

## Bangladesh Health and Injury Survey 2016 (BHIS 2016): Summary Report

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# Bangladesh Health and Injury Survey 2016

## Summary Report





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## Background

Similar to many low- and middle-income countries Bangladesh is passing through an epidemiological transition where there are changes in the causation of diseases and deaths. As a result, injury has appeared as one of the major causes of death, morbidity and disability in Bangladesh. However, data on the magnitude and risk factors of injury especially in low resource setting are scarce. In 2003 a nationally representative Bangladesh Health and Injury Survey<sup>1</sup> (BHIS) was conducted by the Institute of Child and Mother Health (ICMH) with the support from Directorate General of Health Services (DGHS), UNICEF-Bangladesh and The Alliance for Safe Children (TASC) to measure the magnitude of the injuries.

BHIS 2003 was the largest injury survey ever conducted at the community level in a developing country with a sample size of 171,366 households and a total surveyed population of 819,429. It looked at all causes of death (communicable, non-communicable and injury) and showed the burden of injury in proportion to communicable and non-

communicable causes. It characterized injuries in all age groups and looked at moderate, major, serious, severe, and fatal injuries in detail. It examined behavioural and economic aspects as well as the epidemiology.

BHIS 2016 was conducted to measure the current injury situation in Bangladesh after 13 years of the previous BHIS. This survey also uses the same methodology as BHIS 2003 with minor modifications. It defines injury in proportion to all other causes but without classifying them into specific communicable and non-communicable causes. It focuses primarily on the epidemiology of fatal and nonfatal injury, and it extended the definition of moderate severity to include any injury that resulted in loss of 1 day of work, school attendance or ability to care for oneself. Additionally, while BHIS 2003 focused on child age-groups, BHIS 2016 reports on all age groups, including infancy, childhood, young adulthood, middle age and old age. This survey utilised tablets to collect data instead of printed questionnaires as used in BHIS 2003.

## Methodology

BHIS 2016 is a national, cross-sectional survey conducted between March and June 2016. It uses a complex sampling strategy based on probability-proportional-to-size (PPS) methodologies with separate urban and rural samples. No weights were used in the analysis due to PPS sample selection.

### Sampling

- Sixteen districts were randomly selected for the survey.
- The urban sample was drawn from city corporations and the district headquarters of the selected districts.
- Multi-stage cluster sampling was used to select households for visits by data collectors.
- A household member was defined as a member living in the same house, including domestic helpers, long-term guests, etc., who shared meals.
- The target sample size was 70,000 households with a total population of 350,000. The

population interviewed was 330,000. After cleaning and validation, data from 299,216 household residents was available for analysis.

- There were a total of 198,374 adults 18 years and older and 100,842 children 0-17 years in the total population of 299,216. There were 149,995 males and 149,221 females and 106,233 urban residents and 192,983 rural residents.

### Research Instruments

Data collectors administered a set of instruments at each household. The instruments were adapted from those used in the original BHIS survey done in 2003. Four questionnaires were used:

1. Screening Form: to establish a unique household ID for each household member with age, sex, other demographic factors and obtain mortality and morbidity information for all household members.
2. Verbal Autopsy Form: to determine the cause of death as injury or non-injury for all mortality events reported within the recall period.

<sup>1</sup> Rahman A, Rahman F, Shafinaz S, Linnan M. Bangladesh Health and Injury Survey. Dhaka: DGHS, ICMH, UNICEF, TASC, 2005.

3. Injury Morbidity Form: to define morbidity events from injury during the recall period.
4. Injury Mechanism Form(s): to collect information on the mechanism of injury with specifics on characteristics for that mechanism. Separate forms were used for each mechanism of injury.

#### **Data collection**

Data was collected on 7 inch tablets using a custom data entry program developed for the survey. Data was entered on each tablet by the interviewer who conducted an interview guided by the entry software using predefined skip patterns. Once saved to the device, the data was uploaded to a server when there was connectivity allowing transfer of stored data to a server. Once on the server, the data was validated, and exported to SPSS v21 for analysis.

There were 64 data collectors and 16 supervisors. One supervisor was responsible for each team of 4 interviewers. Data collectors were CIPRB field staff with previous experience in household surveys. Supervisors were CIPRB field staff who had participated in previous community surveys. The recall period was two years for mortality and 6 months for nonfatal injury.

#### **Respondents**

Heads of household were preferred as the main respondent for adult members of the household. Mothers were preferred as the main respondent for children. When either was unavailable the most knowledgeable member of the household present at the time of interview was the respondent. Respondents were first asked if there had been any deaths in the household in the last year and then asked about deaths in the year preceding that. Respondents were then asked about injury for each member of the household in the last six months. If there were any deaths of any cause or nonfatal injuries, the interviewer was prompted to administer additional questionnaires according to the algorithms in the data entry program. If a household was unattended at the time of the first visit, a repeat visit was made before excluding the household.

#### **Definitions used**

**Injury:** Physical damage due to the transfer of energy. Injury occurs when the amount of energy transfer exceeds a person's threshold tolerance. The type of energy can be mechanical, thermal,

chemical, electrical, radiation or the absence of essentials such as oxygen (asphyxiation, drowning) or heat (hypothermia). Mechanical energy is the most frequent cause of injury.

