the prevalence of serious injury among 13-year, 14-year, 15-year and 16-year and above age category was 57.84%, 64.80%, 61.60%, and 60.76% respectively.

Around 63.86% of males and 59.71% of female had sustained serious injury. The prevalence in participants from grade 7, grade 8, grade 9, and grade 10 and above was 64.20%, 67.10%, 59.34% and 55.00% respectively. The prevalence was higher (73.61%) among those who were physically attacked and those who were involved in a physical fight (74.67%) in previous one year. Similarly, the prevalence of serious injury was 76.39% among those who were bullied in the past 30 days. The study revealed that 78.61% of current drinkers had sustained serious injuries , as opposed to 60.96% among the non-drinker counterpart . Students who testified being unsafe at school during the previous 30 days presented a higher prevalence of serious injury (72.3%). Prevalence of serious injury was reported more among students who were riding a bike without using a helmet or wearing it rarely/sometime (77.6%) compared to those who always wore a helmet while riding a bike (63.53%). Likewise, in comparison to students who did not indicate participating in drunk driving (59.74%), a more significant percentage of students who revealed drunk driving had serious injury (88.96%) (Table 2).

Table 2. Prevalence of serious injury among participants.

Variables	Categories	Number	Percentage (95% CI)
Age	12 years and under	361	64.87 (51.93-75.94)
	13 years	757	57.84 (52.44-63.05)
	14 years	956	64.8 (59.76-69.54)
	15 years	918	61.6 (54.99-67.8)
	16 years and above	1119	60.76 (55.53-65.74)
Sex	Male	1984	63.86 (58.67-68.74)
	Female	2127	59.71 (53.7-65.45)

Grade	Grade 7	832	64.2 (57.08-70.74)
	Grade 8	1144	67.1 (60.96-72.7)
	Grade 9	1007	59.34 (54.65-63.87)
	Grade 10	1128	55 (47.66-62.14)
Physical attack	No	2377	52.11 (48.07-56.13)
	Yes	1734	73.61 (67.34-79.05)
Physical fight	No	2511	52.87 (47.39-58.27)
	Yes	1600	74.67 (70.68-78.28)
Bullied	No	2219	46.27 (41.52-51.09)
	Yes	1992	76.39 (71.12-80.96)
Current drinking	No	3944	60.96 (56.7-65.05)
	Yes	167	78.61 (65.73-87.56)
Unsafe at school	No	2587	54.92 (50.85-58.93)
	Yes	1524	72.37 (66.72-77.38)
Helmet use	Do not drive	2984	57.4 (53.29-61.42)
	Never/ rarely/ sometimes	712	77.6 (72.15-82.24)
	most of times/ always	415	63.53 (51.2-74.31)
Drunk driving	No	3898	59.74 (55.47-63.87)
	Yes	213	88.96 (80.54-94.01)
Total		4111	61.79 (57.39-66.00)

More than a two-third of the serious injuries resulted from cut, or stab wound (67.61%) followed by broken bone/dislocated joints (11.03%), concussion/head injury (7.05%), burns (3.18%) gunshot/poisoned (0.51%) and others (10.61%). Among the causes of injuries, more than half (56.40%) were due to falls. Likewise, a tenth of the participants (9.48%) reported that they were injured after something fell or hit them. Among other causes of serious injury was motor vehicle accident (9.12%), attack (1.55%) and others (17.31%) (Table 3).

Table 3. Types and causes of injury.

Types and causes of most serious injury	Percentage (95%CI)
Type of most serious injury	
Broken bone/dislocated joints	11.03 (8.82-13.71)
Cut/stab wound	67.61 (63.6-71.38)
Concussion/head injury	7.05 (4.95-9.96)
Burn	3.18 (2.28-4.43)

Gunshot/poisoned	0.51 (0.19-1.34)
Others	10.61 (8.8-12.75)
Causes of most serious injury	
Motor vehicle accident	9.12 (5.5-14.75)
Falls	62.53 (56.4-68.28)
Something fell on me/hit me	9.48 (7.61-11.75)
Was attacked	1.55 (0.94-2.54)
Other (including fire/breathed something bad)	17.31 (14.55-20.47)

fight(AOR=1.62, CI= 1.2-2.2) than those who did not face a physical attack or were not involved in a physical confrontation. Similarly, adolescents who were bullied had almost threefold higher odds (AOR=2.73, CI=2.25-3.31) of having serious injury than those not bullied. Similarly, adolescents who felt unsafe at school were twice more likely (AOR=1.53, CI=1.23-1.91) to have a serious injury compared to their counterparts who did not feel unsafe while at school. The odds of a serious injury amongst those who do not drive were no different for those who always or most of the times used a helmet (AOR=0.9, CI=0.46-1.75). However, the odds increased by twofold amongst those that never/rarely/sometimes use a helmet (AOR=1.69, CI-1.21-2.38) than those who do not drive. Similarly, those who drive motorbike while being drunk were two times more likely (AOR=2.28, CI=1.05-4.96) to sustain a serious injury than those who did not drink and drive (Table 4).

