Bangladesh Health and Injury Survey
Report on Children

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This report has been prepared under the guidance of

Dr. Md. Abdur Rahman Khan, Director General of Health Services, DGHS.
Prof. Dr. Abdul Hannan, Executive Director, Institute of Child & Mother Health.
Dr. Iyorlumun Uhaa, Chief, Health & Nutrition Section, UNICEF Bangladesh.

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Directorate General of Health Services (DGHS), Ministry of Health & Family Welfare (MOH&FW),
Government of the People’s Republic of Bangladesh

Institute of Child & Mother Health (ICMH), Matuail, Dhaka 1362, Bangladesh
Tel: (880 2) 7512820-3, Fax: (880 2) 7512672, www.icmh.org.bd

United Nations Children’s Fund (UNICEF), Bangladesh Country Office, BSL Office Complex, 1 Minto Road, Dhaka 1000,
Bangladesh, Tel: (880 2) 9336701-10, Fax: (880 2) 9335641-2, www.unicef.org/bangladesh

The Alliance for Safe Children (TASC), 4/1 Sukhumvit Soi 1 Klongtoey Nua, Vadhana District Bangkok 10110, Thailand,
Tel: (66 2) 6554811, Fax: (66 2) 6554814, www.tascfoundation.org

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Foreword

Today, the biggest killer of Bangladeshi children between age 1 and 18 is injury. The greatest killer in this group is drowning, which is the most common single cause of death in children in both the 1-4 age and the 5-9 age groups.

This is a dramatic change from the situation of even two decades ago, and this has largely been due to the success in preventing and treating common childhood diseases, such as diarrhoea, acute respiratory tract infections, and vaccine-preventable diseases. As deaths due to infectious diseases continue to decline, other factors are emerging as the leading causes of death.

Injuries and accidents, in particular drowning, were first detected as a growing cause of death among young children by ICDDR,B’s Demographic Surveillance System (DSS) in Matlab. However, this epidemiological trend was not recognized as a national phenomenon since regular health information systems have difficulties in reporting injury cases and nationally representative data obtained at the community level were not available.

Responding to this need for data, the Directorate General of Health Services (DGHIS), the Institute of Child and Mother Health (ICMH) under the Ministry of Health and Family Welfare (MOH&FW) in collaboration with UNICEF and The Alliance for Safe Children (TASC) conducted the national Bangladesh Health and Injury Survey (BHIS) in 2003. The BHIS is the largest injury survey ever conducted at the community level in a developing country. While the sample size alone gives this survey unique status, (some 171,366 households representing over 800,000 persons), the case-control, environmental and behavioral risk survey and qualitative survey modules included in the BHIS have provided researchers with information on the factors contributing to the high prevalence of specific types of injuries such as drowning, burns, poisonings, and selected intentional injuries. These insights, along with the power of the data in the survey, provide direction for creating interventions to prevent future child injury.

The survey has established conclusively that an epidemiological transition has occurred in Bangladesh, and that injury is now one of the major killers of children. Drowning, in particular, was found to be the single largest killer amongst all causes of injury in children.

Much of the world’s research in child survival has been conducted in Bangladesh, and many of the important interventions have been developed and tested here. The Expanded Programme on Immunisation (EPI), Oral Rehydration Therapy (ORT) and Vitamin A supplementation are some of the best examples of evidence-based interventions to improve child survival developed in Bangladesh. This Report provides key policy makers and decision-makers in Bangladesh with the basis for pioneering injury interventions for child survival which can be applied locally and possibly replicated in other developing countries.

It is encouraging to note that injury is already one of the priority areas for action in the Sector Investment Plan (SIP) of Health, Nutrition and Population Sector Programme (HNPSIP). We hope this report will be a valuable resource for designing and implementing various safety promotion programmes. The government of Bangladesh, UNICEF and TASC are committed to work together to fulfill the rights of Bangladeshi children to survival, development, and protection.

We would like to thank the researchers from ICMH, UNICEF and TASC for their hard work in developing this new national evidence-base for injuries and accidents in Bangladeshi children. We further pledge our continued cooperation and support of the interventions that will now be possible, based on the data presented in this report.

Morten Giersing
Representative
UNICEF-Dhaka
Bangladesh

Pete Peterson
President
The Alliance for Safe Children
Thailand

AFM Sarwar Kamal
Secretary
Ministry of Health and Family Welfare
Bangladesh
# Abbreviations

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<tr>
<td>ANC</td>
<td>Antenatal Care</td>
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<tr>
<td>ARC</td>
<td>Accident Research Centre</td>
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<td>ARI</td>
<td>Acute Respiratory Infection</td>
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<td>ASMR</td>
<td>Age Specific Mortality Rate</td>
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<td>BBS</td>
<td>Bangladesh Bureau of Statistics</td>
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<td>BDHS</td>
<td>Bangladesh Demographic and Health Survey</td>
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<td>BHIS</td>
<td>Bangladesh Health and Injury Survey</td>
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<td>BUET</td>
<td>Bangladesh University of Engineering and Technology</td>
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<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<td>CDD</td>
<td>Control of Diarrhoeal Diseases</td>
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<td>CDR</td>
<td>Crude Death Rate</td>
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<td>CMR</td>
<td>Child Mortality Rate</td>
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<td>DGHS</td>
<td>Directorate General of Health Services</td>
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<td>DMC</td>
<td>Dhaka Metropolitan City</td>
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<td>ECD</td>
<td>Early Childhood Development</td>
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<td>EPI</td>
<td>Expanded Programme on Immunisation</td>
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<td>FGD</td>
<td>Focus Group Discussion</td>
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<td>HMV</td>
<td>Heavy Motor Vehicle</td>
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<tr>
<td>ICDDR,B</td>
<td>International Centre for Diarrhoeal Disease Research, Bangladesh-Centre for Health &amp; Population Research</td>
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<tr>
<td>ICMH</td>
<td>Institute of Child and Mother Health</td>
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<td>IMCI</td>
<td>Integrated Management of Childhood Illness</td>
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<td>IMR</td>
<td>Infant Mortality Rate</td>
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<td>LBW</td>
<td>Low Birth Weight</td>
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<td>LMV</td>
<td>Light Motor Vehicle</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>NCD</td>
<td>Non-communicable disease</td>
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<td>NMV</td>
<td>Non-motorised Vehicle</td>
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<td>PIACT</td>
<td>Programme for Research and Intervention for Development, Education, Training and IT</td>
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<td>RTA</td>
<td>Road Traffic Accident</td>
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<td>SVRS</td>
<td>Sample Vital Registration System</td>
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<td>TASC</td>
<td>The Alliance for Safe Children</td>
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<td>U5MR</td>
<td>Under-Five Mortality Rate</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>VMIS</td>
<td>Vietnam Multi-Centre Injury Survey</td>
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<td>WHO</td>
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- D. Contributors
The Bangladesh Health and Injury Survey (BHIS) is 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. The survey, conducted between January and December of 2003, included all age groups; 43 percent (351,651) of the surveyed population were children. Children are defined in this Report as infants and children of all ages, up to their 18th birthday (0-17 years old).

The BHIS characterises injuries in all age groups, looking at moderate, major, serious, severe, and fatal injuries in detail to better determine the risk factors and some of the social and economic costs related to these injuries. As children represent almost half (47 percent) of the population of Bangladesh, the epidemiology of both fatal and non-fatal injury in the 0-17 age group is of enormous importance to the country.

The survey documented an overall child injury rate of 1,592/100,000 children per year. This means that almost two in every 100 children were injured significantly enough to require medical care, or lost at least three days of school or work in the year before the survey. There were over 30,000 children fatally injured in the year before the survey, that is, roughly 83 children per day, or three children per hour.

The BHIS addresses all causes of death and helps characterise the causes within each age group. Communicable and non-communicable disease is still considered a major concern for children, especially infants. However, a newly identified threat is significantly challenging the placement of this concern. Injury, as documented by this survey, now accounts for 38 percent of all classifiable deaths in children aged 1-17. Not surprisingly, the proportion of injury-related mortality increases as children get older with injuries causing 2 percent of infant deaths, 29 percent of 1-4 year old deaths, 48 percent of 5-9 year old deaths, 52 percent of 10-14 year old deaths, and 64 percent of 15-17 year old deaths. The survey supports the observation that injury is a stage of life issue, and that all children must be considered at risk, not just the under-fives.

The data concerning non-fatal injury is equally staggering, documenting almost a million (955,000) injuries to children in the year prior to the survey. This is more than 2,600 per day, 109 each hour, or roughly 2 per minute. Injury leads to over 13,000 permanent disabilities a year among the children of Bangladesh.

This Report clearly documents a previously unrecognised epidemic of child injury.

In addition to the quantitative survey providing hard data documenting the extent of the problem, the survey also included a qualitative study to capture the cultural and behavioural factors related to the perception of risk, prevention and practices related to injuries. Taken together they provide a road map for future action designed to promote an agenda of safety for children of all ages in Bangladesh.
The principal findings and recommendations from the BHIS are:

1. There is a previously unrecognised epidemic of child injury in Bangladesh, which should be responded to now.

2. In addition to being a leading killer of children after infancy (ages 1-17), injury is also a leading cause of morbidity and one of the major causes of permanent disability.

3. Drowning is the single largest cause of death of children over age one.

4. Drowning, road traffic accidents, burns, falls, suffocation, and intentional injuries are all important contributors to child injury, but they affect children at different stages in their lives.

5. Given the complexity of the problem, an effective response will require the broad integration of injury prevention, response, and rehabilitation interventions into child survival programmes in Bangladesh.

6. Bangladesh has made great progress in addressing the issue of communicable disease which affects infants and children under-five. However, all children, from infancy up through to their 17th year, must be considered at risk of injury and targeted for prevention-based interventions.

7. Focusing programmatic efforts on the under-five mortality rate is important but to do so exclusively is short sighted, especially if the gains made in one age group are lost in another as children mature. The BHIS provides policy and decision-makers with a significant tool for moving the issue of child safety in its entirety, rapidly ahead in Bangladesh.

8. It is child lives that are at stake and the goals that governments and international organisations have set to improve those lives cannot be met unless child injury is addressed as part of the package.
The Bangladesh Health and Injury Survey (BHIS) attempts to quantify the burden of injury and to describe the nature of injury for the Bangladeshi people.
Chapter 1: Background

Background

Global burden of injury

Injury is a leading cause of death and disability in the world. According to World Health Organization (WHO), every year more than 5.8 million people die from injuries, with a rate of 97 per 100,000 population. Of this, 3.8 million (128.6 per 100,000 population) are male and 1.9 million (66.7 per 100,000 population) are female. A quarter of the deaths are due to road traffic accidents, 16 percent are suicides and 10 percent are homicides. Among all age groups, injury is the fifth leading cause of death in the world and accounts for 10 to 30 percent of all hospital admissions. More than one-quarter of injury deaths occurred in South East Asia. The burden of injury in developing countries is not new, however, the recognition of it is.

Historically, child injury was largely associated with industrialised countries. However, a UNICEF/Innocenti Research Centre study published in 2001 showed that over 98 percent of all child deaths from injury occurred in developing countries, where most of the world’s children live. The study found that the rate of child death from injury in low and middle-income countries was five times higher than high-income countries. The major causes of injury are drowning, transport accident, burn, fall, poisoning and intentional injuries.

In low and middle-income countries, children grow up exposed to much higher levels of environmental hazard in cultures that do not have an awareness of safety and risk avoidance, and where social situations make close adult supervision difficult. This is compounded by a lack of preventive services and access to emergency medical care, except for a small minority of urban dwellers. A final significant contributor is the general lack of knowledge and skills in basic first aid.

Child injury in Bangladesh

Child mortality and morbidity

In Bangladesh, births and deaths are seldom recorded, making basic health indices such as causes and rates of death difficult to know with any real degree of certainty. However, basic data available from the Bangladesh Bureau of Statistics and the Bangladesh Demographic and Health Survey shows a steady decline in the Infant Mortality Rate (IMR) and the Under-Five Mortality Rate (USMR). Figure 1.1 shows child survival in Bangladesh has improved significantly over the last two decades. In particular, under-five mortality has fallen by half, from 146 to 76 deaths per 1,000 live births during the last decade.

Although there are few studies where causes of deaths are directly comparable, most public health experts have noted a gradual shift in the cause of child death in Bangladesh from largely infectious disease to largely non-communicable disease and injury. Recent evidence from the Demographic Surveillance System of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) shows a growing proportion of child deaths due to injuries. In 1983, nine percent of all deaths among 1-4 years children were due to drowning, by 2000 this had risen to 53 percent. This shift indicates a sharp reduction in child mortality from infectious diseases, with accidents and injuries now the major concern for child health in Bangladesh. It has been estimated that each year about 25,000 children die of injuries; and half of these children are under five
age\textsuperscript{10}. However, most of the child health programmes in Bangladesh are focused on prevention of infectious and nutritional causes of child death. Injuries and chronic diseases have yet to be addressed.

\textbf{Rationale of Bangladesh Health and Injury Survey (BHIS)}

During last few years, a number of small-scale child injury research projects have been carried out by various institutions. These institutions include the Accident Research Centre at Bangladesh University of Engineering and Technology (BUET), the Centre for Health and Population Research (ICDDR,B), the Institute of Child and Mother Health (ICMH) and the Bangladesh Safe Community Foundation. Studies conducted by these institutions suggest that an epidemiological transition has taken place in Bangladesh and injury is now one of the major causes of mortality and morbidity\textsuperscript{11,12,13}.