**Unintentional Injuries:** Unintentional injuries include only those injuries that occur without intent of harm. Such injuries are often known as accidents by laypersons. Unintentional injuries include road traffic injuries (RTI), falls, burn, cut, drowning, animal injury, machine injury, electrocution, poisoning and injuries by blunt objects.

**Intentional Injuries:** Intentional injuries are injuries purposively inflicted by an aggressor or self-inflicted by the victim. If perpetrated by another person, the intentional injury was classified as a homicide if fatal and assault if not. If self-inflicted, it was classified as suicide as fatal and attempted suicide if not.

However, injury was ascertained if any person suffered from the above mechanisms, and sought medical care or had at least one day work loss or absence from school.

**Injury severity:** Severity levels for nonfatal injury were the following:

**Moderate:** Sought medical care but not admitted to hospital; or had a one day work loss or absence from school; and no permanent disability.

**Major:** Hospitalized for less than 10 days; and no permanent disability. This operational level of severity was used to discriminate hospitalizations that did not result in major surgery (e.g. thoracotomy, laparotomy, etc.)

**Serious:** Hospitalized for 10 days or more; and no permanent disability. This operational level of severity was used to discriminate hospitalizations that did result in major surgery (e.g. thoracotomy, laparotomy, etc.)

**Severe:** Any injury that resulted in permanently disability (loss of vision, hearing, handling, ambulation, or mentation).

#### **Other issues**

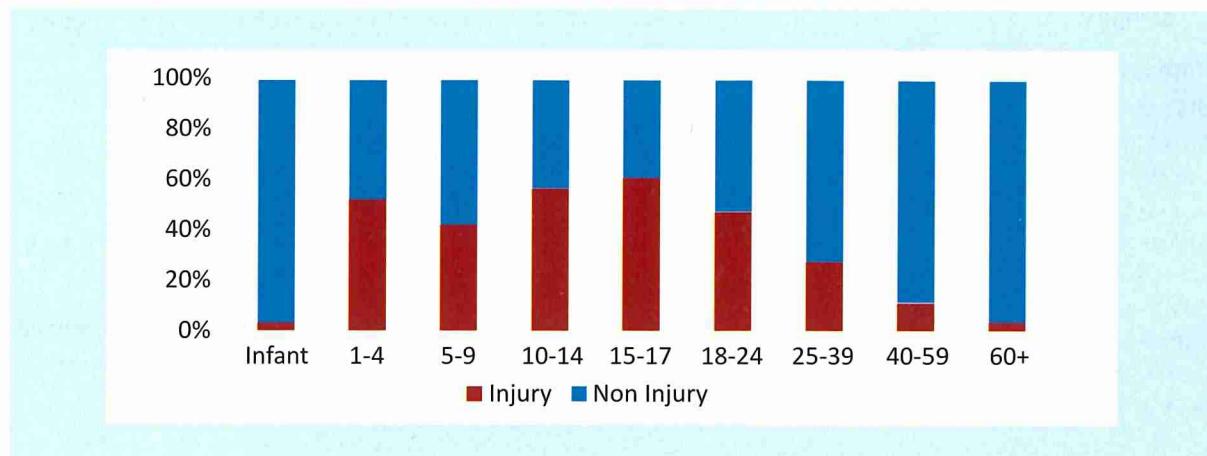
The ethical review board at CIPRB provided oversight and clearance for survey.

Informed consent was obtained from all respondents before collecting data. After collection, the dataset was cleaned, validated and analyzed by CIPRB staff trained to maintain confidentiality. Any access to the dataset outside of CIPRB staff will be restricted to de-identified, anonymized data.

## Summary findings

### Injury mortality

#### Proportional injury mortality by age

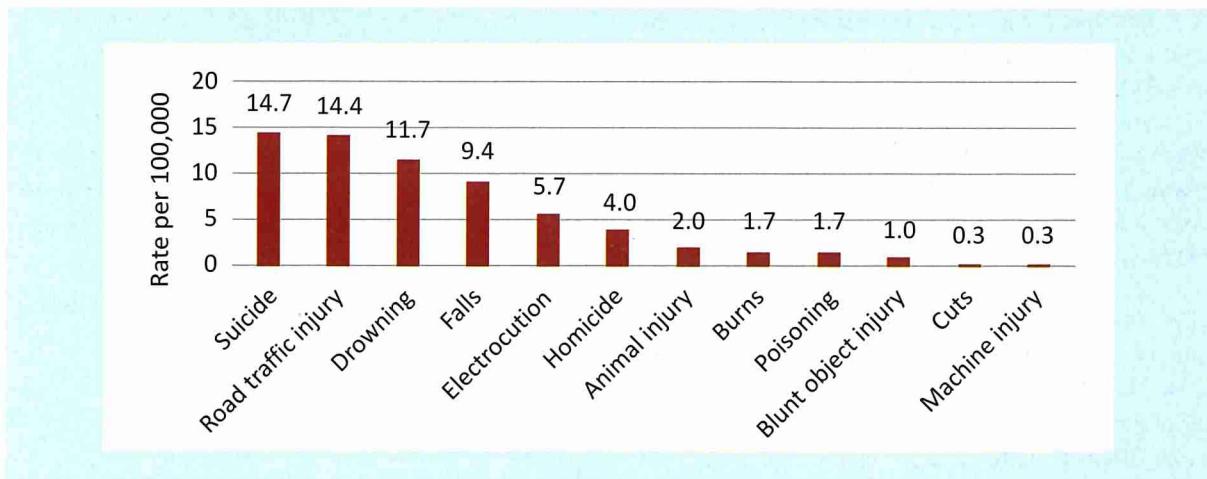


A total of 3201 deaths were identified in the preceding two years of the survey of which 392 deaths were due to injury.

