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Predictors of non-fatal violence or assault among adolescents in rural Bangladesh: cross-sectional study

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ABSTRACT

Objective To determine the predictors of non-fatal violence or assault among adolescents in rural Bangladesh to inform evidence-based interventions.

Design Cross-sectional study.

Setting Household survey and national census in 51 unions of rural Bangladesh.

Participants, methods and main outcome 213 782 adolescents aged 11–19 years who reported violence during a population-based survey in 2013. We used logistic regression to determine the prevalence of factors that predict non-fatal forms of violence or assaults among adolescents. Assault or violence was defined as all injuries inflicted directly by another person or resulting from collateral impact over a 6-month recall period.

Results 457 (0.21%) cases of violence or assault were reported. The prevalence of violence was lower among female adolescents compared with males (PR: 0.60, 95% CI 0.47 to 0.78, p<0.001). Compared with the lowest socioeconomic quintile, being in a higher quintile was associated with lower prevalence of violence, with a 39% decrease in the adjusted prevalence of violence among adolescents in highest compared with lowest socioeconomic index (PR: 0.61, 95% CI 0.44 to 0.84). The adjusted prevalence of violence in Chandpur and Comilla districts was 7.30 times and 7.27 times higher respectively than the prevalence of violence in Sirajganj (PR: 7.30, 95% CI 4.07 to 13.10 and PR: 7.27, 95% CI 3.56 to 14.84, respectively). There was no significant difference in the adjusted prevalence of violence occurring in school compared with home (PR: 1.19, 95% CI 0.85 to 1.69).

Conclusion Male adolescents may be at an increased risk of suffering violence, and socioeconomic factors and place (districts) are strong predictors of adolescent violence among a selected population in rural Bangladesh. These findings are important in guiding interventions to address the burden of violence among adolescents in communities with similar demographics as our study population. Further research is needed to identify the actual burden of violence among adolescents at national level and to establish an effective violence prevention programme across Bangladesh.

INTRODUCTION

Violence is 'the intentional use of physical force or power, threatened or actual, against oneself, or against an individual, group or community that either results in or has a high likelihood of resulting in injury,

What is known about the subject?

► Interpersonal violence is the second most prevalent cause of death in older adolescent males.
► For every recorded death due to violence, many more sustain non-fatal injuries.
► Victims of violence are subject to physical, social and psychological trauma and may further perpetrate violence against others with health and economic burden on communities.

What this study adds?

► Violence is more prevalent among adolescent males and those in the lowest socioeconomic quintile.
► There is an association between place (districts) and violence in rural Bangladesh with adolescents living in Chandpur or Comilla having higher risk of violence.

death, psychological harm, maldevelopment or deprivation'.[1] Mortality from violence, including homicides, is the fourth leading cause of death among young adults aged 10–29 years with 43% of global homicides occurring in this age group.[2] Daily, tens of thousands continue to be victims of non-fatal violence across the world with resultant physical, sexual and psychological abuse, most of which are never reported.[1] Victims of violence or assault may further perpetrate more violence against others with health and economic burden on communities.[2] While global data are not available for the medical and loss of productivity costs associated with violence, these costs amount to approximately US$3.4 billion annually in the USA.[3]

Adolescence typically refers to the age between 10 and 19 years.[4] This phase is crucial in the development of a child because they transition into adult life at this phase and are more vulnerable to violence.[4] About 82 000 violence-related deaths occurred among adolescents in 2015 with interpersonal violence being the second most prevalent

cause of death in older adolescent males, after road traffic accident globally.[4] While it is not uncommon for strangers or acquaintances to perpetrate violence, there is evidence to show that most victims of violence are closely related to their perpetrators.[4 5] The object used to inflict violence may include blunt objects, body parts (eg, fist), stick, knife, acid and firearm.[1 6] Also, there is wide variation in the setting or location where violence can occur. This includes the home, neighbourhood, school, outside of school and workplace.[4]