The official statistics on injuries are difficult to interpret as there is wide variation among the many figures. For example, there are at least three different estimates of the U5MR in Bangladesh. While there is general agreement that an average of these rates is a good estimate of the U5MR, there is very little data on actual causes of death at the community level which is truly nationally representative. It is generally reported that the leading causes of death in children under five years of age include acute respiratory infection (ARI), diarrhoea, malnutrition and injury as well as non-communicable diseases. Children older than four years of age (5 to 17 years) are usually not included in child health statistics, and it is in these child age groups that injury usually predominates. The epidemiology of fatal and non-fatal injury in the entire child age group (0 to 17 years) is of enormous importance as children represent almost half the population (47 percent) of Bangladesh\textsuperscript{6}.

The Bangladesh Health and Injury Survey (BHIS) was conducted to characterise the epidemiology of injuries using a large, nationally representative, community-based sample. It looked at the incidence of moderate, major, serious, severe and fatal injury in detail in all age groups and determined the epidemiology, risk factors and some social and economic costs related to injuries. Using the data from that Survey, this report focuses on children (0 to 17 years). Further reports will be prepared, investigating the impact of injury on mothers, fathers and significant caregivers of children; reports for all ages will be published separately as well.

\textbf{Objectives}

The BHIS attempts to describe the nature of injury in Bangladesh and to quantify the burden of injury for Bangladeshi people so that comparisons can be made across various population groups; and most importantly, so that intervention and control programmes can be developed. The objectives of the study were to:

- determine the cause of death and serious morbidity of children and their parents
- estimate the incidence and proportional mortality and morbidity due to injury
- describe the pattern and characteristics of injury
- explore risk factors for childhood drowning
- gain an understanding of the behavioural, attitudinal and other factors related to risks, hazards and care-seeking behaviours related to injury
- identify the environmental risk and hazards for injury in and around households
- provide information to design affordable and effective interventions for prevention of child injuries in Bangladesh.
The BHIS is the largest injury survey ever conducted at the community level in a developing country: 171,366 households were included, representing 819,429 infants, children and adults.
Introduction
This collaborative injury study pooled the resources and expertise of ICMH, Directorate General of Health Services (DGHS), UNICEF Bangladesh, The Alliance for Safe Children (TASC) and the Centers for Disease Control and Prevention (CDC-USA). The study was composed of four components. The first component was a cross-sectional national survey looking at the incidence of injury. The second component was a case-control study to determine the risk factors of drowning. The third component was a behavioural study examining knowledge, attitude and practices related to injury; and the fourth component was a risk survey to examine the prevalence of certain risk factors for child injury in the home environment. Detailed methodology of each component is elaborated in the following sections. The methodology and tools used in the BHIS were finalised through consultative meetings involving experts from different organisations under the guidance of the DGHS.

Cross-sectional national survey
A cross-sectional survey was conducted to estimate incidence and proportional morbidity and mortality of injury in children. The field activities for data collection were conducted between January and December 2003.

Sampling
- Twelve out of 64 districts were randomly selected for the survey.
- A separate survey of Dhaka Metropolitan City was included to show the injury picture of a large metropolitan mega-city environment. This sample was included in the national data for the overall analysis.
- Multi-stage cluster sampling was used to select 171,366 households; 88,380 from rural areas, 45,183 from district towns (urban areas) and 37,803 households from Dhaka Metropolitan City.
- In each district, one upazila (rural sub-district) was randomly chosen. In each upazila, two unions (lowest administrative units composed of approximately 20,000 people) were selected randomly. A total of 24 unions were selected for the study. All households in the union were included in the survey.
- The district headquarters of the 12 selected districts and Dhaka Metropolitan City
constituted the urban areas. In the urban areas, mohallas served as clusters and systematic sampling was done to achieve the required number of households.

A household member was defined as a member living in the same house, including domestic helpers, long-term guests, etc. and sharing meals and information. All household residents in the selected urban and rural areas of Bangladesh constituted the sample population. There were a total of 467,778 adults and 351,651 children. The population characteristics are detailed in Appendix C.

Data Collectors
There were 48 data collectors and six supervisors. The data collectors were university graduates with previous experience in community research. They were given extensive hands-on-training with standardised role-playing scenarios, interviewing techniques in real situations, and record keeping. The supervisors were university graduates who had participated in many previous ICMH community research projects.

Research instruments
Data collectors administered a set of instruments at each household. The instruments were adapted from those used in the Vietnam Multi-Centre Injury Survey14 and were pre-tested and revised several times prior to the actual survey. Five sets of forms or questionnaires were used for this survey:

1. Screening Form: to collect age, sex, mortality and morbidity information of household members and injury hazards present at household level.
2. Verbal Autopsy Form: to determine the cause of death, with a form for each age group.
3. Verbal Diagnosis Form: to determine the cause of morbidity, with a form for each age group.
4. Injury Form: to collect information on characteristics of injuries. Separate forms were used for each mechanism of injury.
5. Questionnaire for the control group in the case-control drowning study.

Validation activities for instruments, interviews and results
The screening forms included information to compute various indirect measures of infant and child mortality (preceding birth estimates, sibling survivorship, etc.) to serve as internal validation points for the major child mortality indices. Additionally, the mortality data was structured to allow construction of life tables for comparison with the most recent life tables generated by the national census.

The verbal autopsy modules were based on the VMIS module, which was adapted from the WHO standard for verbal autopsies. Major revisions involved asking specific questions about each type of injury, and extending the age groups to include children from five years to 17 years as well as a module for adults aged 18 years and over (the WHO standard forms are for children under five years of age). All the modules, for all age groups, were tested and validated in the field practice area of the ICMH before use in the national survey. After the verbal autopsy forms were entered, the cause of death was determined by two independent panels of paediatricians in a blinded, two-stage procedure that required consensus on the final cause of death.

As part of the field activities, supervisors re-interviewed 5 percent of all households. This was one of the tasks associated with supervising the data collectors. Additionally, 316 verbal autopsies were audio-recorded by supervisors which were later compared with written verbal autopsy data collected by researchers. This assisted in the validation of data. The data collectors also took photographs of serious and severe injury morbidities and places where the injury occurred.

Respondents
Mothers were preferred as the main respondent. When a mother was unavailable, the most knowledgeable member of the household present at the time of interview was the respondent. Where possible, it was the head of household, with as many members of the household present as possible to corroborate or add detail to the respondents’ answers. The respondents were asked if there had been any deaths in the household in the last year and in the year preceding that. Respondents were then asked
about illness for each member of the household in the last six months. If there were any deaths or illness, the interviewer asked the child’s primary caretaker be present to assist with answers to the questions. If a household was unattended at the time of the first visit, a repeat visit was made before excluding the household.

**Adjustment of data for cross-sectional survey**

The stratified, multi-stage sampling scheme generated a national sample that required weighting to allow for proper representation. Weighting factors were calculated for Dhaka Metropolitan City (DMC) and for districts other than DMC. Weighting factors for DMC were calculated for slum, non-slum and peri-urban populations. For other districts, weighting factors were calculated for rural and urban populations in each district. For the national estimation, the proportional size of the population of DMC and other districts was taken into consideration in calculating final weighting factors.

**Recall bias**

To ensure a sufficient number of deaths were represented in the survey, the recall period was two years in the national survey and three years in Dhaka. (The national sample of 130,000 households was sufficiently large to allow a two year recall period. The sample size in Dhaka was only 40,000 households, requiring a longer recall period). An analysis of deaths by year of recall showed that most fatal events were recalled in the first year of the recall period with a rapid fall off in each year after that (Fig. 2.1 & 2.2). This is consistent with significant recall bias. Due to this, final analysis was conducted using deaths from the most recent year to obtain the most accurate fatality rates. However, many of the sub-classification variables (for example, injury type by age or sex) had a zero frequency as a result. In such cases, where an annualised two or three-year period incidence rate was not zero, this is included and noted. The net effect of using an annualised period incidence rate is to underestimate the rate for that particular variable.

**Case-control study**

A case-control study was done to determine the risk factors of drowning. A total of 141 child drownings were identified in the two years preceding the survey. When a child drowning was found during the interview process, controls were selected and interviews conducted by the same interviewer who found the case.

**Cases:** Drowning deaths in the last two years.

**Controls:** For each child drowning, at least two living children, age and sex matched from the same locality.

**Qualitative study**

The objective of the study was to gain an in-depth understanding of the occurrence of injuries, including the current situation and protection practices for prevention of injuries with a view to developing intervention programmes.

Focus Group Discussions (FGD) were conducted among mothers, fathers, adolescent boys and girls and local elites from urban and rural areas in
Narsingdi District. The Narsingdi District was selected because of its high injury rates, identified by the BHIS quantitative survey. A total of 52 FGDs were carried out on six leading causes of injury (drowning, transport injury, burn, poisoning, fall and animal bite) involving more than 500 participants. Six teams, each consisting of an organiser, a moderator and two note takers who were university graduates in social science and well experienced in FGD conduction were employed. A week-long training programme was organised including classroom exercises and field practice. ICMH principal investigators and social and behavioural scientists from PACT-Bangladesh facilitated the training. Draft FGD guidelines were piloted and then finalised based on the field tests. The discussion sessions were carried out during August and September 2003. Groups of 10 to 12 persons from the target group population were gathered for the sessions. The sessions began with participants requested to recall a real event leading to injury that they may have observed or heard about. Once the storytelling was over and the participants were comfortable in taking part in further discussions, the facilitator explained the prescribed points of discussion and aided the participants to take part in the discussion spontaneously. Professional team members including representatives from ICMH, UNICEF and PACT-Bangladesh monitored the FGD sessions. Manual note taking and audio cassettes were used to record the dialogues throughout the sessions. Field teams prepared final notes on each FGD and then it was transcribed. The primary documentation, field notes and transcriptions were prepared through a consensual process, resulting in the final report.

Environmental and behavioural risk survey

A cross-sectional survey was conducted among the subset of the main survey population to determine the prevalence of swimming skills in rural and urban (other than DMC) populations, to assess the level of these skills, to identify the persons involved in swimming training, to identify the place of swimming training and to determine the age at which children attain swimming skills. The survey also aimed to identify the hazards of accidental poisoning, to assess the risk of cuts and injury from sharp objects in households, to assess the risk of drowning in and around households, to assess risk of burns or fires in households and to identify other injury hazards. A total of 2,598 households from three districts were selected by cluster sampling from the 12 districts of the national injury survey. One rural and one urban area were selected from each
district. From each rural area, 600 households (comprising of about 3,000 people) and from each urban area 250 households (comprising of about 1,250 people) were interviewed. A village was considered as a cluster in rural area and a mohalla was considered as a cluster in urban area. Trained interviewers used a structured, pre-tested questionnaire to collect the following information:

- **Swimming skills** - age, sex, swimming ability, when and where learnt and taught by whom.
- **Poisoning** - poison type, container type, container closure, container label, place kept.
- **Sharp objects/tools** - presence, type and where/how stored.
- **Drowning** - potential place of drowning (inside and outside house).
- **Burn** - type of stove for cooking, water boiler type, hot water container, electricity.
- **Electrocution** - type of wiring (earthen or not, fused or not, extension cord use).
- **Hanging hazard** - curtains, ropes, cords, stair rails.
- **Bites** - presence of household pets and domestic animals; snakes seen nearby.
- **Suffocation** - Place of infant sleeping and sleep position.

A separate report on environmental and behavioural risk survey will be published later.

### Data management and analysis

Data collected in this survey was entered into a data entry programme developed by the investigators using Epi-Info 6. Data was double entered by two different groups and then merged for validation of data entry. After cleaning, the data was exported to SPSS 12.1 for analysis.

### Ethical issues

Informed consent was obtained from all respondents before collecting data. Respondents were assured that the data would only be used for research purposes and all answers were confidential. Consent was also obtained for photographs and audio recordings. Ethical clearance for this study was obtained from Ethical Review Committee of ICMH.

### Discussion

Deaths are best studied where they occur, which is in the community. Data gathered at clinics, hospitals and other levels higher than the community are subject to many sources of bias. Many of the biases are so large that they can lead to data that misrepresents the picture of mortality within the community.

To understand these biases and their importance, it is useful to consider how deaths occurring in the community are reported by the health information system:

1. To report a death at a clinic or hospital, the death must be seen there. Deaths that occur immediately, such as drowning are not seen at clinics or hospitals because parents bury the drowned child (death certificates are rare or non-existent in most areas and a dead child is almost never taken to a hospital). This creates a survivorship bias, where deaths from causes that kill quickly are under-reported; and the quicker they kill, the less likely they are to be reported. Injury is most affected by this as many severe injuries such as drowning, electrocution, falls from heights, etc. are immediately fatal.

2. If a death occurs at the hospital, the cause reported is usually the final cause of death, and not the underlying cause of death. For example, the final cause of death in an elderly person who dies while hospitalised from a hip fracture suffered in a fall is usually an infectious complication (pneumonia), but the underlying cause is actually the fall, which is an injury. Injury and non-communicable causes are most affected by this source of bias, which is a misclassification bias.

3. There are several dozen diseases legally required to be reported by a health facility. These diseases are predominantly infectious and the requirement for reporting creates a systematic reporting bias favouring infectious diseases over non-communicable and injury causes.
4. While many facilities report diligently, a large number do not, and the completeness and accuracy of reporting varies substantially. Thus, information on the cause of death is often unreliable.