Injury accounted for 12.2% of all deaths among all age groups. Injury caused 3.2% of infant

deaths, then rose to be the leading cause through the rest of childhood (52.6% 1-4; 42.1% 5-9; 56.9% 10-14 and 60.7% 15-17) and remained the leading cause at 47.4% in young adults before dropping to 27.7% in adults and 10.9% in middle age and 3.6% in old age.

#### Injury mortality rates by mechanism of injury, all ages



Four leading causes of death predominate and count for the majority of all fatal injury. These are suicide, road traffic, drowning and falls.

A very high rate of suicide in females makes suicide the leading cause.

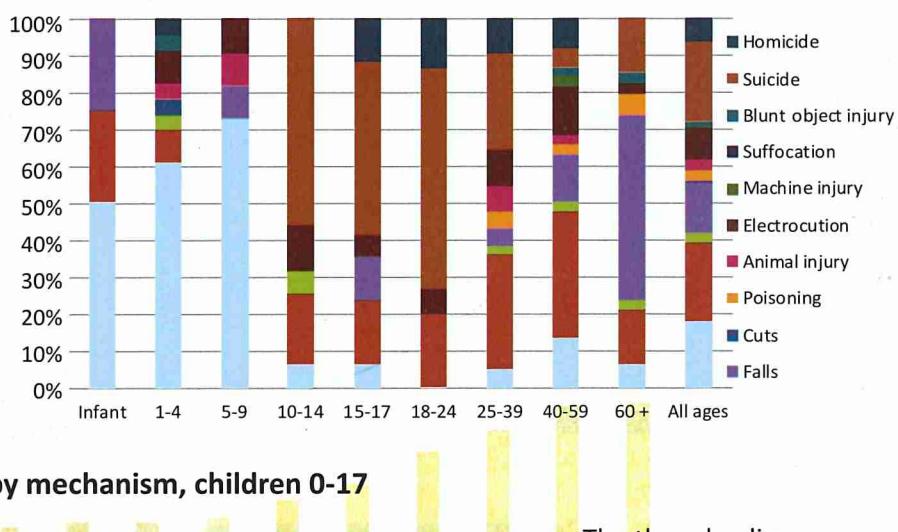
### Estimated number of deaths from injury, all ages

Mechanism of Injury	Number per year	Number per day
Suicide	23,868	66
Road traffic injury	23,166	64
Drowning	19,247	53
Falls	15,045	41
Electrocution	9,210	25
Homicide	6,475	18
Animal injury	3,248	9
Unintentional poisoning	2,672	7
Burns	2,714	7
Blunt object injury	1,624	4
Cut	555	2
Machine injury	534	1
<b>Total</b>	<b>108,358</b>	<b>297</b>

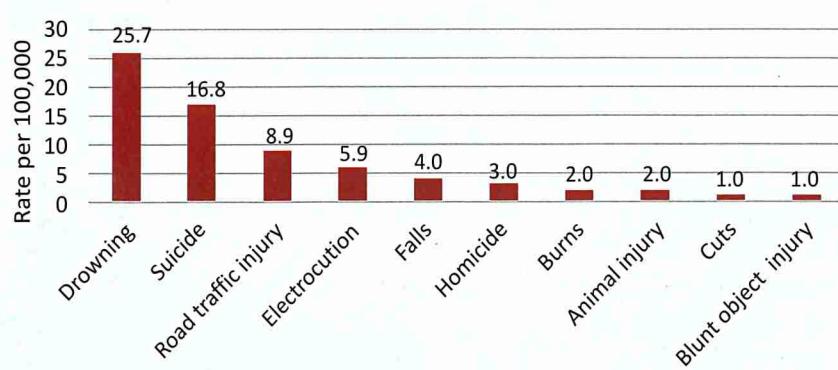
Over 108,000 people of all ages die due to injury each year, 297 persons each day. Suicide, road traffic injury and drowning are the top three causes of injury mortality in all ages. These account about two-thirds of the injury mortalities.

### Proportion of injury mortality by mechanism and age group

Different mechanisms of fatal injury predominate in different age groups. Drowning predominates in early life; suicide, road traffic and falls in adulthood; and falls in old age.



### Injury mortality rates by mechanism, children 0-17



The three leading causes of fatal injury in children were drowning, suicide and road traffic. These accounted for the majority of all fatal injury in children. They were followed by electrocution, falls, violence, burns, animal injury, cuts and blunt object injury at much lower levels.