In Bangladesh, the burden of fatal and non-fatal injuries is huge with an annualised injury morbidity rate of 18 002 per 100 000 population. Those aged 10–17 years account for 17% of injury morbidity, and violence accounts for 3% of the injury morbidity among this age group.[7] Available studies on adolescent violence in Bangladesh have focused mainly on violence against women and girls, intimate partner violence and sexual violence.[1 8 9] Some studies have also shown increased violence among unmarried adolescents in rural Bangladesh.[10 11] However, there

are sparse population data on the predictors of violence among adolescents in rural Bangladesh, and other low/middle-income countries (LMICs). Population-based surveys have been found to be vital to fully capture the true burden and consequences of both fatal and non-fatal violence.[1] In this study, we analysed data from a large population-based survey in rural Bangladesh to examine the predictors of violence among adolescents aged 11–19 years.

METHODS
Data source
This study used data from the Saving of Lives from Drowning (SoLiD) project, a household census and baseline survey conducted using a cross-sectional study design in rural Bangladesh between June and November 2013. Detailed description of the tool, data collection method and procedure for the SoLiD household survey has been previously reported.[7 12 13] The

Figure 1 Map of Saving of Lives from Drowning study sites in Bangladesh.[14] Source: geographic information system unit, International Center for Diarrheal Disease and Research, Bangladesh.
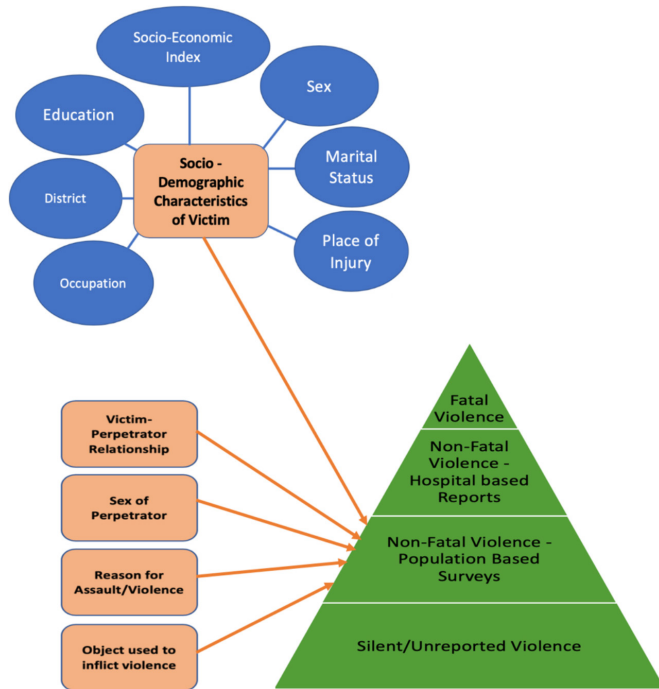
Figure 2 Conceptual framework describing relationship between various predictors and non-fatal violence. Figure adapted from Global Status Report on Violence Prevention, 2014.[1]

census covered 51 unions from 7 purposively selected subdistricts of rural Bangladesh (figure 1).[14] The 51 unions were selected to exclude unions with history of major injury prevention programme. Data on sociodemographic characteristics and non-fatal injuries were collected by an interviewer administered questionnaire from all households in the 51 unions.[14] Non-fatal injury was defined as any household member who sought treatment or lost at least 1 workday or could not go to school for at least 1 day due to an injury event, for events occurring in the previous 6 months period from the date of the interview.

For this study, we extracted information on adolescents, defined as all those aged 11–19 years, from the SoLiD census. This yielded a study population of 213 782 adolescents from 270 387 households in rural Bangladesh. We hypothesised that the following explanatory variables, sociodemographic characteristics, location of event, sex of perpetrator, victim–perpetrator relationship, kind of object used to inflict harm and reason/circumstance of assault, are associated with violence in adolescents (figure 2).[1 2 5 7 11 15]

Patient and public involvement

During the design of the survey tools and protocol, meetings were held involving local partners, government officials and researchers in Bangladesh to discuss existing gaps and modalities for implementation of the survey. Instruments were modified to accommodate the needs of the Bangladeshi population.