These differing types of bias and lack of completeness are often summarily referred to as ‘facility bias’. They make it difficult, if not impossible, to obtain accurate and precise information on injuries in developing countries. Therefore, to obtain the actual pattern of morbidity and mortality at the community level, the BHIS survey was conducted at the household level in the community.

Within household surveys, there are a number of potential sources for bias and they generally fall in two groups: those due to finding the death (enumeration errors); and those due to labelling the death (classification errors).

**Enumeration errors**

The goal of the survey was to include every death from the area surveyed. However, this is impossible to achieve, as at any point in time many normal residents of an area are not present and are unable to give information on deaths within their household. Many residents are part of the migratory population who work or are seeking work outside their districts; many are visiting family members in other communities or are travelling for business or other reasons. Their deaths or their knowledge of deaths of others cannot be determined, and these are lost to the survey. Additionally, there are people who do not want to be counted, visited or interviewed by researchers for a variety of reasons, especially, where there is a legal issue, such as an assault or homicide. These are also lost to the survey. There are also lost deaths due to other reasons: if a person normally not resident in an area is killed in that area, they do not get listed in the survey (their household is elsewhere and not being visited). If a head of household dies, that death and any others in the household are lost, because the household often disbands with the remaining dependents joining families elsewhere.

The net effect of these is to undercount deaths, and this is a factor common to all household mortality surveys in the community, including the census. A general rule of thumb in large household surveys is that even with the most rigorous canvassing it is impossible to find more than 95 percent of total deaths. The significance of the undercounted deaths depends on the amount of undercounting of total deaths, as well as any systematic biases operating to undercount particular types or causes of deaths. Great effort was taken to capture all deaths (and other significant non-fatal health events), but inevitably, some deaths were not counted.

There are differing approaches taken to deal with undercounting. The first, which is often used in large surveys such as the census, is to use a second small survey to ascertain the rate of new deaths found compared to the initial rate, and then to use this to adjust the initial rates. Depending on how rigorous the initial canvas of deaths was, as well as the re-canvas, adjustments by this method commonly increase rates by 10 to 20 percent compared with the unadjusted rates. The second approach is to use existing ‘gold standards’ such as the crude mortality rate, infant mortality rate and child mortality rate from the census, and adjust the survey rates proportionately accordingly to their difference from the gold standard. A third approach is to report the rates "as-is" and show the comparison of the survey rates and the gold standards, as well as showing the results of internal validation measures built into the survey. Users of the survey data are expected to make any adjustments necessary for their specific circumstances.

The BHIS rates reported are not adjusted for undercounting; they are "as-is". Users should compare the agreement of the 2003 BHIS demographic rates with the 2001 census rates (which refer to the count from 2000) adjusted according to their expectations for the three-year time difference. Additionally, two other validation exercises are in progress: a life table analysis is being conducted that will allow age-specific comparison of all-cause mortality with the census rates; an indirectly derived index of early child mortality rates (IECM) from preceding births and sibling survivorship methods are also being prepared. For this initial report, a series of mortality indices were computed from the sample population and compared with the census data (IMR, CMR, CDR, ASMR, etc). There was a high degree of concordance as seen in the following table.
Chapter 2: Methodology

Classification errors

The classification process was standardised. When each household was visited a screening form was used to collect information on the household, including information about the number of household members, age, sex, number of deaths in the household in the last two or three years (depending on the study area), and the number of sick (ill or injured) persons in the household in the last six months. If any deaths or morbidities were identified, a standard verbal autopsy or verbal diagnosis form was completed to determine the cause of death or morbidity. This provided a systematic process of death and morbidity classification that allowed a translation of the layman’s description to a medical diagnosis. When injury deaths/morbidities were detected, injury mortality/injury morbidity questionnaire(s) were used to gather detailed injury related information. Most injury morbidity and mortality was relatively easy to identify as they were often reported as such by respondents (drowning, traffic crash, electrocution, poisoning, etc.); however, classifying communicable and non-communicable diseases was a bigger challenge. To classify these, two panels of medical doctors (paediatricians) were involved, each composed of three members. Each panel began by independently identifying the underlying cause of death (rather than the final cause of death). Each panel then blindly classified these separately and then classifications of the two panels were matched. For discordant cases, the groups met, discussed and reached a consensus. In a number of cases, (10 to 15 percent), there was insufficient knowledge of the death by the respondent to allow adequate classification. It was coded as “cause unable to be determined”. Characteristics of deaths coded as “cause unable to be determined” were compared with those with a known cause to ascertain whether there was a systematic source of classification bias introduced by the classification system.

Issues of sample size

To appreciate the issue of sample size, it is useful to consider the current situation in Bangladesh. The 2001 census found a crude death rate of 5.4/1,000 population. In an average household of five persons about one death can be expected to occur in every 200 households each year. The two groups with the highest mortality rates are elderly persons and neonates. To find a single death in a child older than infancy several thousand households have to be visited. To find a large enough number for statistically reliable rates to be measured, the total number of households surveyed has to be quite large. Despite the enormous sample size, given the relative rarity of fatal events, the confidence intervals around the rate estimates can be wide. This must be recognised when the rates are being interpreted.

Table 2.1: BHIS summary findings versus SVRS 2002

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>4.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Crude death rate</td>
<td>5.4/1,000 population</td>
<td>5.1/1,000 population</td>
</tr>
<tr>
<td>Neonatal mortality rate</td>
<td>34.3/1,000 live birth</td>
<td>36/1,000 live birth</td>
</tr>
<tr>
<td>Postneonatal mortality rate</td>
<td>21.3/1,000 live birth</td>
<td>17/1,000 live birth</td>
</tr>
<tr>
<td>Infant mortality rate</td>
<td>55.6/1,000 live birth</td>
<td>53/1,000 live birth</td>
</tr>
<tr>
<td>Under-5 mortality rate</td>
<td>71.6/1,000 live birth</td>
<td>76/1,000 live birth</td>
</tr>
<tr>
<td>Child death rate</td>
<td>3.7/1,000 children 1-4yrs</td>
<td>4.6/1,000 children 1-4yrs</td>
</tr>
<tr>
<td>Injury death rate (1-17 years)</td>
<td>48/100,000 children</td>
<td>Not available</td>
</tr>
<tr>
<td>Injury morbidity rate (1-17 years)</td>
<td>16.4/1,000 children</td>
<td>Not available</td>
</tr>
</tbody>
</table>
of the events in the last, smallest group may not be sufficient to occur even once. In this case, the rate cannot be determined, as it is below the power of the survey to measure. It is important to recognise that the rate is not zero (i.e., it does not occur); but that it did not occur at a sufficiently high level to be measured.

The sample size for the study was 171,366 households with 819,429 residents - 434,598 rural and 384,831 urban. There were 1,452 child deaths and 19,304 morbidities in the year prior to the survey. This enormous sample size was required in order to provide sufficient power to capture the rare fatal child injury events. To our knowledge, this is the largest survey of injury at the household level in a developing country to date.
Over 30,000 children die from injury each year in Bangladesh. This is 83 children each day, over half (46) die from drowning.
Chapter 3: Mortality Overview

Introduction

In the survey a total number of 1,452 deaths among children 0-17 years were identified in the preceding one year. The causes of these deaths were initially classified into four broad categories: infection; non-communicable disease (NCD); injury; and 'information insufficient for classification'. The specific causes of the deaths that were classifiable were determined, and the top ten leading causes are presented in this chapter. The unclassifiable portion ranged from 11 percent to 26 percent in different age groups. (Detailed information available in table 3.3 of appendix C).

Child injury is a stage of life issue. Injury rates dramatically change with the changing stages of a child’s life.

Table 3.1: Ratio of deaths by category in Bangladesh

<table>
<thead>
<tr>
<th>Age</th>
<th>Infection</th>
<th>NCD</th>
<th>Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>27,300</td>
<td>28,500</td>
<td>1,000</td>
</tr>
<tr>
<td>Children 1-17</td>
<td>13,000</td>
<td>4,300</td>
<td>10,800</td>
</tr>
</tbody>
</table>

Table 3.1 shows that infectious and NCD deaths greatly outnumber injury deaths during infancy, with over 27 infectious deaths and over 28 NCD deaths for each injury death. This is due to the infant’s physical dependence on the mother or caretaker, which provides protection from most injuries. However, the situation changes dramatically when the infant begins to walk at age one. The young child is now independent and has greatly increased unsupervised exposure to environmental hazards. After age one, over the next 17 years of childhood, there are almost equal numbers of children killed from injury as infectious causes (1:1.2) and over twice as many children killed from injury as non-communicable causes (2.5:1).

As infancy is relatively injury free, it is more appropriate to report injury rates for infancy separately. In this report, injury rates are reported separately for infants and children 1-17 years, or the childhood age groups (1-4 years, 5-9 years, 10-14 years, and 15-17 years).

Proportional mortality by category

Injury accounted for 38 percent of all classifiable deaths in children aged 1-17. Injury caused 2 percent of infant deaths, 29 percent of 1-4 year old deaths, 48 percent of 5-9 year old deaths, 52 percent of 10-14 year old deaths and 64 percent of 15-17 year old deaths (Fig.3.1). In infants, death due to non-communicable diseases was higher than infectious diseases, as almost two-thirds of these deaths occurred in the neonatal period, and most of the neonatal deaths were the result of birth-related causes, which were coded as non-communicable diseases.

Leading causes of child deaths

The tables that follow show the leading causes of child deaths by age of child. The causes of death, where there was a large number of deaths associated with them, within each of the three main categories (infection, non-communicable, and injury) were ranked by frequency to determine the leading causes of death. Within the three categories of death, specific causes of death that had only one or two deaths associated with them were not ranked as single cause, but as 'other'. Where there were more than 10 causes, only the
As mortality in infants generally occurred in the neonatal period, neonatal causes (low birth weight, preterm, etc.) predominate. Injury was not a large cause of infant deaths, with falls being the tenth leading cause (Fig. 3.2).

Drowning was the leading cause of death in children aged 1-4, followed by pneumonia. The drowning rate was 86.3/100,000 and it accounted for 26 percent of mortalities in the age group. Malnutrition, diarrhoea, meningitis, septicaemia, transport injuries and dengue were among the top ten causes of mortality in children aged 1-4 years (Fig. 3.3).

There was a direct relationship between age and injury. As age increased, so did the proportion of children dying of injury, which was 48 percent in children aged 5-9 years. Drowning was the leading cause of death, responsible for 29 percent of deaths. The rate of drowning in this age group was 26.2/100,000. Transport injuries, animal bites and electrocution were also leading killers for children aged 5-9 years (Fig. 3.4).

Transport injury, falls, drowning and animal bites were four of the five leading causes of death in the 10-14 year age group, and accounted for almost 44 percent of all deaths (Fig. 3.5).

Neonatal deaths and respiratory infections remain as major concerns for child survival.
Injury was responsible for five of the ten leading causes of death among children aged 15-17 years (Fig. 3.6). In this age group, suicide was the leading cause of death (38 percent), with animal bites, transport injury, drowning and violence among the other leading causes.

In children aged 1-17 years, drowning was the leading cause of death, responsible for almost one-quarter of deaths, followed by pneumonia, malnutrition, diarrhoea and meningitis (Fig. 3.7).

Fig. 3.8 shows there were differences in rates between males and females in many of the leading causes of deaths in the 1-17 age group, but none of these differences were statistically significant.

**Age specific causes of injury mortality**

Injury mortality rates by age are presented in the following figures.

As seen in Fig. 3.9 suffocation was the major cause of fatal injury (30.9/100,000) in infants. The fatal injury rates from falls, drowning and burns were 24.7, 18.5 and 6.2/100,000 respectively.
Drowning was the leading cause (86.3/100,000) of injury death in 1-4 year old children. It accounted for more than 90 percent of fatal injuries in this age group (Fig. 3.10).

As seen in Fig. 3.11 drowning was the major cause of injury mortality (26.2/100,000) in the 5-9 year age group and accounted for about 60 percent of fatal injuries. Transport injuries began to appear as a significant cause in this age group.

On reaching the 10-14 age group transport injuries become the leading cause of fatal injury (7.8/100,000) among children, followed by falls, drowning, and animal bites with rates 3.9, 2.9 and 2.9/100,000 respectively. Intentional injury (homicide) appeared for the first time as a leading cause of injury death (Fig. 3.12).

Fig. 3.13 shows intentional injury (suicide, most often by poisoning) was the leading cause of fatal
injury among 15-17 years children at the rate of 23.5/100,000. Even though animal bites and transport injury were significant as other causes of fatal injury, suicide was responsible for over half (57 percent) of fatal injury deaths in this age group.

For the child age group 1-17 years, drowning was the leading cause of injury death. The other five leading causes of fatal injuries were transport injuries, animal bites, suicides, falls and electrocutions (Fig. 3.14).

There were differences in rates between males and females for many of the causes of deaths from injury in the 1-17 age group (Fig.3.15), but none of these differences were statistically significant.

The numbers in table 3.2 represent the total number of child deaths (infants and children 1-17) resulting from injury in 2002, the year preceding the BHIS. The numbers were computed by applying the age-specific fatal injury rates found in the BHIS to the actual numbers of infants and children in Bangladesh in each age group according to the SVRS (adjusted for 2002). The numbers in a projection such as this are susceptible to all the errors inherent in the BHIS rates as well as those in the SVRS rates. They should be interpreted with appropriate caution and in light of the confidence intervals for the BHIS. They are offered as one measure of the importance of the child injury issue in Bangladesh.