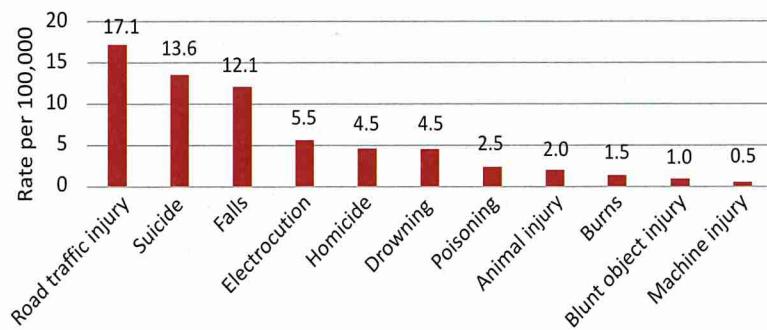
### Estimated number of child (0-17 years) deaths from injury in 2003 and 2016

Mechanism of Injury	BHIS 2003	BHIS 2016		
	Number/year	Number/day	Number/year	Number/day
Drowning	16,892	46	14,438	40
Suicide	2,218	6	9,441	26
Road traffic injury	3,412	9	4,998	14
Electrocution	853	2	3,332	9
Falls	1,706	5	2,221	6
Homicide	512	1	1,666	5
Burns	341	1	1,111	3
Animal injury	2,559	7	1,111	3
Others	512	1	1,111	3
<b>Total</b>	<b>30,200</b>	<b>83</b>	<b>39,428</b>	<b>108</b>

Over 39,000 children are estimated to die from injury each year, 108 each day. Drowning is the leading cause of death and causes over one third (37.0%) of all child injury deaths. Four causes-- drowning, suicide, road traffic and electrocution account for over four-fifths

(82.4%) of injury deaths in children. Drowning remained the leading cause of child injury death as it was in BHIS 2003. However, suicide appeared as the second leading cause of death among children in BHIS 2016, which was in fourth position in BHIS 2003.

### Injury mortality rates by mechanism, adults 18 and over



Road traffic, suicide and falls were the three leading causes of injury death in adults. These three causes accounted for the majority of all fatal injury in adults. Electrocution, violence, drowning, poisoning, animal injury, burns, blunt object injury and machine injury were also causes but at much lower levels.

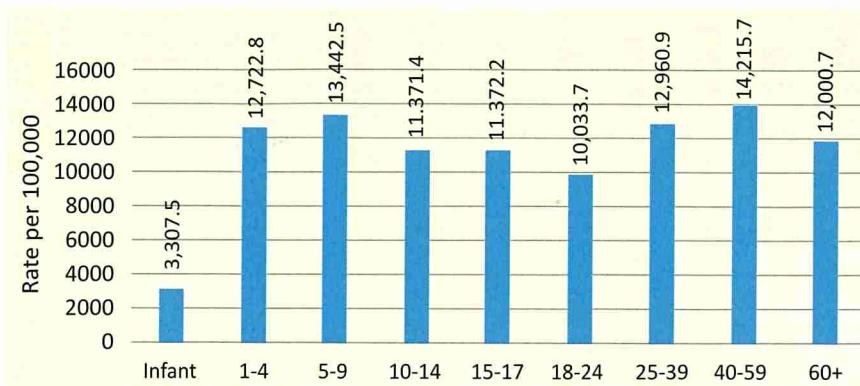
### Estimated annual number of adult deaths from injury in Bangladesh

Over 63,000 adults are estimated to die from injury each year, over 170 each day. Three causes-- road traffic, suicide, and falls account for about two thirds (65.9%) of the total injury deaths in adults.

Mechanism of Injury	Number per year	Number per day
Road traffic injury	18,168	50
Suicide	14,427	40
Falls	12,824	35
Electrocution	5,878	16
Homicide	4,809	13
Drowning	4,809	13
Poisoning	2,672	7
Animal injury	2,137	6
Burns	1,603	4
Blunt object injury	1,069	3
Machine injury	534	1
<b>Total</b>	<b>68,930</b>	<b>189</b>

## Injury morbidity

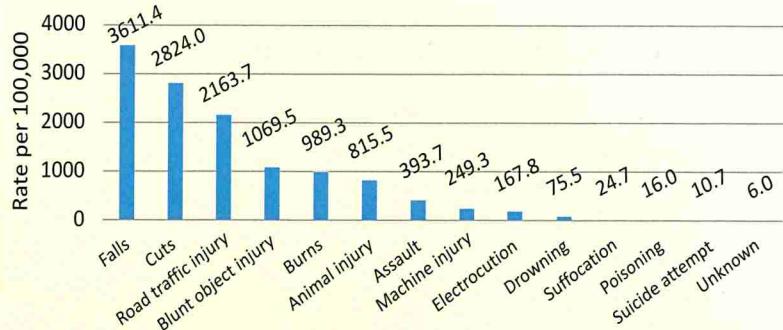
### Injury morbidity rates by age



Except infancy almost similar high rates of injury morbidity were observed across all ages. The highest injury morbidity rate (14,215.7 per 100,000) was observed in 40-59 years age group, which was followed by children of 5-9 years and 1-4 years.

### Injury morbidity rates by mechanism, all ages

Three causes falls, cuts and road traffic are the predominant causes of nonfatal injury at twice the rates of blunt objects, burns and animals which in turn are twice the rates of the other causes of assault, machines, electrocution, drowning, suffocation, attempted suicide and unknown.