Data analysis

The dependent variable of interest was physical violence which was defined as all injuries inflicted directly by another person or resulting from collateral impact. This was treated as a binary variable (experience of physical violence vs no violence). Some respondents reported multiple occurrences of violence, and online supplementary table 1 shows the frequency of multiple occurrences of physical violence in the previous 6 months. Less than 11% of adolescents reported multiple occurrences of physical violence; hence, only the first case of physical violence reported by each adolescent was used in our final analysis to determine the predictors of physical violence. We operationalised our independent variables (sex, marital status, socioeconomic index, occupation, education, district, location of event, sex of perpetrator, victim–perpetrator relationship, kind of object used to inflict harm and reason/circumstance of assault) as categorical variables, and described the distribution of these variables stratified by our dependent variable (violence vs no violence) using simple proportion and a χ^2 test. A total of 174 (0.08%) observations were missing information on the variable 'occupation'. These were retained in the dataset; however, a complete case analysis was conducted. Multicollinearity among our covariates was assessed using the variance inflation factor. Variables found to be collinear were further assessed and only one of the collinear variables selected in order to increase precision in our model. Simple logistic regression was used to estimate the prevalence OR of physical violence among adolescents in rural Bangladesh. Given that the prevalence of violence for all ages in rural Bangladesh population is less than 10%,[7] the prevalence OR from a logistic regression approximates the prevalence ratio (PR).[16] A univariable and multivariable logistic regression was used to determine the PR of violence among adolescents. All analyses were conducted in Stata/IC V.15.1.[17] Two-sided p values with the level of significance set at 0.05 based on Wald tests were considered statistically significant.

RESULTS

A total of 457 (0.21%) cases of physical violence were reported among 213 782 adolescents between the ages of 11–19 years from rural Bangladesh in 2013. The mean age for adolescents reporting physical violence was 15.2 years. Forty-six (10.07%) of violence cases reported occurred in school. There was a statistically significant difference in the gender distribution, socioeconomic index, district and location of injury among those who reported violence compared with those who reported no violence (table 1).

In table 2, out of the 457 adolescents who were victims of physical violence, quarrel/fight was the the most common reason reported for violence (92.56%) followed by burglary (3.28%). Friends or acquaintances were the most commonly reported perpetrators of violence (31.73%). Physical violence by known non-relatives

Table 1 Baseline sociodemographic characteristics for adolescents (11–19 years)