**Discussion**

The epidemiology of child deaths from injury is both simple and complex. It is simple in that as a single factor, injury is the leading cause of child death after infancy. It is complex however, in that in each stage of the child’s life after infancy, the pattern of injury death changes.

First and foremost, it is clear that injury is the result of the interaction of the child with it’s environment. During infancy, interactions with the environment, and the potential hazards in that environment are controlled by the mother or other primary caregiver. This is usually an adult, and as a result, injury rates are very low. Exceptions to this occur when the adult is actually the cause of the injury (overlayment and suffocation of the infant) or is not actively supervising the infant.
(falls, burns and drowning). In the later stages of the child’s life, the child itself determines the interaction, and the injuries resulting from that interaction are influenced by the child’s growth and development stage, as well as its ability to learn from experience. Early in toddler-hood, the child is small in stature, has limited co-ordination and strength, is confined mainly to the home and is unaware of the hazards presented by water, fire, animals and heights. Thus, while drowning predominates, burns, falls and animal bites are also leading causes of injury death, and almost all fatal events occur in and immediately outside the home. Later, in middle childhood when the child is socially active and ranging further with friends and schoolmates, drowning remains high, but further away, and in larger bodies of water. Road traffic accidents (RTA) become a significant cause of death as the child is frequently exposed to traffic as a pedestrian or bicyclist. As the child enters the adolescent years, the characteristics of adolescence including the pressures and demands from approaching adulthood such as early marriage and employment, intentional injury becomes a leading cause of death.

Therefore, a focus on one type of injury or one age group will not be an effective approach to child injury reduction. Child injury reduction will require interventions across the different stages of a child’s life and which address the differing types of injury; both unintentional and intentional.

Secondly, the BHIS demonstrates convincingly that an epidemiological transition has occurred in Bangladesh, largely as a result of enormous efforts in health development that have literally transformed the pattern of mortality in the country over the last three decades. It is an amazing achievement, accomplished primarily through the focus on young children and their mothers. As a result, after infancy, the single leading cause of death in children is now drowning; in any child age group, injury is either the leading killer or a leading killer; and in the late adolescent years, intentional injury is the leading cause of child death. In order to continue the downward pressure on child death rates, injury will have to be targeted as single-mindedly and effectively as the previous leading causes of child death: infectious diseases.

Thirdly, most early childhood mortality is now compressed into the infant age group, and within this group, most death occurs in the first month of life. Most of the mortality previously occurring from infectious causes in early childhood is now occurring later in childhood from injury. This shifting and splitting of the bulk of mortality from a single span of years beginning at birth and ending by age five, into multiple areas that encompass later stages in childhood mandates a mid-course correction to continue to effectively target mortality in the child age group.
Figure 3.16 shows the vast majority of mortality in the under-five age group occurs in infancy and within this period, most occurs in the neonatal period—the first month of life. This distribution strongly indicates the need to continue the focus on infant mortality reduction as a priority. Within this period, the real target now becomes neonatal mortality, and the focus on finding affordable and sustainable ways to provide perinatal services that include emergency obstetric care to all pregnant women in Bangladesh. Eighty percent of pregnancies in Bangladesh are in rural areas and these pregnancies are the main contributors to neonatal mortality. Reducing the rate of neonatal mortality will be a monumental challenge, requiring major changes in the current health infrastructure. Developing effective, affordable and sustainable interventions will require a great deal of operational research and programmatic effort.

Figure 3.16 also shows that while injury is an issue in infant mortality, it is greatly overshadowed by neonatal causes, non-communicable disease and infections. Where injury occurs, it is mainly in the postneonatal period, and involves suffocation and falls in the early post-neonatal period and drowning in the late postneonatal period. However, injury is a leading cause of child deaths in the rest of the under-five age group, from age 1-4. Within this group, drowning is the single largest cause of death, accounting for over a quarter of all deaths. To reach the Millennium Development Goal (MDG) of U5MR reduction, drowning mortality in the 1-4 age group will need to be targeted, as well as neonatal mortality.
Figure 3.17 shows that further significant reductions in child mortality in the middle and adolescent age groups will only be possible through directly targeting injury as the leading cause of child mortality in these age groups. Accidental causes predominate in the 5-9 age groups, and intentional causes predominate in the 15-17 age group; there is a mix in the 10-14 age group. Thus, effectively addressing injury in childhood from the age of five years and up will require interventions in both unintentional and intentional injury.

The success of the child survival effort in Bangladesh has fundamentally changed the pattern of mortality in Bangladesh. To continue the encouraging decline in child mortality will require integration of child injury prevention into the current programme mix and a broadening of its focus from child survival to child protection. How to best accomplish this should be a major new focus of operational research.
Chapter 4

Morbidity Overview

Almost 1 million children are injured each year, seriously enough to be disabled, hospitalized or miss three or more days of school or work. This is over 2,600 children each day.
Morbidity Overview

Introduction

Mortality is relatively easy to study, as there are only two outcomes - alive and dead. In contrast, for morbidity, there are many possible outcomes with different levels of severity. At one end of the spectrum is what might be called "minor" injury, or injury that does not require medical attention. This type of injury does not result in lost school or work, and does not incur social or economic costs, for example, a scraped knee. At the other end of the spectrum is the highest degree of severity, short of death, where injury causes permanent disability; for example, a broken neck with full paralysis of the body (quadriplegia). Severity levels in between are not standardised and have many operational definitions. The definitions used in the BHIS are:

### Moderate
Sought medical care but not admitted to hospital; or had at least a three-day work loss or absence from school or inability to do normal daily activities, but had no permanent disability. Three days was set as the minimum number following extensive discussions with social scientists and epidemiologists familiar with Bangladeshi cultural norms.

### Major
Hospitalised for a period of less than 10 days but no permanent disability.

### Serious
Hospitalised for 10 days or more, but no permanent disability.

### Severe
Permanently disabled (loss of vision, hearing, handling, ambulation, or mentation) regardless of whether hospitalisation occurred.

BHIS did not include injury (or illness) that did not incur a cost. To be included, an injury had to result in seeking care, or missing school or work or inability to do normal daily activities. This requirement for inclusion in the survey was to enable the BHIS to examine the economic and social costs of injury.

Most of the costs of injury are incurred as a result of non-fatal injury. Fatal injury often occurs quickly, and in Bangladesh most deaths from injury occur outside the hospital, with little direct economic costs for medical care. Non-fatal injuries, which result in hospitalisation have higher economic costs for medical care. Categorising non-fatal injury by different severity levels allows comparisons of types of injuries at comparable levels of severity. This allows for the determination of factors such as social and economic burden of injury in a meaningful way. For example, comparing all children injured from falls with all children injured by machines is difficult as there are great differences in distribution of severity. Most children (over 90 percent) injured from falls did not require hospitalisation, and less than 2 percent had permanent disability. However, about 15 percent of children injured by machines were hospitalised and over 6 percent were permanently disabled. The nature of the injury and the physical forces involved in the two events differ, and the amount of trauma and severity of injury differs. By using the same level of severity of injury, it is possible to more directly compare injury from falls with injury from machines to determine the relative economic and social burden of each type of injury.

Finally, it must be noted that like fatal injury, non-fatal child injury is a stage of life issue as well. Non-fatal injury rates dramatically change with the changing stages of a child’s life.

Table 4.1: Ratio of morbidities by category in Bangladesh

<table>
<thead>
<tr>
<th>Age</th>
<th>Infection</th>
<th>NCD</th>
<th>Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>13,700</td>
<td>1,500</td>
<td>1,000</td>
</tr>
<tr>
<td>Children 1-17</td>
<td>85,000</td>
<td>14,000</td>
<td>49,000</td>
</tr>
</tbody>
</table>

Table 4.1 shows that infectious and NCD morbidities greatly outnumber injury morbidities during infancy, with almost 14 times as many infectious morbidities and one and a half times more NCD morbidities than injury morbidities.
This is because the infant is physically dependent on the mother or caretaker and is protected from most injuries. However, the situation changes dramatically when the infant begins to walk at age one. The young child is then independent and has greatly increased unsupervised exposure to environmental hazards. From this point on, over the next 17 years of childhood, there are 49 times as many children injured than in infancy. (On a per-year basis, this is about three times as many). As infancy is relatively free of injury, it is more appropriate to report infancy injury rates separately rather than combined with childhood (1-17 years). In this report, injury rates are reported separately for infants and children aged 1-17 years, or the childhood age groups (1-4 years, 5-9 years, 10-14 years, and 15-17 years).

**Proportional morbidity by category**

A total of 19,304 morbidities were identified among all children (0-17) in the year preceding the survey. About a third of total morbidities were due to injury. About 5 percent of morbidities did not have enough information reported to be classifiable by cause.

Fig. 4.1 shows only 6 percent of infant morbidity was caused by injury. Proportional morbidity due to injury was much higher in the older age groups, with 26, 40, 37 and 38 percent among 1-4, 5-9, 10-14, and 15-17 year old children respectively.

**Leading causes of childhood illness**

For the infant age group, acute respiratory tract infection (ARI)/pneumonia was the leading cause of morbidity. Injury occurred at lower rates than other causes and was predominantly falls and burns (Fig. 4.2).

![Figure 4.1: Cause-specific proportional morbidity, all children](image1)

![Figure 4.2: Leading causes of illness in infants](image2)

![Figure 4.3: Leading causes of illness in children aged 1-4](image3)

ARI/pneumonia and diarrhoeal diseases were the first and second leading causes of morbidity.
among children aged 1-4 years. Burns, falls and near-drowning were among the top ten causes of morbidity among children in this age group (Fig. 4.3).

There was a direct relationship between age and injury as a cause of illness. As age increased, so did the proportion of children injured. Falls were the leading cause of morbidity in children aged 5-9 years (Fig. 4.4).

Injury accounted for the second, fourth, seventh and ninth leading causes of morbidity in the age group 10-14 years (Fig. 4.5). As seen in Fig. 4.6 the pattern of morbidity in the late adolescent age group (15-17 years) was very similar to that of the early adolescent age group (10-14 years).
The higher morbidity rates in the early and middle child age groups (1-4 and 5-9) skewed the distribution of morbidity by cause in all children towards that of the lower age groups (Fig. 4.7).

There were sex differences in rates in the leading causes of illness. The male predominance in ARI, diarrhoea, fever, falls, cuts and transport injury was statistically significant. The rest were not (Fig. 4.8).

**Age specific causes of injury morbidity**

The injury morbidity rate was 1,636/100,000 for children aged 1-17. The stage of life issue as it relates to injury morbidity can clearly be seen in Fig. 4.9. Infants had the lowest injury rates. Injuries dramatically increased to a peak in early childhood (1-4 years) and then decreased in the older age groups.

Fig. 4.10 shows there was a strong male predominance in injury morbidity rates in all age groups. The differences were statistically significant in all age groups except infancy.
Injury severity

The largest proportion in each age group was moderate, followed by major, then serious and severe (Fig. 4.11).

External causes of non-fatal injury

While injury rates were very low in infants, falls and burns predominated (Fig. 4.13).

Burns, falls and near-drowning were the leading causes of non-fatal injury in toddlers (Fig. 4.14).
Transport injury became more prominent in children aged 5-9 years (Fig. 4.15).

Fig. 4.16 shows cut injury and transport injury were increasingly important as a cause of morbidity in the early adolescent age group (10-14 years).

Overall, the leading causes of morbidity from injury were falls, burns, cuts, transport injury, followed by lower rates of other injury causes (Fig. 4.18).

The male predominance is statistically significant in all injuries in children 1-17 except poisoning (Fig. 4.19).

**Permanent disability from injury**

Permanent disability is the highest level of severity for non-fatal injury in the BHIS. This level of classification was chosen due to the enormous social, medical and other economic costs incurred over the rest of a child’s life when they become
permanently disabled. There are many other causes of permanent disability besides injury (birth trauma, congenital defects, and complications of many infectious and non-communicable diseases) but injury is one of the leading causes, if not the leading cause, in the childhood age groups. The infant age group does not appear in the following set of figures because not enough cases of permanent disability were found to enable a meaningful distribution. This is likely to be due to the rate of occurrence in infants being below the power of the survey to measure. It is unlikely that there was no permanent disability due to injury in infants.

Falls from heights and severe burns were the most common causes of permanent disability in children aged 1-4 years (Fig. 4.20).

Cuts resulting in major nerve damage and amputations along with burns were the leading causes of permanent disability in the age group 5-9 years. Violence was a significant cause as well (Fig. 4.21).

Falls from heights and severe burns were the most common causes of permanent disability in children aged 1-4 years (Fig. 4.20).
As seen in Fig. 4.22 burns and falls stand out as the two leading causes of permanent disability in children aged 10-14 years.

Transport injury and falls tied for the leading cause of permanent disability in 15-17 age group (Fig. 4.23).

As seen in Fig. 4.22 burns and falls stand out as leading causes of permanent disability in the overall child age group (Fig. 4.24).

Fig. 4.25 shows with the exception of infancy, permanent disability rates were almost double in males compared to females. The sex differences in each age group were statistically significant. The lack of permanent disability in male infants and females in the 15-17 age group was most likely due to insufficient power, rather than a lack of occurrence. For the females 15-17, the rate was probably too low for the BHIS to measure, as the leading cause of permanent disability in this age group was likely to be RTA, and females in this age group have very low RTA rates, due to very low exposures compared to males (see Chapter 6 for details).