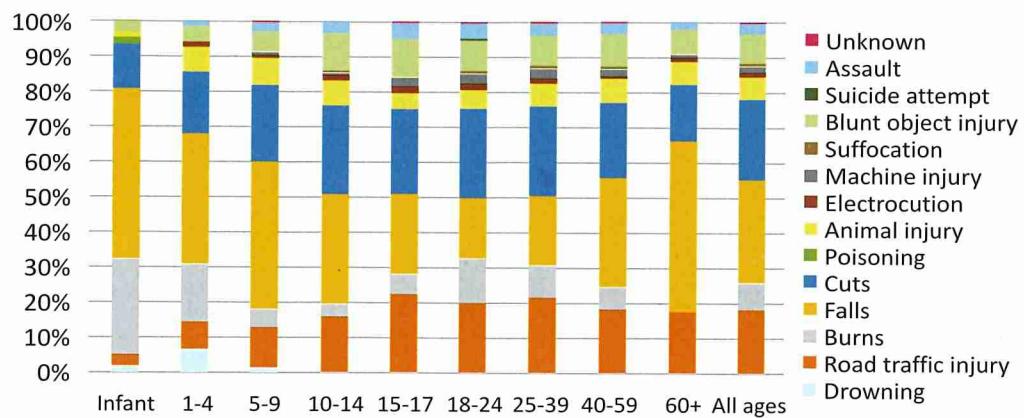


### Estimated number of injury morbidity, all ages

Mechanism of Injury	Number per year	Number per day
Falls	5,930,470	16,248
Cuts	4,544,171	12,450
Road traffic injury	3,420,299	9,371
Blunt object injury	1,712,774	4,693
Burns	1,586,665	4,347
Animal injury	1,319,431	3,615
Assault	629,530	1,725
Machine injury	381,908	1,046
Electrocution	270,622	741
Drowning	144,576	396
Suffocation	39,605	109
Poisoning	28,090	77
Suicide attempt	15,981	44
Unknown	9,428	26
All Injuries	20,033,550	54,886

Over 20 million adults and children are estimated to be nonfatally injured each year, about 55,000 each day. The three major causes - falls, cuts and Road traffic injury account for over two thirds (69.4%) of the total injury morbidities in all ages.

## Proportion of injury morbidity by mechanism and age

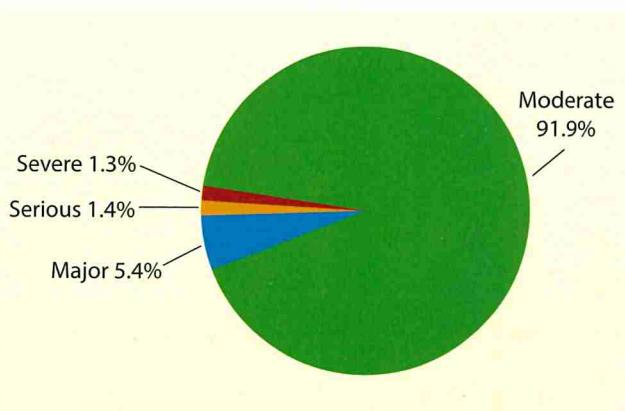


Different mechanisms of nonfatal injury predominate in different ages. Falls, burns and cuts are major causes in all age groups and road

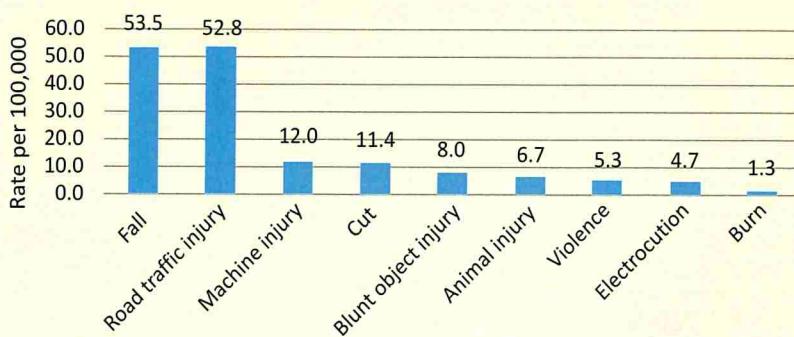
traffic begins in childhood and increases thereafter. Poisoning and animals occur at lower proportions throughout life.

## Injury severity rates by type of injury in all ages

The majority about 92.0% of all injuries in all ages were moderate in severity i.e. the injured persons either sought medical care but not admitted to hospital or had a one-day work loss or absence from school. Over 5.0% suffered from major injury severity which means the injury resulted in less than 10 days hospitalisation with no permanent disability and did not require major surgery. A small proportion (1.4%) had serious injury which caused hospitalisation for 10 days or more and required major surgery but no permanent disability. Only 1.3% had severe injury that resulted in permanent disability.



## Permanent disability rates due to injury, all ages



Permanent disability due to fall and road traffic injury appeared as the leading causes of permanent disability due to injury, which are followed by machine and cut injuries.

### Estimated number of permanent disability due to injury, all ages

Mechanism of Injury	Number per year	Number per day
Falls	82,954	227
Road traffic injury	80,448	220
Cuts	18,791	51
Machine injury	18,551	51
Blunt object injury	12,367	34
Animal injury	10,408	29
Assault	8,448	23
Electrocution	7,163	20
Burns	2,265	6
<b>Total</b>	<b>241,395</b>	<b>661</b>

These projected numbers clearly show the tremendous burden of injury with 661 persons being permanently disabled each day. Four

causes falls, road traffic injury, cuts and machine injury were responsible for over 80.0% of all permanent disabilities in all ages.