Baseline characteristics	Violence n=457	No violence n=213325	P value
Sex of victim, n (%)			
Male	346 (75.71)	107553 (50.42)	0.000
Female	111 (24.29)	105772 (49.58)	
Marital status n (%)			
Married	27 (5.91)	18241 (8.55)	0.138
Never married	359 (78.56)	168222 (78.86)	
Divorced	1 (0.22)	262 (0.12)	
Widowed	0 (0.00)	98 (0.05)	
Separated	1 (0.22)	158 (0.07)	
Not applicable	69 (15.10)	26344 (12.35)	
Education n (%)			
No education	23 (5.03)	10996 (5.15)	0.22
Primary	201 (43.98)	81827 (38.36)	
Secondary	208 (45.51)	108044 (50.65)	
A levels	25 (5.47)	12067 (5.66)	
College	0 (0.00)	390 (0.18)	
Advanced/professional degree	0 (0.00)	1 (0.00)	
Occupation n* (%)			
Agriculture	10 (2.19)	3320 (1.56)	0.232
Business	10 (2.19)	2916 (1.37)	
Skilled labour (professional)	30 (6.56)	11453 (5.37)	
Unskilled/domestic (unskilled)	12 (2.63)	4077 (1.91)	
Rickshaw/bus (transport worker)	5 (1.09)	1198 (0.56)	
Students	327 (71.55)	157305 (73.80)	
Retired/unemployed/housewife	62 (13.57)	31370 (14.72)	
Not applicable (others)	1 (0.22)	1512 (0.71)	
Socioeconomic Index n (%)			
Lowest	87 (19.04)	32482 (15.23)	0.041
Low	88 (19.26)	41936 (19.66)	
Middle	91 (19.91)	46385 (21.74)	
High	114 (24.95)	47885 (22.45)	
Highest	77 (16.85)	44637 (20.92)	
District n (%)			
Chandpur	345 (75.49)	114591 (53.72)	0.000
Comilla	23 (5.03)	5057 (2.37)	
Sirajganj	12 (2.63)	16777 (7.86)	
Sherpur	27 (5.91)	38528 (18.06)	
Narshindi	50 (10.94)	38372 (17.99)	
Place of injury n† (%)			
Home	198 (43.33)	5899 (40.68)	0.000
School	46 (10.07)	894 (6.17)	
Other playground	46 (10.07)	1206 (8.32)	
Roads/highway/railway station	99 (21.66)	3304 (22.78)	
Agricultural field	31 (6.78)	1389 (9.58)	
Workplace	15 (3.28)	547 (3.77)	
Others	22 (4.81)	1262 (8.70)	

*One hundred and seventy-four observations were missing for occupation. These were left in the data set as it accounted for only 0.08% of the total observations.
†This category was based only on the population reporting violence (N = 457) under the 'violence' column, and other types of injury (N = 14 501) under the 'no-violence' column.

accounted for 22.10% of cases while strangers were involved in 7.66% of violent cases. About 86% of violence was perpetrated by males. In terms of the object used to inflict violence, stick/club was the the most common object (41.36%) reported, following by use of person/body (eg, fist) in 38.95% of cases.

Table 2 Distribution of other baseline characteristics predicting violence

Baseline characteristics	Violence n=457*
Reason for assault or violence n (%)	
Quarrel/fight	423 (92.56)
Burglary	15 (3.28)
Committing a crime (other than above)	11 (2.41)
Do not know	2 (0.44)
Others	6 (1.31)
Victim–perpetrator relationship n (%)	
Spouse	25 (5.47)
Father	10 (2.19)
Mother	14 (3.06)
Son/daughter	2 (0.44)
Brother/sister	38 (8.32)
Grandparents	6 (1.31)
Other relatives	65 (14.22)
Friends/acquaintance	145 (31.73)
Colleague	7 (1.53)
Known (non-relatives)	101 (22.10)
Stranger	35 (7.66)
Others	8 (1.75)
Do not know	1 (0.22)
Sex of perpetrator n (%)	
Male	392 (85.78)
Female	65 (14.22)
Object used to inflict violence n (%)	
Stick/club	189 (41.36)
Knife/cutting/tool	29 (6.35)
Fire	0 (0.00)
Gun/firearm	1 (0.22)
Acid	0 (0.00)
Person/body parts (eg, fist)	178 (38.95)
Others	60 (13.13)

*Only 457 individuals with violence reported on reason for violence, victim–perpetrator relationship, sex of perpetrator and object used to inflict violence.

In table 3, we found a significant association between sex of the victim and non-fatal violence with the unadjusted prevalence of violence being 67% lower in females compared with males (Prevalence Ratio (PR): 0.33, 95% CI 0.26 to 0.40). This remained significantly lower (PR: 0.60, 95% CI 0.47 to 0.78) after adjusting for other variables as shown in table 3. Overall, marriage and level of education were not significantly associated with violence among adolescents.