Fig. 4.26 shows the full spectrum of severity for non-fatal injury. Severe injury, causing permanent
disability, is really the "tip of the ice-berg" in relation to the rest of non-fatal injury. For each permanently disabled child, there were two other children hospitalised for at least 10 days, or who had major surgery as a result of the injury. There were four other children hospitalised between one and nine days, and 64 children who required medical care, or missed three days of school or work.

The numbers in tables 4.2 and 4.3 represent the total estimated number of child morbidities and permanent disabilities (infants and children aged 1-17) resulting from injury in 2002, the year before the BHIS was conducted. The numbers were computed by applying the age-specific non-fatal injury rates found in the BHIS to the actual numbers of infants and children in each age group according to the SVRS (adjusted for 2002). The numbers in a projection such as this are susceptible to all the errors inherent in the BHIS rates as well as those in the SVRS rates. They should be interpreted with appropriate caution and in light of the confidence intervals for the BHIS. They are offered as one measure of the importance of the child injury issue in Bangladesh.

**Table 4.2: Estimated number of permanently disabled infants and children due to injury**

<table>
<thead>
<tr>
<th>Injury Types</th>
<th>Per Year</th>
<th>Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>3,754</td>
<td>10</td>
</tr>
<tr>
<td>Burns</td>
<td>3,412</td>
<td>9</td>
</tr>
<tr>
<td>Cut injury</td>
<td>1,706</td>
<td>5</td>
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<tr>
<td>Transport injury</td>
<td>1,365</td>
<td>4</td>
</tr>
<tr>
<td>Machine injury</td>
<td>1,024</td>
<td>3</td>
</tr>
<tr>
<td>Falling object</td>
<td>853</td>
<td>2</td>
</tr>
<tr>
<td>Violence</td>
<td>512</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>512</td>
<td>1</td>
</tr>
<tr>
<td>All injuries</td>
<td>13,134</td>
<td>36*</td>
</tr>
</tbody>
</table>

*Total and individual numbers not equal due to rounding of fractional numbers.

**Table 4.3: Estimated number of infants and children injured**

<table>
<thead>
<tr>
<th>Injury Types</th>
<th>Per Year</th>
<th>Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>281,529</td>
<td>771</td>
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<tr>
<td>Burns</td>
<td>172,842</td>
<td>474</td>
</tr>
<tr>
<td>Cut injury</td>
<td>122,508</td>
<td>336</td>
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<tr>
<td>Transport injury</td>
<td>111,417</td>
<td>305</td>
</tr>
<tr>
<td>Near-drowning</td>
<td>68,761</td>
<td>188</td>
</tr>
<tr>
<td>Animal bite</td>
<td>59,036</td>
<td>162</td>
</tr>
<tr>
<td>Electrocution</td>
<td>46,410</td>
<td>127</td>
</tr>
<tr>
<td>Falling object</td>
<td>31,565</td>
<td>86</td>
</tr>
<tr>
<td>Violence</td>
<td>24,229</td>
<td>66</td>
</tr>
<tr>
<td>Machine injury</td>
<td>17,404</td>
<td>48</td>
</tr>
<tr>
<td>Poisoning</td>
<td>5,801</td>
<td>16</td>
</tr>
<tr>
<td>Others</td>
<td>13,821</td>
<td>38</td>
</tr>
<tr>
<td>All injuries</td>
<td>955,322</td>
<td>2,617</td>
</tr>
</tbody>
</table>

The numbers in tables 4.2 and 4.3 represent the total estimated number of child morbidities and permanent disabilities (infants and children aged 1-17) resulting from injury in 2002, the year before the BHIS was conducted. The numbers were computed by applying the age-specific non-fatal injury rates found in the BHIS to the actual numbers of infants and children in each age group according to the SVRS (adjusted for 2002). The numbers in a projection such as this are susceptible to all the errors inherent in the BHIS rates as well as those in the SVRS rates. They should be interpreted with appropriate caution and in light of the confidence intervals for the BHIS. They are offered as one measure of the importance of the child injury issue in Bangladesh.

**Discussion**

The same statement made about fatal child injury is appropriate for non-fatal child injury; it is simple and complex at the same time. Simple, in that it is a leading cause of morbidity, and complex for several reasons:

- There is only one outcome for a fatal injury, and the social, economic and other costs of fatal injury are relatively straightforward. In contrast, non-fatal injury, with its multiple outcomes spans a range of outcomes that vary from minor nuisance, to permanent disability with all of its life-altering consequences and extraordinary social and economic burdens.
- It may be overly simplistic, but it can be said that the costs of fatal injury are fixed and relatively finite as compared to the real costs of serious injury morbidity, which has higher direct and indirect economic costs and greater social burdens.
- The social burdens of many types of non-fatal injury (particularly intentional) far outstrip the economic costs associated with fatal injury.
- Fatal injury can only happen once; in contrast, non-fatal injury can happen (and usually does) multiple times over the various stages of development of the child.

The BHIS did not look at what might be called "minor" injury. The lowest level of severity that was permitted for inclusion in the survey required direct medical care or loss of school, work or normal daily activities. Given the very high rates
of non-fatal injuries of all kinds, in all age groups, in both sexes, and in both urban as well as rural areas which satisfied these criteria, it is clear that injury in infants, children and parents in Bangladesh imposes a burden on daily life that is harsh, relentless and often brutal.

There are clear gender and other equity issues apparent in the BHIS results which will, by their nature, mean that successful interventions will need to be undertaken with a trans-generational approach. Schools and other social institutions that are currently employed in other equity issue approaches will be fundamentally important in decreasing both the rates of the specific injuries as well as the equity gap.

The health sector will be a necessary and central partner in injury prevention in children, as they are often the gatekeepers to mothers, having programmatic contact with them at key access points in a child’s life, first at the fetus stage, then at the neonate stage, and later during the dangerous transition from infancy to childhood with its increased risk of injury. Many of the prevention efforts for child injury will necessarily be focused on mothers and other caretakers and decision-makers. However, in contrast with many of the child survival programmes, the child itself will be a major focus for much of the prevention and response programmes. Other gatekeepers to older children will be key in injury prevention. One key sectoral gatekeeping partner for UNICEF and Government of Bangladesh injury programmes will be teachers and the education sector. In Bangladesh this is writ broadly, with partners in government, in NGOs in the madrassas and other religious schools and in the private sector. All will be key partners in injury prevention for children.

Injury cannot be prevented in its entirety, and any comprehensive approach must include injury response and rehabilitation programmes. The results of the BHIS show that a strategy of simply increasing the numbers of clinical facilities and health personnel will not solve the real issue of injury response-appropriate and effective first-response care to injured children (and parents and other adults). Even if there was a functioning system of emergency medical care in rural areas where 80 percent of the population lives, it is a hollow victory to transport to hospital a child RTA victim who has an intact spinal cord immediately after the crash, but then was rendered a quadriplegic because the only available first responders-the child’s friends and adults around them-did not have the basic first aid knowledge to prevent that outcome. It will be decades before there is a functional emergency response system that covers all of rural Bangladesh, where trauma and other injury rates are several times that of urban areas. The only practical way to provide widespread first aid knowledge and first-response
skills to children that are effective in a public health sense, is to teach them these basic life skills as a component of the school system. UNICEF has a programme called "Facts For Life" (FFL) and endorses a "Life Skills Approach" in many of the programmes for over-five children. TASC has advocated for the adoption of "Skills For Life" (SFL) as a companion to FFL and clearly, non-fatal (and fatal) injury rates will not fall until there is widespread acquisition of first aid and basic trauma response skills as necessary components of an SFL programme. Given Bangladesh’s centralised educational training system, it would be possible over several years to create an entire national legion of children as first responders. They would have the ability to swim and the skills for rescue when their friends are at risk of drowning; to splint a fracture and prevent the potential for amputation later; to stop severe bleeding and prevent shock and rapid death; to know to "drop and roll" to put out clothing fires; to perform abdominal thrusts when their friends are choking; and so on. Currently, when injured, the usual responses either do not help or worsen the degree and severity of the injury incurred.

The figures 4.27 & 4.28 clearly show that injury is an issue in each stage of the child’s life, and that it’s toll increases as the child becomes older. The distribution of injury, throughout the stages of life of the child mandates that it be addressed in each stage. Arguments to the contrary, or about whether to focus on the over-fives as well as the under-fives, whether to deal with intentional injury or only unintentional injury, or whether an integration of injury prevention into a protection approach threatens resources for the continued success of child survival need to be evidence-
based. The BHIS provides clear and compelling evidence that injury is a key health issue for children. Each year almost a million children (955,000) are injured seriously enough to require care or miss school or work, and over 13,000 children are permanently disabled. This is a daily toll of over 2,600 children injured and 36 permanently disabled. This is over a hundred children each hour—a staggering figure in pain and suffering that is preventable. Many of the potential interventions and prevention approaches are discussed in the following chapters on the specific types of injury.
Drowning is the leading cause of injury for children.

- Almost 17,000 children die from drowning each year. This is over 46 each day.
- Over 68,000 children become victims of near drowning each year and narrowly escape death.
Drowning and Near-drowning

Introduction

Drowning may seem like a simple event to define, however, classifying it as an injury is not simple. For example, drowning when swimming for pleasure can easily be classified as drowning. However, if the swimming was to escape a natural disaster, for example a flash flood or the sinking of a ship, it could also be classified as a death due to a natural disaster or as a transportation fatality which are two entirely different classifications.

There is an issue of whether drowning is always fatal, or can be survived. Many people think of drowning as an always fatal event that cannot be survived. Others think of near-drowning as an outcome that is never fatal. For the purposes of interpreting the data obtained from this survey, it is important to recognise the definitions used in the survey.

In the BHIS study, the definition used for drowning was: death resulting from suffocation within 24 hours of submersion in water; victims of near-drowning survive for at least 24 hours. Thus, drowning is always a fatal event and near-drowning may or may not be. If the drowning occurred due to direct exposure to water NOT involving water transport, it was a drowning. If it occurred as a result of a water transport mishap, then it was a water transport death. Drowning during a flood was considered to be drowning, but drowning related to a ship sinking was considered a transport fatality.

Magnitude of drowning

The fatal drowning rate among children 1-17 years 28.6/100,000; males 32.4/100,000 and females 24.8/100,000.

![Figure 5.1: Drowning rates by age](image)

Drowning peaked in the 1-4 age group and then rapidly declined as age increased (Fig. 5.1).
There was no statistically significant difference in rates between males and females in any age group (Fig. 5.2).

Fig. 5.3 shows that among children, one-year olds had the highest rates, with rates falling rapidly for the older children. The rapid decline in drowning rates after the first year is likely related to development. As a child develops in the second and third years of life, they acquire co-ordinated motor skills and physical stature. A child who is almost one metre tall is able to stand in shallow ditches and ponds and not drown. They also have the physical strength to pull themselves out of a ditch or shallow pond. Most drowning occurs within the window of hazard formed between the first steps in infancy and the end of the third year. The reciprocal relationship between swimming ability and drowning that is clearly evident after this window closes is convincing evidence that swimming skills are the public health “magic bullet” for drowning of children after age four. There are two key issues clear in this relationship: 1) that children in a country like Bangladesh with no pools, no certified life guards and no other infrastructure assumed to be necessary for teaching swimming on a large scale can acquire swimming skills, in the context of their normal environments, 2) that it is a cultural norm, at least in rural areas, that children learn to swim very early, as most rural mothers are aware of the very high drowning hazards for their children, and see swimming as a necessary life skill.

**Magnitude of near-drowning**

The age pattern of near-drowning was identical to that of drowning, only the rates of near-drowning were several times higher (118/100,000 near-drowning; 28.6/100,000 drowning) among children 1-17 years (Fig. 5.4).
Most near-drowning (94 percent) was moderate in severity and did not result in hospitalisation. Six percent of near-drownings were major which resulted in hospitalisation. All of those hospitalised were in the younger child age groups (1-4 and 5-9) as shown in Fig. 5.5.

Factors associated with drowning

Significantly different drowning rates were observed among different age groups of rural and urban children in Bangladesh. The differences are most likely due to the differences in urban and rural environments regarding water sources. Urban areas have few, and rural areas have many. Children aged 1-4 years old in rural areas had the highest drowning rate (136.9/100,000). The age groups 10-14 and 15-17 do not appear as there were too few drownings in these age groups to enable a meaningful comparison between urban and rural distributions (Fig. 5.6).

More than three quarters of drownings took place in bodies of water less than 20 metres from the house. Infants drowned in bodies of water very close to the house, within 10 metres (Fig. 5.8).

As shown in Fig. 5.7 natural bodies of water such as ponds, ditches, lakes and rivers were common places of drowning. Ponds were the most common place of childhood drowning in Bangladesh. More than 80 percent of drowning occurred in natural water bodies as opposed to man-made containers (tubs, buckets and drums). Infants drowned in ponds and ditches near their residence, and not in lakes or rivers at further distances from their residence. Toddlers (1-4 years) mainly drowned in ponds and ditches outside the home, and in buckets, tubs and drums inside and in the house yard.

Fig. 5.9 shows water bodies where drowning occurred were used for bathing and washing (33
percent), collecting cooking and drinking water (13 percent) and raising fish (20 percent). About one-third of the water bodies where drowning occurred, were not used for household work.