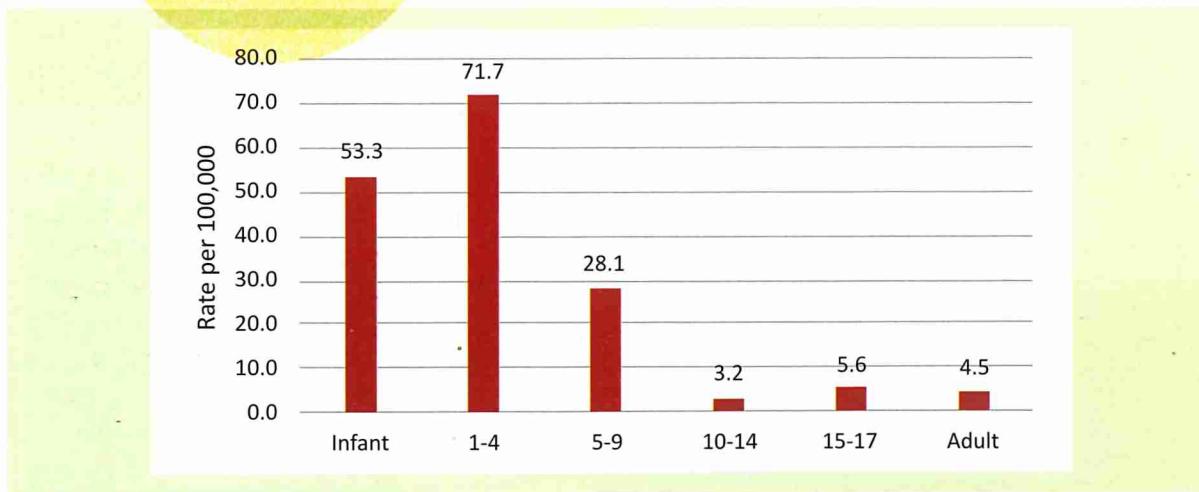
### Leading injury mortality by age and sex

BHIS 2016 clearly defines injury as an important cause of death in every age group in Bangladesh. For children, the top three leading causes of

injury death are drowning, suicide and road traffic injury. Road traffic, suicide and falls are the three major causes of injury death in adults.

#### Drowning

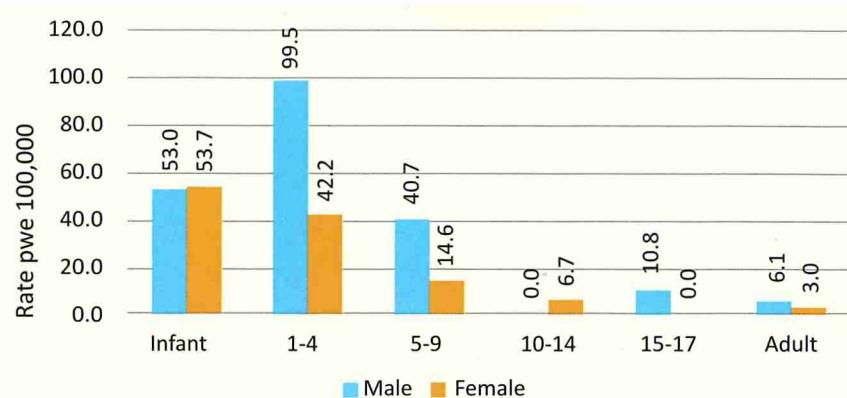
##### Fatal drowning rates by age



The all-ages fatal drowning rate was 11.7/100,000. Drowning rates are high in infancy, peak in the 1 - 4 age group, fall rapidly through middle childhood and adolescence and then remain at relatively low rates throughout the rest of life.

This figure clearly shows the great burden of drowning in childhood, and especially concentrated in early childhood where drowning makes up almost three quarters of all injury.

## Fatal drowning rates by age and sex

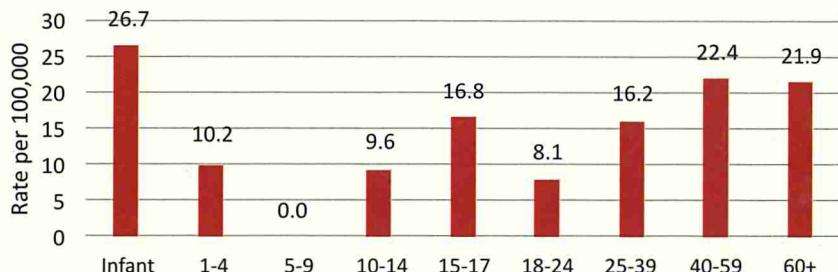


The all-ages fatal drowning rate was 16.0/100,000 for males and 7.4/100,000 for females. Drowning rates were higher in males than females in early and middle childhood and similar in older age groups.