Socioeconomic index was significantly associated with violence in adolescents in Bangladesh. Compared with the lowest socioeconomic quintile, being in a higher quintile was associated with lower prevalence of violence. There was a 27% decrease in the unadjusted prevalence of violence among adolescents in middle compared with lowest socioeconomic index (PR: 0.73, 95% CI 0.55 to 0.98), which remained significantly lower after adjusting for other variables (PR: 0.63, 95% CI 0.46 to 0.85). Similarly, there was a 36% decrease in the unadjusted prevalence of violence among those in the highest socioeconomic index compared with those in the lowest socioeconomic index (PR: 0.64, 95% CI 0.47 to 0.88). This also remained significantly lower after adjusting for other variables (PR: 0.61, 95% CI 0.44 to 0.84). The district where violence occurred was found to be significantly associated with violence. The adjusted prevalence of violence in Chandpur and Comilla was 7.30 times and 7.27 times higher respectively than the prevalence of violence in Sirajganj (PR: 7.30, 95% CI 4.07 to 13.10 and PR: 7.27, 95% CI 3.56 to 14.84, respectively), after adjusting for sex, socioeconomic status and place of injury.

There was a significant association between location (place of injury) and occurrence of violence. The unadjusted prevalence of violence occurring in the school was 53% significantly higher than the prevalence of violence in the home (PR: 1.53, 95% CI 1.10 to 2.13). However, the adjusted PR was not significant (PR: 1.19, 95% CI 0.85 to 1.69). The adjusted prevalence of violence occurring in the roads/highway/railway station was 33% lower compared with prevalence of violence in the home (PR: 0.67, 95% CI 0.52 to 0.87).

In table 4, the relationship between victim and the perpetrator was found to be significantly associated with violence. The unadjusted and adjusted prevalence of physical violence inflicted by spouse, son/daughter, brother/sister, other relatives, known non-relatives or strangers was significantly lower compared with the prevalence of violence inflicted by friends/acquaintances. Overall, there was no association between object used and prevalence of violence among adolescents. The use of person/body parts was significantly associated with a 34% higher prevalence of violence compared with the use of stick or club (PR: 1.34, 95% CI 1.07 to 1.68). However, this was not significant after adjusting for reason for violence, victim–perpetrator relationship and sex of the perpetrator (PR: 1.24, 95% CI 0.98 to 1.57).

DISCUSSION

Our result show that non-fatal violence is common among adolescents in rural Bangladesh with males significantly more affected compared with females even after adjusting for education, occupation, socioeconomic index, district and location of violence event. Several studies have shown that non-fatal injury rates are significantly higher in males across all age groups and also among those with low socioeconomic status or no education,[2 7 8 15] and this study is the first to establish similar associations for non-fatal adolescent violence in rural Bangladesh. Most other