Studies in Matlab reveal a seasonal pattern of drowning which shows a clear increase in child drowning in the rainy season peaking in the summer (July) with the winter relatively free of drownings. The BHIS has almost a similar pattern of seasonality except a sudden decrease in July and increase in December in the year prior to the survey due to reasons which are not clear (Fig. 5.10).

Almost all (97 percent) drownings occurred during the daylight between 0600 hours and 1800 hours (Fig. 5.11).

Fig. 5.12 shows almost half (42 percent) of the drowned children were either working or playing near the water reservoirs before drowning.

Fig. 5.13: Swimming skills of drowned children over 4 years
As shown in Fig. 5.13 most of the drowned children could not swim. Almost half (46 percent) were under four years of age and too young to know how to swim. Among those five years or older, an age where they could have learnt to swim; only 7 percent of drowned children could swim. Swimming skills appear to be highly protective for drowning prevention.

In about two-thirds of instances (64 percent) when children drowned, they were alone, or accompanied by someone who was not capable of rescuing them (Fig. 5.14).

At the time of the child drowning more than two-thirds (67 percent) of mothers or caregivers were involved in household activities; 16 percent were working outside and 7 percent were sleeping or talking with others (Fig. 5.16).

For those two-thirds of child drownings where the child was accompanied, almost half were accompanied by children too young to rescue them. Almost one-third (29 percent) of drowning children were accompanied by a child under-five and a fifth (19 percent) were accompanied by a child less than 10 years old (Fig. 5.15).
Risk factors for childhood drowning

Table 5.1: Association between socio-demographic factors and childhood drowning

<table>
<thead>
<tr>
<th>Factors</th>
<th>Drowning cases</th>
<th>Control</th>
<th>OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothers Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary+</td>
<td>28</td>
<td>19.8</td>
<td>91</td>
<td>26.8</td>
</tr>
<tr>
<td>Illiterate</td>
<td>70</td>
<td>49.6</td>
<td>135</td>
<td>39.8</td>
</tr>
<tr>
<td>Primary</td>
<td>43</td>
<td>30.5</td>
<td>113</td>
<td>33.3</td>
</tr>
<tr>
<td>Father’s Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary+</td>
<td>47</td>
<td>33.4</td>
<td>112</td>
<td>33.0</td>
</tr>
<tr>
<td>Illiterate</td>
<td>64</td>
<td>45.4</td>
<td>139</td>
<td>41</td>
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<tr>
<td>Primary</td>
<td>30</td>
<td>21.3</td>
<td>88</td>
<td>26.0</td>
</tr>
<tr>
<td>Mother’s Occupation</td>
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<td></td>
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<tr>
<td>Home maker</td>
<td>135</td>
<td>95.7</td>
<td>326</td>
<td>96.2</td>
</tr>
<tr>
<td>Other than housewife</td>
<td>6</td>
<td>4.3</td>
<td>13</td>
<td>3.8</td>
</tr>
<tr>
<td>Father’s Occupation</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cultivator</td>
<td>98</td>
<td>69.5</td>
<td>221</td>
<td>66.2</td>
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<tr>
<td>Other occupation</td>
<td>43</td>
<td>30.5</td>
<td>118</td>
<td>34.8</td>
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<tr>
<td>Mother’s Age</td>
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<tr>
<td>25-29 yrs</td>
<td>47</td>
<td>33.3</td>
<td>117</td>
<td>34.5</td>
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<td>2.7</td>
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<tr>
<td>20-24 yrs</td>
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<td>14.9</td>
<td>76</td>
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<td>30 yrs</td>
<td>69</td>
<td>48.9</td>
<td>137</td>
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<td>30 yrs</td>
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<td>25-29 yrs</td>
<td>12</td>
<td>8.5</td>
<td>34</td>
<td>10.0</td>
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<tr>
<td>Less than 25 years</td>
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<td>6+</td>
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<td>19.1</td>
<td>90</td>
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<td>86</td>
<td>61.0</td>
<td>205</td>
<td>60.5</td>
</tr>
</tbody>
</table>

Case-control study

A case-control study was conducted as a separate component of the BHIS to identify the demographic, environmental and caring factors associated with childhood drowning. The odds ratios with 95 percent confidence intervals were estimated for various associated factors for drowning and shown in tables 5.1 & 5.2.

Having a mother who was illiterate (OR 1.7) or having five or more children in the family (OR 1.95) were significantly associated with childhood drowning, as well as caring factors such as the main attendant of the child not being the mother (OR 74.5), and the accompanying person of child when drowned not being the mother (25.4). Lack of swimming ability (for children five and over) was associated with childhood drowning (OR 4.5).

Discussion

Drowning is the leading cause of death in children aged one year and over in Bangladesh. Based on the rate reported in the BHIS, in the year preceding the survey, almost 17,000 children drowned or about 46 per day. There was about four times this number (over 68,000) of near-drownings. This was about 188 child near-drownings per day. Drowning rates in Bangladesh are 10 to 20 times the rates of child drowning in developed countries.

There are a number of findings in the survey that are important to consider. First, drowning is predominantly an issue in infants and toddlers aged 1-4, who account for almost half of all drownings. The rates increase as infants begin to walk, and peak during the first year. The onset in late infancy is likely to be the result of mothers being unaware that the child is about to begin to walk, and leaving the child unsupervised thinking they can only crawl. Among children 1-4 years old, one-year olds have peak rates, with rates falling rapidly as the child gets older. The rapid decline in drowning rates after the first year is...
development related, with most drowning occurring within the window of hazard formed between the first steps in infancy and the end of the third year when the child’s physical and mental development has rendered them less susceptible to drowning in the shallow depressions and ditches that are frequently filled with water during the rainy season.

Second, there is a distinct temporal period for drowning, which peaks during the heavy rains and monsoon/cyclone season, and has a nadir in the dry, winter months. Fig. 5.17 shows the usual seasonality of drowning in Bangladesh as determined by the Matlab research site, between 1983 and 1995. There was a clear increase in child drownings in the rainy season which peaked in the summer (July) and the winter was relatively free of drownings with the lowest month January. However, the BHIS has almost a similar pattern of seasonality except a decrease in July and increase in December in the year prior to the survey due to reasons which are not clear.

Third, the place of drowning for infants and toddlers was almost entirely within 10 metres of the house, in ditches, ponds, tubs and drums. They drowned immediately outside the house, while unsupervised by the mother, and either alone or accompanied by a peer or an older sibling.

Fourth, drowning occurs in the daylight hours, and when mothers are often engaged in housework or other chores.

Fifth, it occurs when there are large families, and the mother is busy with other chores and the responsibility of the infant or toddler falls to one of the older siblings, still a child themselves.

Families with illiterate mothers who have many children can be targeted as high-risk as the findings of the case-control study are very clear. Illiteracy in the mother is a possible marker for traditional roles, rather than a factor in itself. These mothers lack education, not intelligence, and when given facts regarding risks for their very young children, can use that for the benefit of their children. Similarly, having more than five children is also a likely marker for this traditional role, and one that necessitates assigning supervision responsibility onto an older sibling of the infant or toddler. Unfortunately, the older sibling is him/herself not yet capable of supervising an infant or toddler with the critical attention necessary. Informing these mothers that an older sibling must be well developed before they are capable of performing child supervision, and working with the mothers to discuss alternatives for adult or adolescent supervision of the youngest children should allow them to find ways to increase supervision, and to reduce the drowning hazards (fencing around the pond, etc).

It is clear that for children over five years of age swimming is a necessary life skill for survival in a country such as Bangladesh. The good news is that most children over five in rural areas do acquire this life-saving skill, and as a result, drowning rates dramatically decrease. The reciprocal relationship between swimming ability and drowning that is clearly evident is convincing evidence that development of swimming skills is the public health "cure" for the epidemic of drowning in children after age four.

There are two key issues in this relationship: 1) children in a country like Bangladesh with no pools, no certified swimming instructors or life guards and no other infrastructure assumed to be necessary for teaching swimming on a large scale can acquire swimming skills, in the context of their normal environments. 2) it is a cultural norm, at least in rural areas, where children learn to swim very early. Most rural mothers are aware of the very high drowning hazards for their children, and see swimming as a necessary life skill.

There are some obvious interventions that are appropriate and affordable in the context of Bangladesh. Health workers can identify
households with four or more children; inform the mother of the risks to her younger children and the need to provide adult supervision to the youngest children; and survey the home for water sources nearby and devise ways to decrease access to these (fences, door gates, etc).

For all mothers, health workers can use the nine month EPI visit for measles immunisations to counsel the mother on the need to increase supervision of the infant in the next several months as they begin to walk. A hazard checklist for drowning hazards could be given to mothers at this visit (suitable for both literate and illiterate mothers) allowing them to critically appraise their homes for drowning hazards to their youngest children. It could also encourage them to teach their children to swim at an early age. Finally, given the fact that homes are the most hazardous places for children for injury of all causes, not just drowning, the EPI-centred drowning hazard reduction could include other injury hazards to young children (burns, falls, poisons, etc). That would provide continuing reductions in injury hazards to the children as they grow up in the home.

Bangladesh has an opportunity to integrate drowning prevention (and other injury prevention) programmes into the existing child survival and development programmes. The existing EPI programme provides one direct contact to mothers of children at nine months who are entering the window of drowning risk. Given that drowning is the single largest contributor to under-five deaths in the post-infant period, (over a quarter of all deaths are between the years 1-4) fully integrating a drowning hazard reduction programme into the existing EPI programme would rapidly reduce the U5MR and help Bangladesh achieve its MDG goal in this critical area. Fully integrating a home-hazard based intervention programme (Child Safe Home) for drowning plus other leading injury causes of early child death and disability (burns, poisons, animal bites, etc) with EPI, ARI, CDD and ECD programmes would provide a commensurately greater decrease in U5MR.

Using programmes and communications channels to encourage all mothers and fathers, urban as well as rural, to ensure their children learn to swim as early as possible, will provide children with a critically needed life skill in Bangladesh. Any programme that leads to swimming skills in young children will decrease drowning later in childhood, and as drowning is the leading single cause of child deaths from one to 17 years, responsible for nearly one quarter of deaths (23 percent) this will certainly decrease overall child mortality. Joint UNICEF/TASC research currently underway to define norms, safe methods and hazards in inter-generational swimming skills transmission will be helpful in this regard. Using this knowledge, it will be possible to develop an appropriate, effective, and sustainable early childhood swimming programme with national coverage to meet the goal of having all children learn to swim as a needed life skill in a country such as Bangladesh.
Road traffic accidents kill over 3,400 children each year.

This is about 9 children each day.
Transport Injury

Introduction

Bangladesh is a country often described as a delta formed by the three major rivers and their tributaries that intersect the country. Boats, barges, ships and rafts are major sources of transport for most members of the populace. In some regions, boats, launches and steamers are the main means of transportation, especially in the southern part of the country. Natural disasters like floods and cyclones cause frequent boat and launch capsizings and a considerable number of lives are lost every year.

For road traffic accidents, the accident situation is worsening in Bangladesh. Data constraints and widespread under reporting of accidents prevents the real magnitude of the road accident problem from being known, but the available data indicates that road accidents and fatalities are increasing in Bangladesh. Factors responsible for this increase include rapid urbanisation, large scale shifts of traffic previously carried by rail and boat to roads, poor socio-economic conditions, lack of enforcement of traffic safety regulations, and poor engineering factors. In 1982, the accident fatality rate was 125.7 per 10,000 vehicles. This rose to 170 in 1992. This rate was the highest in Asia, and almost 100 times more than Norway and Sweden. One study from the only orthopaedic hospital in Bangladesh reported that over half (56 percent) of total emergency patients were the victims of road traffic accidents. About 80 percent of road fatalities occurred on rural sections of the main highways. In urban areas, pedestrians represent up to 70 percent of road fatalities. The estimated total annual cost of road traffic crashes is approximately US$ 750 million.

Transport injury types

Despite the importance of water transport in Bangladesh, most transport related deaths are due to road transport. Ferries and other ships frequently sink in Bangladesh due to overcrowding and other unsafe practices, and drowning deaths because of this often reach several hundred per year. However, while the sinking of ships cause large losses of life, they are sporadic by nature. Road trauma occurs around the clock, day in and day out. All transport deaths found in BHIS were related to RTA.

In children aged 1-4 years and 5-9 years old, the rate of fatal RTA was higher among females than males. In children aged 10-14 years, fatal RTA was about three times higher among males (11.6/100,000) than females (3.9/100,000). The lack of fatal RTA in females aged 15-17 years old is likely due to the power of the survey being insufficient to determine the rate in this group. It is probably less than the rate in 10-14 year old females, but not zero (Fig. 6.1 & 6.2).
Non-fatal transport injury rate is highest in 15-17 years. Rates increased for males as age increased, but decreased for females. This most likely reflects the different gender roles for males and females in Bangladesh, with fewer females spending time outside the house (and at risk of RTA) than males in the ages 10+ when gender roles become strong factors (Fig. 6.3 & 6.4).

Significantly different non-fatal transport injury rates were observed in all age groups of rural and urban children in Bangladesh except in infants and children 1-4 years (Fig. 6.5).
More than 40 percent (8 out of 19) of fatal RTA occurred among pedestrians. Heavy motor vehicles caused 32 percent of the fatal injury (Fig. 6.6).

More than 40 percent of the road users in fatal RTA were passengers and an equal proportion were pedestrians (Fig. 6.7).