A multivariable analysis revealed that physical attack, being involved in a physical fight, being bullied, feeling unsafe at school, using a helmet while driving motorbike and driving while being drunk were associated with a serious injury. The odds of a serious injury was almost twofold higher among those facing a physical attack (AOR=1.54, CI=1.17-2.04) or involved in a physical

Table 4. Factors associates with serious injury.

Variables	Bivariate analysis		Multivariable analysis		
	Unadjusted OR (95% CI)	p value	Adjusted OR (95% CI)	p value	
Age	12 years	Ref	Ref		
	13 years	0.74 (0.46-1.21)	0.23	0.8 (0.49-1.29)	0.35
	14 years	1 (0.58-1.71)	0.99	1.09 (0.61-1.96)	0.76
	15 years	0.87 (0.5-1.51)	0.61	1.2 (0.61-2.38)	0.59
	16 years	0.84 (0.48-1.48)	0.53	1.23 (0.61-2.51)	0.56
Sex	Male	Ref	Ref		
	Female	0.84 (0.63-1.11)	0.22	1.02 (0.8-1.32)	0.85
Grade	Grade 7	Ref	Ref		
	Grade 8	1.14 (0.8-1.62)	0.46	1.27 (0.92-1.75)	0.14
	Grade 9	0.81 (0.63-1.06)	0.12	0.84 (0.62-1.14)	0.26
	Grade 10 or above	0.68 (0.48-1.02)	0.06	0.66 (0.44-1.00)	0.05
Physical attack	No	Ref	Ref		
	Yes	2.56 (1.92-3.42)	<0.001	1.54 (1.17-2.04)	<0.001
Physical fight	No	Ref	Ref		
	Yes	2.63 (2.08-3.32)	<0.001	1.62 (1.2-2.2)	<0.001
Bullied	No	Ref	Ref		
	Yes	3.76 (3.1-4.56)	<0.001	2.73 (2.25-3.31)	<0.001
Current drinking	No	Ref	Ref		
	Yes	2.35 (1.32-4.19)	0.01	1.4 (0.78-2.49)	0.25
Felt unsafe at school	No	Ref	Ref		
	Yes	2.15 (1.67-2.77)	<0.001	1.53 (1.23-1.91)	<0.001
Use of helmet	Do not drive motorbike	Ref	Ref		
	Never/rarely/sometimes	2.57 (1.98-3.34)	<0.001	1.69 (1.21-2.38)	<0.001
	Most of times/always	1.29 (0.8-2.08)	0.28	0.9 (0.46-1.75)	0.75
Drink and driving	No	Ref	Ref		
	Yes	5.43 (2.74-10.78)	<0.001	2.28 (1.05-4.96)	0.04

DISCUSSION

The prevalence of serious injury among adolescents was 61.79% in our study. A study which analysed data from GSHS in 47 low-income and middle-income countries (LMICs) had found that close to two in five adolescents had sustained a serious injury in the year preceding the survey.² In another study that included an analysis of 68 LMICs, the overall prevalence of serious injury was 42.9%. Meanwhile, region-wise disaggregation revealed that the prevalence of serious injury was 48.1% in African Region, 39.9% in Regions of America, 39.3% in Eastern Mediterranean Region, 47.4% in South East Asian Region and 47.9% in Western Pacific Region. Among South East Asian countries, the prevalence of serious injury was 72.2% in Timor-Leste, 51.6% in Maldives, 43.2% in Bangladesh, 40.6% in Thailand and 30.1% in Indonesia. The prevalence in Nepal seems to be higher than all of the regional average and most of the South East Asian countries.¹⁰ Also the prevalence of serious injury among adolescents in Nepal is higher than its neighbouring countries; Bangladesh (43.8%) and Bhutan (43.7%).¹¹ These differences across countries could be because of variations in different factors like prevalence of physical fighting, physical attack, bullying, drink and driving and adoption of preventive measures like use of helmets that have been found to be associated with serious injury among adolescents.

Similar to the findings in our study, a study conducted in Oman had revealed that the adolescents who were bullied, were involved in a physical fight and were physically attacked had two times higher odds (each of the three variable) of having serious injuries.¹² In a multi-country analysis of GSHS data, physical fighting and being physically attacked were found to be associated with serious injury in both males and females in Argentina, Bolivia and Uruguay. In the same study, adolescents of both gender who were involved in the physical fight were found to have higher odds of serious injury while being physically attacked was found to be associated with serious injury only among girls in Chile.¹³ In other similar studies in Djibuti and United States, physical fighting was found to be associated with injury.^{14,15}