Table 3 Logistic regression analysis

Predictors	Crude		Adjusted*	
	PR (CI)	P value	PR (CI)	P value
Sex of victim				
Male	Ref	Ref	Ref	Ref
Female	0.33 (0.26 to 0.40)	0.000	0.60 (0.47 to 0.78)	0.000
Marital status				
Never married	Ref	Ref	Ref	Ref
Married	0.69 (0.47 to 1.03)	0.066	1.06 (0.66 to 1.70)	0.809
Education				
No education	Ref	Ref	Ref	Ref
Primary	1.17 (0.76 to 1.81)	0.466	0.93 (0.59 to 1.49)	0.773
Secondary	0.92 (0.59 to 1.42)	0.706	1.05 (0.56 to 1.93)	0.714
A levels	0.99 (0.56 to 1.75)	0.974	2.24 (0.56 to 1.96)	0.883
Occupation				
Students	Ref	Ref	Ref	Ref
Agriculture	1.45 (0.77 to 2.72)	0.249	1.37 (0.70 to 2.67)	0.362
Business	1.65 (0.88 to 3.10)	0.120	1.74 (0.90 to 3.38)	0.100
Rickshaw/bus (transport worker)	2.01 (0.83 to 4.86)	0.109	1.28 (0.51 to 3.24)	0.595
Retired/unemployed/housewife	0.95 (0.72 to 1.25)	0.716	1.08 (0.78 to 1.51)	0.636
Socioeconomic Index				
Lowest	Ref	Ref	Ref	Ref
Low	0.78 (0.58 to 1.05)	0.107	0.73 (0.54 to 0.99)	0.045
Middle	0.73 (0.55 to 0.98)	0.038	0.63 (0.46 to 0.85)	0.003
High	0.89 (0.67 to 1.18)	0.408	0.76 (0.57 to 1.02)	0.069
Highest	0.64 (0.47 to 0.88)	0.005	0.61 (0.44 to 0.84)	0.003
District				
Sirajganj	Ref	Ref	Ref	Ref
Chandpur	4.21 (2.37 to 7.49)	0.000	7.30 (4.07 to 13.10)	0.000
Comilla	6.36 (3.16 to 12.79)	0.000	7.27 (3.56 to 14.84)	0.000
Sherpur	0.98 (0.50 to 1.93)	0.953	1.84 (0.93 to 3.66)	0.081
Narshindi	1.82 (0.97 to 3.42)	0.062	3.16 (1.67 to 6.00)	0.000
Place of Injury				
Home	Ref	Ref	Ref	Ref
School	1.53 (1.10 to 2.13)	0.011	1.19 (0.85 to 1.69)	0.314
Other playground	1.14 (0.82 to 1.58)	0.443	0.86 (0.61 to 1.22)	0.398
Roads/highway/railway station	0.89 (0.70 to 1.14)	0.364	0.67 (0.52 to 0.87)	0.003
Agricultural field	0.66 (0.45 to 0.98)	0.037	0.60 (0.40 to 0.89)	0.012
Workplace	0.82 (0.48 to 1.39)	0.457	0.55 (0.31 to 0.97)	0.040
Others†	0.52 (0.33 to 0.81)	0.004	0.39 (0.25 to 0.61)	0.000

*Prevalence ratio (PR) from the logistic regression model was adjusted for sex, marital status, occupation, education, socioeconomic index, district and place of violence.
†Others include: industry, factory, workshop, market or bazaar, office, construction area, trees or cowshed.

studies on violence in Bangladesh have focused on sexual or intimate partner violence, and have reported that sexually harassing behaviours were significantly higher among Bangladeshi adolescent girls with secondary or higher level of education.[10] Across all age and sex groups, non-fatal injuries broadly were previously reported highest among rickshaw pullers and bus drivers, agricultural workers and unskilled labourers.[7] However, our study found no association between violence in adolescents and occupation which may be due to the limited

Table 4 Logistic regression analysis

Predictors	Crude		Adjusted*	
	PR (CI)	P value	PR (CI)	P value
Reason for assault or violence				
Quarrel/fight	Ref	Ref	Ref	Ref
Burglary	0.90 (0.51 to 1.50)	0.710	0.89 (0.46 to 1.71)	0.733
Committing a crime (other than above)	0.86 (0.45 to 1.64)	0.637	0.86 (0.44 to 1.67)	0.652
Do not know	1.00 (0.22 to 4.56)	0.995	0.66 (0.14 to 3.12)	0.604
Victim–perpetrator relationship				
Friends/acquaintance	Ref	Ref	Ref	Ref
Spouse	0.30 (0.19 to 0.47)	0.000	0.30 (0.19 to 0.47)	0.000
Father	1.17 (0.55 to 2.49)	0.685	1.22 (0.57 to 2.61)	0.614
Mother	0.93 (0.50 to 1.75)	0.823	0.97 (0.50 to 1.92)	0.941
Son/daughter	0.22 (0.51 to 1.75)	0.038	0.20 (0.05 to 0.85)	0.032
Brother/sister	0.41 (0.28 to 0.61)	0.000	0.42 (0.28 to 0.62)	0.000
Other relatives	0.50 (0.36 to 0.70)	0.000	0.51 (0.37 to 0.71)	0.000
Known (non-relatives)	0.51 (0.39 to 0.68)	0.000	0.52 (0.39 to 0.70)	0.000
Stranger	0.55 (0.37 to 0.83)	0.004	0.61 (0.38 to 0.97)	0.038
Others	0.37 (0.17 to 0.78)	0.009	0.38 (0.18 to 0.82)	0.014
Sex of perpetrator				
Male	Ref	Ref	Ref	Ref
Female	0.97 (0.73 to 1.29)	0.831	0.97 (0.71 to 1.33)	0.846
Object used to inflict violence				
Stick/club	Ref	Ref	Ref	Ref
Knife/cutting/tool	0.93 (0.61 to 1.43)	0.752	0.97 (0.63 to 1.50)	0.906
Gun/firearm	0.92 (0.11 to 7.67)	0.937	1.21 (0.13 to 11.67)	0.869
Person/body parts	1.34 (1.07 to 1.68)	0.011	1.24 (0.98 to 1.57)	0.068