Among all children, non-motorised vehicles were the main (39 percent) transport involved in non-fatal injuries. Next in proportion were pedestrians (36.3 percent). The highest proportion (52 percent) of non-fatal injuries occurred among children aged 5-9 years, who were pedestrians (Fig. 6.9).
Consequences of Road Transport Accidents
Hospitalisation and severity

The pattern of severity can be seen in this figure. Most (79 percent) RTA injuries were moderate in severity (did not require hospitalisation). One percent, 8 percent and 12 percent of the injuries were severe, serious and major in nature respectively. Levels of severity increased in the older age groups, with children in the 10-14 age group having the largest proportion of severity requiring hospitalisation (Fig. 6.10).

Discussion
RTA was the second leading cause of fatal injury and the sixth leading cause of death in children 1-17 years. The rates were high enough to be seen at all levels of severity, from fatal to permanent disability and lengthy hospitalisation as well as simply seeking care or missing school. At the rates found in the BHIS, over 3,400 children were killed by RTA in the year prior to the survey, most of them as pedestrians. That is over nine children each day. Due to the high levels of trauma incurred, it was the fourth leading cause of permanent disability from injury, responsible for over 1,360 children being permanently disabled or almost four children each day. It was the eighth leading cause of morbidity in children, causing over 110,000 child injuries, or over 300 per day.

There is a clear male predominance in most age groups for both fatal and non-fatal RTA injury. This is because of the gender roles that predominate in Bangladeshi culture, and which leads to different exposure rates for males and females to the various RTA hazards. As a generalisation, females spend much more time at home and do not go outside the home with the same frequency as males. This places them at lower risk of RTA and this is seen in the rates. One of the most visible areas is in the age groups where the different
gender roles become the social norm. In the 10-17 age groups, the female rates for fatal and non-fatal RTA are less than a quarter of the males. It is also particularly visible in comparing risks for the two sexes regarding specific types of RTA. In early childhood the rates are closer to parity, as male and female toddlers both play or walk near roads at about equal rates, and are struck as pedestrians at almost the same rates. However, in middle childhood, when children begin to ride bicycles as a major means of transport, there is a stark difference in fatality rates between males and females, in large part because in Bangladesh, females rarely, if ever, ride bicycles.

Child RTA prevention poses many challenges. Developed countries have made great progress in making the transportation infrastructure much safer, with controlled access to highways and other engineering approaches that result in separation of traffic streams, less harmful barriers, greatly decreased injury hazards within vehicles, and in massive investments in enforcement and education. Clearly, these work, and work well. But just as clearly, these are not options in the here-and-now in a country such as Bangladesh. The road infrastructure is flooded annually and is constantly being washed out; just keeping it passable is a major challenge. Enforcement requires a massive investment in traffic police to be anywhere near a ratio of police to drivers that is effective and this creates an unsustainable burden in benefits and other retirement issues that would be necessary to support the expanded civil service. The same issues make it financially impossible to move forward with sufficient health sector investment to provide emergency medical services of the level that have contributed so much to the developed world’s record of rapid reduction in traffic-related fatalities. Finally, most child RTA injury occurred as pedestrians, so developed country technologies such as seat belts, air-bags, child seats and helmets, have no effect on these injuries.

The current approach to RTA prevention in the developing world with its focus on trying to adopt the strategies and technologies that have been so effective in the developed world face major constraints beyond finance and personnel. There are barriers related to culture and level of development that will need to be lowered
significantly in order to establish an effective national RTA programme. For example, basic literacy is required for driver training and understanding of signs and road hazards; and creation of new behavioural norms for road discipline will be required. Ultimately, as development progresses they will have an impact, but this will be a process likely to be decades long. In the space of one decade, over fifty thousand Bangladeshi children will be killed or permanently disabled by RTA; several hundred thousand will be hospitalised and an additional hundred thousand children will lose their parents due to RTA. It is clear that Bangladesh need to embrace a more immediate, more sustainable and more feasible approach to this epidemic of RTA injury. A well designed primary and secondary school curricula with knowledge and skills appropriate for each level of child development would have a significant impact on the toll that RTA imposes today. Young children are mainly killed or injured as pedestrians, and they could be given the knowledge and the skills to more safely share the existing road system. Schools themselves are points where children converge within the transportation system and much could be done to make them safer places for coming and going to school. Traffic calming measures and controlled pedestrian access to schools can easily be incorporated into a Safe Schools programme. Given that there is a centralised training system for the schools in Bangladesh through the teachers training colleges, it is possible to quickly implement a skills-based programme taught by teachers that would have a rapid and sustainable impact on the child RTA epidemic, and over time, through inter-generational knowledge transfer and growth and with legions of students trained, would provide the basis for a national impact.

A schools-based system would also be an opportunity to provide skills for response as well as prevention. The current reality is that there is no effective emergency response to children (and adults) injured through RTA. Many children needlessly die or are permanently disabled as a result. Child pedestrians are most likely to be accompanied by their peers when struck, and if their peers were trained in basic trauma response skills through a school-based programme, it is likely that more children would survive with fewer permanent disabilities. Given the factors of time and the group effect, the students trained would form a base for an effective national first response system, for all injury, not only for RTA.
Burns injure over 170,000 children each year, and permanently disable over 3,400 children.
**Introduction**

In developing countries, burns are important causes of injury mortality and morbidity, often ranking as a significant source of mortality after traffic injuries, drowning and falls. House fires and clothing fires are the most severe and lethal events, but are less frequent than scalds and other mild to moderate burns. Scald injuries are particularly severe as they often lead to permanent disability from the extensive scarring over large body areas, or blindness from corneal scarring.

Most burn injuries in developing countries, particularly among children and women, occur in homes. Most homes are heated by burning wood or coal in open fires, and cooking is done on the same, open fire. Since most homes are single-room dwellings in rural areas, there is always close proximity of children and fire or scalding liquids. This is the case in Bangladesh as well, where almost all rural homes (which make up 80 percent of all homes) have open fires or kerosene stoves for cooking and heating. Rural homes are often single room homes, or with rooms separated by reed curtains, and with a separate area set aside for cooking, with no way to effectively exclude children from the cooking area. Children commonly help the mothers in cooking and thus are also exposed to many sources of fire and hot liquids. Additionally, most rural homes are engaged in rice farming, and the newly harvested rice is boiled to loosen the husks in large, pressure cookers commonly made from discarded oil drums. Children are commonly exposed to these as they help in the threshing and processing of the rice, and the home-made rice boilers commonly leak and occasionally explode, showering everyone nearby with scalding, superheated water.

**Burn injury pattern**

There were only two fatalities for children due to burns in the survey sample, one in a male infant, and one in a male toddler in the age group 1-4. These numbers are too small to use for meaningful fatal burn patterns across the child age group. Despite the low fatality numbers, the high incidence rates mean that fatal burns are still a major problem for Bangladeshi children. About 340 children are fatally burnt each year in Bangladesh, with almost one children dying each day from burns. Fatal burn injury was 0.6/100,000/year among all children. The rates for the infant and 1-4 age group are listed in tables 3.12 and 3.13. The rest of the data cited relates to non-fatal burn injury in children.

As shown in Fig 7.1 the highest non-fatal burn rate (782.1/100,000) was among children 1-4 years old. Burn injury rates were highest in these toddlers, in direct consequence of the high exposure rates for them to many burn and scald hazards in the typical Bangladeshi home, and their lack of stability in walking as well as their lack of knowledge about the hazards of stoves, lamps, cooking surfaces or hot liquids. The risks decrease rapidly as the child gets older, acquires dexterity and acquires knowledge through experience about the risks of hot objects and liquids.

The following Fig. 7.2 shows that there is a male predominance through infancy, early and middle childhood until the age of 10, when gender roles place females at higher risk due to cooking and other roles with higher fire exposure rates. Non-fatal burn injury was higher among females in the...
older age groups, with 114.3 and 110.9 per 100,000 female children of 10-14, and 15-17 year old compared to 58.2 and 54.0 per 100,000 male children of the same age groups (Fig. 7.2).

Burn injury had a rural predominance in all age groups (Fig. 7.3).

Fig. 7.5 shows 90 percent of burns occurred at home (inside and immediately outside).

Three-quarters of burn injuries occurred inside homes; more than half of them occurred in the kitchen or kitchen area (Fig. 7.6).

Consequence of burn injury

For children 1-17, most of the burns (93 percent) were moderate in severity. However, in each age group there were more serious burns, and in all age groups there were burns serious enough to cause lengthy hospitalisation and/or permanent disability (Fig. 7.7).
As shown in Fig. 7.8, children burnt or scalded seriously enough to require hospitalisation, the source of the burn or scald was about the same in all age groups; one-third open flame, one-third hot object and one-third hot liquid. Infants were permanently disabled by scalds, toddlers aged 1-4 by hot objects (mainly walking or falling into hot ashes left in open fires), and children 5-9 by open flames. Older children were permanently disabled by all three major sources of thermal injury. There were no 15-17 year olds permanently disabled by burns (Fig. 7.9).

**Discussion**

Burns were the fifth leading cause of child injury in Bangladesh, and the survey shows there were over 340 children burnt to death in the year prior to the survey, or about one per day. Almost 173,000 children were burned significantly enough to require medical attention or suffer serious consequences, including permanent disability. This was about 474 children each day. Burns were the second leading cause of permanent disability from injury in children, with over 3,400 permanently disabled, almost nine per day. Even in cases of non-permanent disability, it was a significant cause of loss of school days, as
well as hospitalisation and medical expense. There is also the very real social burden incurred through burn injury: the scarring and disfigurement associated with burns of young children have major effects on their lives as adults, especially when it occurs to young girls.

Bangladeshi culture has several unique factors that increase burn risks for children. First, rice is a staple of the daily diet, and it is boiled, rather than steamed as is most common in East Asia. (Boiling rice requires much larger volumes of water than steaming it and the steaming process leaves no left-over rice water to set aside to cool). Large quantities of rice are boiled every day in most homes, resulting in large pots of scalding liquid being set aside after the rice is boiled. Thus, in the typical rural home in Bangladesh with only one room and a portion of it set aside for cooking, large pots of scalding rice water on the floor or on a table presents a serious scald hazard to children.

Second, Bangladeshi people prefer the use of round-bottomed pots called hari or patil that have flared tops and no handles for cooking rice and boiling liquids. As seen in the photographs, these large pots have no fixed tops and with no handle and rounded bottoms, present serious risks for tipping over, spilling or burning while handling, especially when used by children.

Third, tea and coffee is an important part of Bangladeshi culture and it is prepared fresh when served, and this involves boiling water in the round-bottomed hari preferred in Bangladesh, rather than using closed thermoses to store hot water as is common in East Asia. Burns and scalds are frequent for those preparing tea and coffee as well as creating a scald hazard for children when the unused water is set aside to cool.

The high rate of fatal burns in children aged 1 - 4 and the very high rates of non-fatal burns that require hospitalisation in infants as well as children show this is a major public health and safety issue for Bangladeshi children. One of the most common burn injuries in infants and young children is scalding which causes severe morbidity, but is not usually fatal. From a public health perspective, scalding is one of the largest child health problems due to the enormous burden
in direct medical costs as well as later, the high social costs from the disfigurement and permanent disability. Another similar injury is burns from fire ash, as very young children commonly walk or fall into the open fire pit where the hot ashes envelope the extremity and part of the trunk. These cause extensive burns and scarring, often resulting in severe burns and permanent disability. These injuries are preventable.

In Bangladesh, most homes in urban areas do have separate rooms for kitchens, and thus young children can be kept isolated from cooking stoves, which often have the round-bottomed pots filled with hot or boiling water. Most kitchens typically have a raised platform at a height of one-metre for stoves and pots, pans and thermos jugs. This height is a dangerous height as it is just at arm's length for toddlers and very young children. When left unsupervised and when pots are simmering, very young children can pull the contents of the pans directly on to themselves. This results in severe injury as large areas of the body are scalded when this happens. Since the toddler is looking up when pulling the pot down, severe facial burns accompanied by blindness often occurs. Relocation of the cooking surface to a different place, using pots and pans with flat bottoms and handles and turning the handles so they do not extend over the floor, or best, isolation of the cooking area from the place where the toddler is active are all potentially appropriate, cheap and effective prevention measures. It is more difficult in the rural environment to keep children separate from cooking stoves and fires, as most houses are one room dwellings or do not have solid walls with closable doors between rooms. In these circumstances it is important to train mothers to place stoves and pots containing hot water (from boiling rice, for example) in areas that are difficult for children to reach, to place barriers around open fire pits and to dispose of hot ashes in ways that prevent children from being burnt. Mothers should also be encouraged to use containers with handles, and keep toddlers away from the food preparation area.

Given the high burn rates for children in Bangladeshi households, a Safe Home programme
that helps mothers to identify the obvious burn hazards for their children and modify the child’s household environment to reduce the burn hazards would have an enormous payback in reduced permanent disability rates and the social burden that burns create. The fact that most of the serious or severe burns in infants and young children result from scalds, or ashes associated with cooking provides evidence that focusing on the kitchen or cooking area for hazard reduction would likely result in decreased permanent disability for children.

As infants are victims of scalding, the most effective way to implement the programme would be as a combined effort with poisons, falls and other causes of infant injury. Implemented as a part of an ante-natal care, it is an effective way to integrate infant and child injury prevention in Safe Motherhood programmes.
Falls are the leading cause of non-fatal injury with over 770 children injured each day.