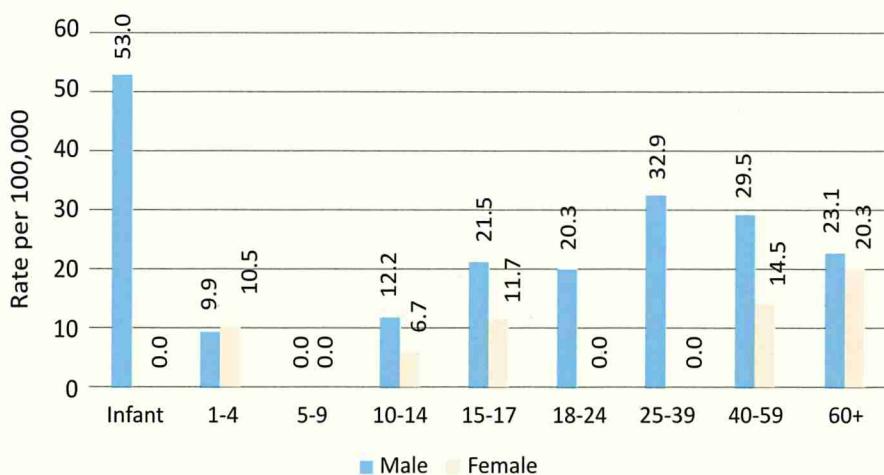
## Road Traffic Injury

### Road traffic injury mortality rates by age

The all-ages fatal road traffic injury rate was 14.4/100,000. There was only 1 infant death from road traffic injury, making the high rate in infancy subject to large confidence intervals.



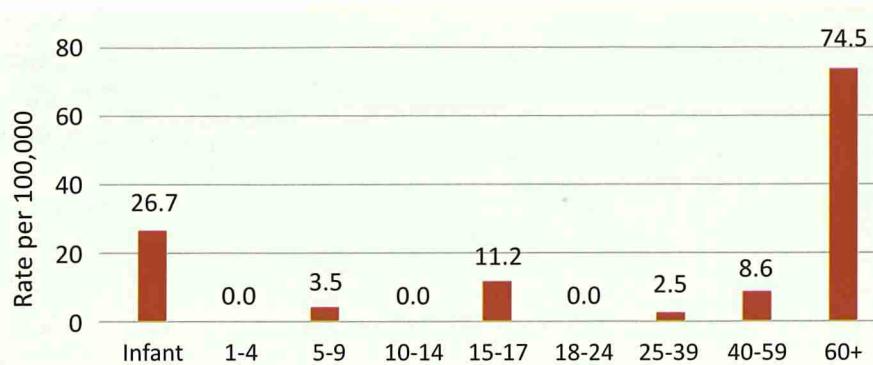
### Road traffic injury mortality rates by age and sex



The all-ages fatal road traffic injury rate was 22.7/100,000 in males and 6.0/100,000 in females. There is clear male predominance in road traffic injury. For all ages, rates in males were over three times those in women. This predominance was seen in every age group where a measurable rate was obtained in the survey.

## Falls

### Fatal fall injury rates by age

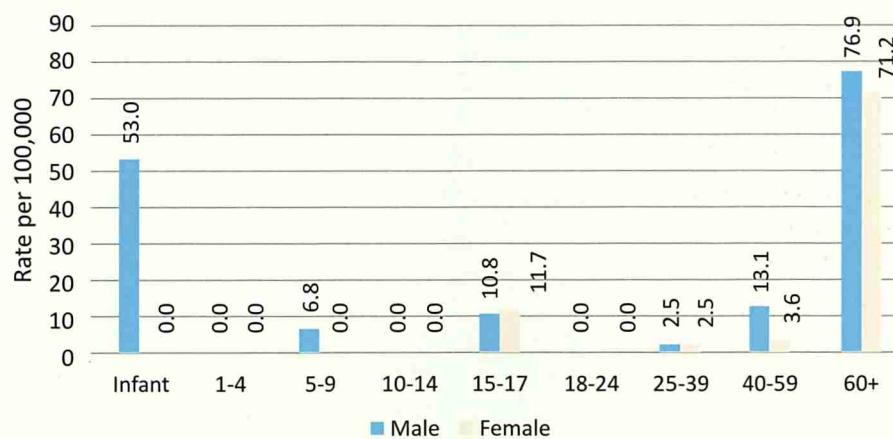


The all-ages fatal fall injury rate was 9.4/100,000. The rates in infancy and middle childhood have large confidence intervals due to there being only 1 fatal fall in each age group. The number of fatal falls markedly increase in old age and the rate is

(74.5/100,000) 8 times higher than the all-age mean rate.

### Fatal fall injury rates by age and sex

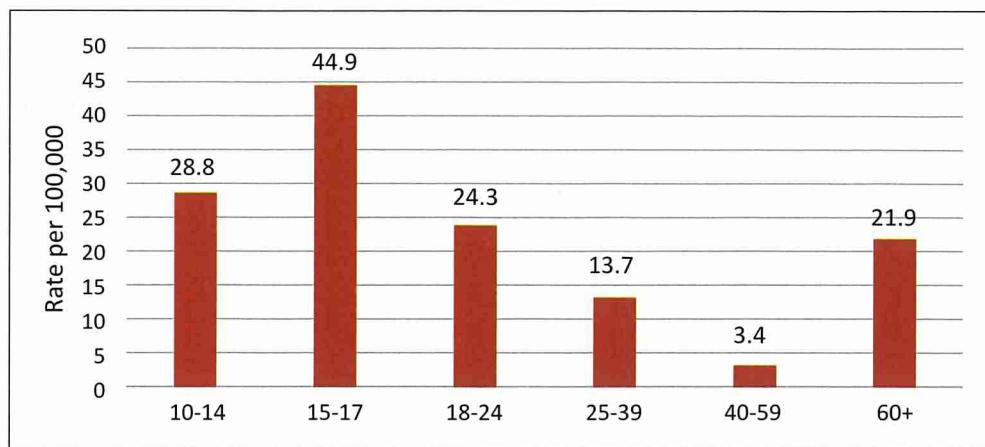
The all-ages fatal fall injury rate for males was 12.0/100,000 and 6.7/100,000 for females. The lack of fall incidents in both sexes in early and middle childhood, and the absence of falls in the 10 - 14 group are due to insufficient power



of the BHIS 2016 to establish these rates rather than there being no falls in these groups.