*From the logistic regression model was adjusted for reason for violence, victim–perpetrator relationship, sex of the perpetrator and object used to inflict violence.
PR, prevalence ratio.

numbers of some occupational classes in rural setting, including transport workers, rickshaw pullers and bus drivers.

We found that lowest socioeconomic index was significantly associated with violence among adolescents. Although there is no consistency in the definition of socioeconomic index across studies, association between violence and percentage of families living below poverty line has been reported previously.[18 19] Also, our study shows a significant association between geographical district and occurrence of violence with over sevenfold increase in prevalence of violence in Chandpur and Comilla compared with Sirajganj. Indeed, the statistically significant differences in the prevalence of adolescent violence comparing districts may be due to differences in structural risk factors such as poverty and population density comparing these districts. For example, Chandpur, which has the highest prevalence of adolescent violence among all the districts compared, also has one of the highest poverty headcount ratios (51%) compared with Sirajganj (39%) and Narshindi (24%).[20] Similarly, the population densities are higher in Chandpur and Comilla (population size of 1 227 519 and 2 043 174, respectively) compared with the other districts (Sirajganj—1 205 745; Narshindi—527 922 and Sherpur—658 627).[20] These structural risk factors affect violence in several ways as people who live in poverty are likely to be involved in acts of violence because of circumstances they are exposed to such as poor housing, distressed neighbourhood and disrupted families.[21] It was found that countries having dense population have increased tendency towards crime and violence.[20 22–24] This indicates that population density might be a potential factor for committing more violence among adolescents.[20] These findings call for concerted efforts by various government agencies and non-governmental organisations including community-based organisations to put in place schemes that could help identify and address various structural factors that may influence violence, including measures to alleviate the socioeconomic status of persons in districts with high violence experiences. Such collaborative and multisectoral approach could lead to the delivery of affordable

housing, effective criminal justice system to punish perpetrators of violence, adequate land planning to support healthy physical activities and social services especially for those in the lowest socioeconomic quintile mostly impacted by violence.[25] Furthermore, expanded community engagement involving key stakeholders will help identify practicable strategies and approaches to address adolescent violence in districts that are most impacted.

Currently, education and technology are evolving simultaneously, with adolescents becoming more exposed to modern technologies such as smartphones, tablets and computers which are known to have negative effects on the development and health of children.[26] While the impact of social media influences on adolescents is expected to be more prevalent in developed countries where internet connectivity is very high, settings in LMICs similar to rural Bangladesh are also catching up on this trend.[27 28] Adolescents from Comilla and Chandpur may have greater access to modern technologies compared with those from other districts given the higher literacy rates in these districts, 53% and 56% in Comilla and Chandpur, respectively (compared with Sirajganj (39%), Narshindi (49%) and Sherpur (33%)).[20 29] As such, adolescents from Comilla and Chandpur are likely to be more exposed to internet and digital technologies, which though are commonly used as learning aids in rural settings, may also increase the exposure of these adolescents to violent and harmful behaviours being portrayed on the internet. According to UNICEF Bangladesh, about 25% of the children aged 10–17 started to access the digital world when they were below the age of 11 and adolescent boys (63%) are more frequent regarding online access and use than girls (48%).[29] Research indicates that increasing the time on social media is directly associated with aggressive behaviour among adolescents and act as a vector for violence.[30 31] Therefore, exposure to technologies and social media might be a trigger for violent behaviour among adolescents.