Similarly, another multi-country study had found that the adolescents who were bullied had slightly higher odds of having a serious injury in countries like Israel, Ireland, United States, Sweden and Portugal.¹⁶ The findings also comply with another study in the United States which had revealed that different types of bullying (physical bullying, physical victimisation, relational bullying and relational victimisation) were found to be

associated with a serious injury.¹⁵ The study in Djibouti indicates that frequency of bullying could influence the association between bullying and sustaining serious injury. In the study, the adolescents who were bullied 3-5 times and 6-9 times in past 30 days had higher odds of having injury where being bullied for ten times or more was found to have a borderline protective effect. In the same study, being bullied for 1-2 times was not found to be associated with having injury.¹⁴

There may be a complex interplay of bullying victimisation, physical fighting, being physically attacked and sustaining severe injury among adolescents. As suggested in the previous study, the association between bullying and serious injury could be because adolescents may have sustained an injury because of the physical form of bullying itself or may have resorted to fighting and sustained injuries as a self-defence to bullying.¹⁶ The study has also indicated that the bully victims are more likely to carry weapons indicating their likely involvement in violent behaviour.¹⁶ Weapon carried was also found to be associated with physical fighting among adolescents.¹⁷ Meanwhile, evidence suggests that health professionals working in violence prevention and providing care to injured adolescent should explore the possibility of multiple problems like bullying victimisation, engagement in physical fighting, victimisation from physical attack, among others.¹⁴

Adolescents who drove motorbike while being drunk were found to have higher odds of having serious injuries which could be because of the higher risk associated with road traffic injuries. However, current drinking or alcohol consumption was not found to be associated with serious injury in our study. Contrary to our findings, previously published studies conducted in different setting have also revealed the association between alcohol and injuries among adolescents.^{8,18,19} Multi-country study that involved analysis of data from Israel, Ireland, United States, Sweden and Portugal had revealed that alcohol consumption increased the odds of having a serious injury.¹⁶ One of the previous studies has also suggested that alcohol consumption could be significantly associated with injuries occurring due to fighting and those occurring in the street.⁸ The quantity of alcohol consumed, and the activities adolescents are involved in after consuming alcohol could make a difference in whether adolescents get seriously injured.

In one of the multi-country study, feeling unsafe in school was found to be associated with serious injury in Ireland and the United States while no association was found in Israel, Sweden and Portugal.¹⁶ Another study

in Brazil had found that adolescents who felt unsafe at school had higher odds of having serious injury compared to their counterparts.¹⁹ The variations across countries could also be related to school environment like physical infrastructures (particularly for injuries from non-human agents like fall, cut, among others) and the policies school has adopted in preventing injuries. Adolescents likely felt unsafe in school with poor infrastructures and those lacking appropriate injury prevention policies.

The study also found that those who never/rarely/sometimes use helmet during driving motorbike had almost twofold higher odds of having serious injuries compared to their counterparts who did not drive a motorbike. Those who used helmet most of the times or always while driving motorbike did not differ significantly from those who did not drive a motorbike. This indicates that use of helmets may prevent injuries particularly related to road traffic injuries. Furthermore, those who did not use helmet may have been engaged in other risk-taking behaviour too, which exposes them to the risk of serious injury.

The risk of an injury is, however, shaped by the social context in which an adolescents grow.²⁰ The strategies aimed at preventing injuries among adolescents should adopt a comprehensive approach that aims to build an environment that minimises exposure to injury causing factors while also trying to address its immediate causes. Besides the factors analysed in the study, some other factors like poor urban setting,²⁰ parental engagement in violence,²¹ peer norms,²² violent and sexual content in cigarette and alcohol advertisement,²³ due in part, explain some of the variations in prevalence figure across various regions of the world. Policy responses to reducing injuries in adolescence should start with addressing risks at home, which includes engaging with parents to eliminate any forms of violence. Likewise, interventions aimed at building positive parent-child relationship enable identification of early signs of bullying. Such confidence-building measures also provide early warning on discomfort or unsafe feeling about any acts in a family environment or while at school. Second, recognising the crucial role of peer relationship in protecting adolescents from harm,²⁰ psychosocial counselling sessions at school can look to foster positive peer pressure, anger management and disincentivise bullying. Likewise, measures to build a positive teacher-student relationship will be crucial to minimise any risk factors that lead to serious injuries. Third, outreach programmes of the law enforcement agencies that highlight the incentives to follow the law on helmet use and drink driving could minimise factors

causing harm. The law enforcement agencies can also look to use adolescents as change agents to encourage the larger society to adopt protective or precautionary measures.

Despite being the nationwide study, there are some limitations. The study involved school-going adolescents and have not considered those out of school. The study involves 12 months recall period, which may have introduced some degree of recall bias in the study. Furthermore, the analysis is based on the GSHS survey, which may have missed some of the critical variable that could be linked to injuries.

CONCLUSIONS

The findings of this study reported a high prevalence of injury among school adolescents in Nepal. Factors like physical attack, being involved in a physical fight, being bullied, feeling unsafe at school, helmet use while driving motorbike and drink and drive were significantly associated with the injury. Since injury is preventable; these variables could be useful for designing effective prevention programs.

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