## Suicide

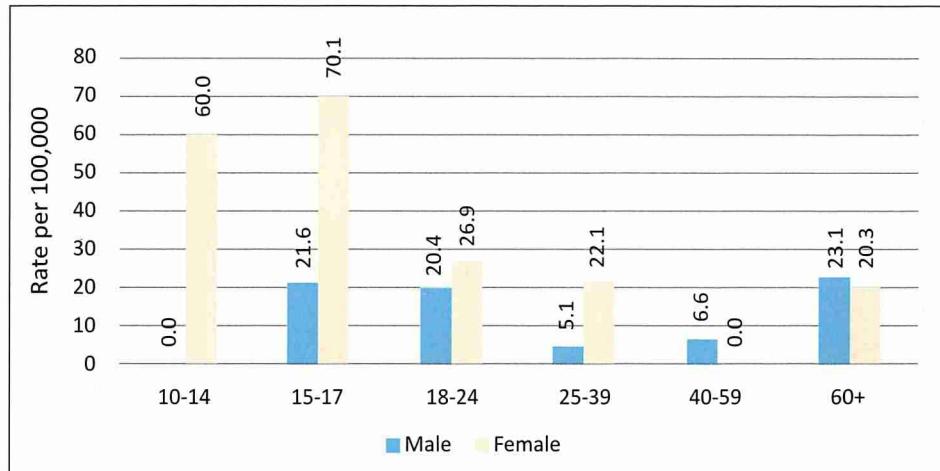
### Suicide rate by age



The all-ages suicide rate was 14.7/100,000. Suicide began in early adolescence and continued in all age groups after that, peaking in late adolescence and then later in old age.

### Suicide rates by age and sex

The all-age suicide rate in males was 8.0/100,000 and 21.4/100,000 in females. There is a clear predominance of females until middle and older age groups.



## Conclusion

BHIS 2016 revealed that injury is one of the major public health problems of both children and adults in Bangladesh. It accounted for 12.2% of all deaths among all age groups. It is estimated that about 109,000 people were fatally injured in the year preceding the survey, about 300 each day. About 20 million children and adults were injured annually, i.e. about 55,000 each day. Over 241,000 people became permanently disabled in Bangladesh, over 660 each day.

Four leading causes of death predominate and count for the majority of all fatal injury in all ages. These are suicide, road traffic injury, drowning and falls. Drowning was found as the leading cause of injury deaths in early and middle childhood. Suicide predominates in adolescents (10-17 years) and young adulthood. Death due to road traffic injuries were found higher in productive age group (25-59 years) and fall was the leading cause of injury deaths in old age. Falls, cuts and road traffic were the three predominant causes of injury morbidity and permanent disability for all age groups.

## Recommendations

The central finding of the BHIS 2016 is that injury is one of the major public health and social issues which deserves immediate attention to reduce these unwanted deaths, morbidities and disabilities. It is the time to strengthen injury prevention, control and rehabilitation interventions and injury needs to be included as integral part of Bangladesh's development efforts. The following recommendations could be considered:

1. Injury should be included in the priority agenda of health issues.
2. A feasible national injury prevention strategy should be developed and implemented.
3. As injury prevention is a cross-cutting issue, a multisectoral committee should be formed involving representatives from the relevant ministries. Ministry of Health and Family Welfare should be the lead ministry. This committee should provide policy guidance, approval of the strategy and provide support to implement the interventions as per plan.
4. Evidence based interventions should be scaled up throughout the country. For example, recent Prevention of Child Injuries through Social-intervention and Education (PRECISE) study, which was conducted by the Centre for Injury Prevention and Research, Bangladesh (CIPRB) in collaboration with United Nations Children's Fund (UNICEF), The Alliance for Safe Children (TASC) and Royal Life Saving Society Australia (RLSSA) with the support of Directorate General of Health Services (DGHS), revealed that Anchal (a community day care centre), and SwimSafe, (a survival swimming teaching to children) together with community awareness activities were effective in reducing injuries including drowning. Large scale implementation of these programmes were also found feasible and acceptable by the communities in Bangladesh. The other notable interventions trialed in Bangladesh include use of playpen by the young children, teaching community with the skills of first response including cardiopulmonary resuscitation (CPR). In the Global Report on Drowning Prevention of the World Health Organization (WHO) also suggested these interventions for the low- and middle-income countries.
5. Existing Management Information System (MIS) to be strengthened to obtain injury data from all sources including community.
6. Government agencies including Ministry of Health and Family Welfare/ Directorate General of Health Services (MOHFW/DGHS) should encourage and support for conducting research to improve understanding of effectiveness of potential interventions for injury prevention.
7. Awareness raising and capacity building on injury prevention should be introduced and encouraged immediately.