These two districts are also in closer proximity to major urban cities in Bangladesh, and a spillover of violence behaviours from the urban centres into these districts is possible. When urbanisation is rapid and poorly planned, the numbers of unemployed youth increase rapidly resulting in different types of violence and social unrest.[32] During the last four decades, there has been rapid urbanisation in Bangladesh with migrant population as one of the causes.[33] An exploratory study conducted in Bangladesh regarding adolescent's exposure to violence showed that a large number of respondents from Comilla were exposed to both low and high levels of violence, sexual harassment and witnessing and/or experiencing sexual and physical violence. Crime statistics 2018 shows that all kind of crimes like robbery, kidnapping, burglary, arms act, smuggling and drug cases are higher in Chittagong division in which both Comilla and Chandpur districts are situated but low in Rajshahi division where Sirajganj district is situated.[34] Witnessing high levels of violence can affect attitude and perception towards violence and increase the

likelihood of further violence and distress.[2 35] Exposure to high level of violence could be a factor behind the high prevalence of violence seen in Comilla and Chandpur. In order to elucidate this further, qualitative approach like ethnography should be explored in these districts.

Previous reports show that the proportion of youths attending school is relatively similar across the five districts of Sirajganj (69%), Narshindi (69%), Sherpur (69%), Comilla (71%) and Chandpur (74%).[20] Hence, school attendance may not be a significant factor to explain violence in rural Bangladesh as found in some other studies.[36–38]

The home settings in rural Bangladesh often include multiple families and households living together in a single settlement, and adolescent violence may be more likely among peers who may not necessarily be family members but live in close proximity within these settlements. This may explain the high prevalence of violence in the home from our study. Previous studies in Bangladesh and other similar settings have shown that community norms that encourage acceptance of physical assault or violence are associated with the perpetration of violence among adolescents, especially community tolerance of physical violence among male adolescents.[8 39 40] There is need for implementation of programmes and policies directed at discouraging the community acceptance of violence both at home and in schools settings in rural Bangladesh, as this will help denormalise this attitude and practice. Also, involvement of community leaders to champion campaigns against violence will help reduce the perpetration of violent acts. In addition, interventions to raise the economic status of adolescents should be considered by the government as high socioeconomic quintile has been found to be protective against violence.

LIMITATIONS
Given that this study was done in a predominantly rural setting, the findings may not be generalisable and nationally representative for Bangladesh. Also, the data are subject to recall bias given that information on violence was self-reported over a 6-month recall window. Similarly, the definition of non-fatal injury over a 6-month window as well as differential recall bias of minor cases or community acceptable forms of violence may have led to underestimation of the true prevalence of non-fatal violence. In addition, misclassification of injuries may have resulted from various forms of information bias, data collection or entry errors, which may have led to misclassification of violence by age or gender. In addition, there may be some confounding by school attendance given that this was not directly adjusted for in the analyses. However, given the large population size covered under this study, these likely biases are expected to be minimised.

CONCLUSION
We found that male adolescents may be at increased risk of suffering violence in rural Bangladesh. Also,

socioeconomic factors and place (districts) are strong predictors of adolescent violence in seven selected rural districts of Bangladesh, with higher risk of violence in Chandpur or Comilla. Violence was found to occur more at home and typically involved an acquaintance or friend. The results suggest pertinent directions for public health policies aimed at addressing violence among adolescents and should guide the development and execution of interventions that are directed at those in low socioeconomic class particularly in rural communities with similar demographics as our study population. Moreover, further research is needed to identify the actual burden of violence among adolescents at national level in Bangladesh and to establish an effective violence prevention programme all over the country.

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