Falls are one of the major causes of permanent disability in children, disabling 10 children each day.
Introduction

Falls are generally the most frequent non-fatal injury in childhood in developed countries and in other developing countries where they have been studied. They were also known to be very common in Bangladesh. Several studies in Bangladesh have shown that falls comprised one-third of total childhood injuries and that falls from trees and tree-related injuries are the main cause of hospital admission due to trauma among children\textsuperscript{11,22}. Major categories of falls in Bangladesh are fall from trees, cliffs, buildings, through windows or from roofs, from furniture and jumping or diving into water.

Fall injury pattern

The fatal fall injury rate was 2.8/100,000 for children of all ages.

Fig. 8.1 shows rates were highest in infants, and the high fatality rates in this age group were most likely due to the vulnerability of infants to brain injury due to soft skulls with bones not yet fused together. Falls from even low heights can result in fatal brain injury. Infants sleeping in the same bed with their parents often fall off the bed while crawling around, even as their parents sleep.

The fatal fall injury was significantly higher in female infants than in male infants. It is not clear whether this gender difference was due to chance or other reasons. The lack of incidence in both sexes in early and middle childhood, and the absence of falls in the 15-17 group were most likely due to insufficient power of the BHIS to find these rates rather than there being no falls in these age groups (Fig. 8.2).

Non-fatal falls were very common in all age groups, as can be seen from the high rates, including infancy. The highest rates were in the early and mid-childhood when children are most active and still developing motor skills and coordination (Fig. 8.3).
Non-fatal falls were significantly higher in males than in females in all age groups. This predominance in males was seen in all other age groups for non-fatal falls. The highest non-fatal fall injuries (726.5/100,000/year) were among male children 5-9 years old (Fig. 8.4).

Non-fatal fall injury rates were higher in rural areas than in urban areas. However, significant differences were observed in infants, 5-9 years and 10-14 years age groups (Fig. 8.5).

About half the falls were from the same level and about half were from different levels. The proportion of falls from these two levels was almost the same in different age groups of children (Fig. 8.6).

Over half of falls in infants occurred from beds and tables.
Chapter 8: Fall Injury

Not surprisingly, the higher the fall, the higher the level of severity of the injury incurred from the fall. Almost a third of falls leading to permanent disability (severe) were from heights of more than 10 metres (Fig. 8.7).

Stumbling was the major cause (41 percent) of the same level fall among children. Slipping or tripping was the next common cause (31 percent) of the same level fall (Fig. 8.8).

Sports areas were the most common place (34 percent) for same level non-fatal fall injuries. Most of these falls occurred while children were engaged in sports and games (Fig. 8.9).

Fig. 8.10 shows accidental falls were the predominant cause of different level non-fatal fall injuries.
About one-third of different level falls occurred from trees. Over half (55 percent) of falls in infants occurred from furnitures, mainly beds (Fig. 8.11).

The highest proportion (44 percent) of falls happened from a height of 1-5 metres. However, about one-quarter of falls occurred from heights of more than 5 metres (Fig. 8.12).

Most of the falls were moderate in severity. About 2 percent of falls resulted in permanent disability. Infants tended to have a higher proportion of falls requiring hospitalisation (over 20 percent) than other age groups (Fig. 8.13).

Falls from trees are one of the main cause of hospitalisation.
Discussion

In Bangladesh, as in most developing and developed countries elsewhere, falls were the leading cause of child injury, and in the year prior to the survey, there were over 280,000 children injured in falls, or about 770 per day. Falls killed over 1,700 children (almost five per day); and were the leading cause of permanent disability due to injury in children, responsible for over 3,750 children being permanently disabled in the year prior to the survey, over 10 children per day.

The places that children fell from in Bangladesh were not dramatically different than in developed countries. However, the severity of the resulting injury was generally higher. Over a third of falls occurred while children were engaged in sports and play. These happened without the usual protective gear that children in developed countries wear; the sports and recreational areas are often bare earth, or hard macadam covered road surfaces.

Children engaged in sports and play in developed countries often have adult supervision while playing, and access to emergency medical services, or at least have peers who are knowledgeable about basic first aid and the measures needed to be taken to prevent further injury or disability where the falls have resulted in broken bones or potential spinal cord injury. This is not the case in Bangladesh, and children who suffered serious injury from falls, whether at home or outside the house were almost always unsupervised by the mother, and either alone or accompanied by a peer or an older sibling.

Bangladeshi homes are hazardous places for children, and this is especially true for falls. Even infants had relatively high rates of falls, with subsequent serious injury (22 percent of infant falls resulted in hospitalisation). Infants are especially vulnerable to brain trauma, given their soft, incomplete skulls, and many serious fall injuries occurred when infants fell from the bed.
while the parent was sleeping, or while placed on raised surfaces and left unsupervised.

For older children, homes have many fall hazards in them as well; stairs and roofs often lack railings, the stair cases usually have non-standard pitches (heights and depths of treads), electrical extension cords often snake across the floor, etc. The floors in urban areas are often bare tiles or concrete and in rural areas hard packed earth. The immediate area outside the house often contains very tempting places for young children who love to climb; many homes have water towers, roofs are usually easily accessed by young children, and trees are "child magnets".

A Safe Home programme is clearly needed in order to render homes less dangerous for children. Given the frequency and severity of infant falls, educational efforts aimed at expectant mothers as part of the usual antenatal care programme would likely reduce these. A checklist given to parents of young children that focused on hazard identification and risk reduction for fall hazards in the typical home would be one way to reduce these.

The most common first responder for a child other than an infant, who has suffered a serious injury as a result of falling, will almost always be a peer or older sibling. Currently, they lack even a basic knowledge of how to properly respond, and often increase the severity of the fall injury, sometimes causing permanent disability and even death. A Safe School programme that incorporated basic first aid and first response skills in the curricula that was appropriate for the different age groups would be one effective way of addressing this issue. It would also provide a greatly needed first-response capability for children at the community level, and if implemented as a national programme, would likely have a substantial and beneficial impact for all post-event injuries, whatever the cause.
About 350 children are victims of cut injury and 5 of them become permanently disabled each day.
Chapter 9: Cut Injury

Introduction

Cut injury primarily relates to the mechanism of injury. It is classified as such because in Bangladesh, there is an almost universal exposure of children to sharp cutting objects in every environment they find themselves in. In developing countries and predominantly in rural Bangladesh, children are surrounded by sharp objects in their daily lives. Sharp objects are ubiquitous regardless of age or sex, such as knives and other cutting implements used in domestic chores; farm tools used in cultivation of crops or animal husbandry, and tools used in home handicrafts such as weaving.

Non-fatal cut injury

The universality of exposure is clearly seen in the high rates that were almost uniform in all age groups after infancy in the figure above. Even in the infant age group, cut injury was a relatively common occurrence at 18.5/100,000 infants (Fig. 9.1).

The cut injury rate among all children was 204.7/100,000. The highest cut injury rate (246.0/100,000) was in children aged 5-9 years old. The cut injury rate was highest (325.7/100,000) among male children in the 10-14 year age group (Fig. 9.2).

Children have universal exposure to sharp instruments.
While cut injury was significantly higher in rural areas, it is noteworthy that cut injury rates in all child age groups were high in urban areas and had the same pattern as rural areas. However, urban infants do not seem to have the same hazardous exposure to sharp objects that their rural peers do (Fig. 9.3).

As shown in Fig. 9.4 most (40 percent) non-fatal cut injuries were caused by knives or knife-like cutting instruments. The second most common cause was rubbish on the ground (glass, brick chips, snail shell etc) followed by agricultural tools (hoes, sickles, etc).

Overall, for children aged 1-17, 94 percent cut injuries were moderate. Five percent required hospitalisation, and 1 percent caused permanent disability. Children in the 5-9 and 10-14 year age groups had the highest permanent disability rates (Fig. 9.5).

Discussion
At the rates found in the BHIS, in the year prior to the survey over 120,000 children suffered cut injuries, or over 330 per day. Over 1,700 children were permanently disabled each day (almost five per day) from cut injuries. It is a major public health problem for children in Bangladesh, both in urban and rural areas, but appears to be especially serious in rural areas. Clearly, a Safe Home programme is needed to reduce the risk of sharp object exposure for young children.
The rural nature of Bangladesh means most children are reared in homes engaged in agriculture, and this means frequent exposure to sharp tools and cutting machines, often in the house, as well as in the fields. Children are at risk from sharp objects and tools stored in the homes and yards, as well as in using them to help with chores. This increased risk of cut injury in children in rural areas is a common theme in developing countries elsewhere, as children usually supply a large amount of the family labour in the fields. However, Bangladesh culture has a unique issue that increases cut risks for very young children. This is the almost universal use of a special kind of knife that is especially hazardous to children. This is called a boti. The boti, as seen in the following photograph resembles a small sickle with a set of feet to keep it steady and the blade positioned pointing up. It is hazardous in that the blade is kept steady, and the object being cut is pressed into the blade, usually using both hands and the hands are moved into the blade in order to cut the object. In contrast, the usual (and safer) way of cutting is to keep the object being cut stationary, and holding the blade in the hands and slicing the object to be cut in a motion away from the hands and body. This type of cutting instrument, a boti, is often quite large, and usually the person using it sits on it or uses a foot to keep it steady. This also increases the hazard in using it, and the size makes it unlikely to be kept in a drawer or elsewhere out of reach of children. Thus, it is often present on the floors where infants and young children are playing nearby, and makes a tempting object of play. Constructed with feet so that it is always facing up with the blade exposed, it is extremely hazardous to toddlers and anyone who walks or falls nearby.

Given the almost universal use of boti by Bangladeshi women and men for cooking and cutting chores, it will be difficult to get most homes to abandon its use in favour of safer cutting instruments. However, parents can be educated to place it in a cabinet or on a shelf in a box to keep it away from young children. Even in the setting of the poorest one room home, being placed on its side in a box and left in a corner will decrease the hazard it presents to young children.
Other, less hazardous cutting instruments would be rendered less risky to children if they were placed in boxes, drawers, or simply stored on high shelves out of reach of children. A Safe Home programme that incorporates a systematic approach to identifying the predominant cut hazards for children in and around the home, and then provides knowledge for parents on how to render these hazards less risky would likely pay great dividends in lower cut rates, especially for infants and very young children. For maximum effectiveness, it should be implemented as part of a broader Safe Home programme focused on reducing the other hazards for the children within the house.
86 children are injured by falling objects each day, and 2 are permanently disabled.
Falling Objects

Introduction

Being struck by falling objects is a frequent cause of injury in developing countries. In contrast to developed countries, which have building codes, standards, and populations who have been educated into a culture of safety, children in developing countries are often exposed to all manners of falling objects. This is the case in Bangladesh, where the lack of building codes and safe construction practices, and the lack of secure storage areas with lockable doors in homes, schools and other buildings, all contribute to the hazardous environment for children. Additionally, children engaged in organised and informal sports in developed countries usually have safety equipment like helmets, face masks, etc., that protect them from being struck by objects while playing games with bats, balls and other objects that can be dangerous. Such protections are virtually non-existent in most rural communities, and are infrequent in urban areas as well.

Non-fatal injury caused by falling objects

The rate of non-fatal injury caused by falling objects was 55.4/100,000 in children aged 1-17. The highest rate (127.3/100,000) was observed among the 15-17 year male children (Fig. 10.1 & 10.2).

Falling object injury was relatively constant in pattern across all age groups, and higher in rural children than in urban children (Fig. 10.3).

Safety measures during sports are virtually non-existent in Bangladesh.
Many of the falling objects were the same among the different age groups. Sporting paraphernalia like bats and balls were common across all age groups, as were tree branches and construction materials. Bicycles and rickshaws figured in falling objects rather than RTA for these episodes of injury as they were leaning against a wall or other support and fell, striking the child (Fig. 10.4).

However, 5 percent were major (requiring hospitalisation of less than 10 days) and another 7 percent required hospitalisation for more than 10 days. Three percent of children were injured severely enough to have permanent disability.

**Discussion**

Falling objects were not a large cause of fatal injury in children, but they were a significant cause of permanent disability, hospitalisation and missed school and work. At the rates found in the BHIS, there were over 850 children permanently disabled in the year prior to the survey (over two per day) and over 31,500 children were injured by falling objects (86 per day).

The nature of the falling objects injury among children in Bangladesh says a great deal about the daily life and exposures of children in a developing country like Bangladesh. The range of objects that caused the injury included bicycles and rickshaws, farm tools, household objects as well as trees and branches. To cause injury serious enough to require hospitalisation, or result in permanent disability, the objects and the physical forces involved must have been large.

While a Safe Home, Safe School and Safe Community programme could decrease these rates to a degree, it will require a sustained effort over years to create the necessary culture of safety in children and their parents that ultimately will make a major difference in this. Creating that culture of safety will be a large part of the overall activity, and best accomplished through the two most powerful forces of socialisation in any culture: the schools and peer pressure. Effective use of these two powerful mediators of behaviour will require a well-thought out communication programmes and a set of targeted communication and behaviour change strategies.
Almost 6,000 children are accidentally poisoned each year, almost 16 per day.
Poisoning

Introduction

Children are exposed to all manner of poisons in Bangladesh. Most children live in rural homes, and since most rural households engage in farming, children have high exposure rates to agricultural chemicals such as insecticides and rodenticides. In urban settings, poisons are also commonly found, as well as cleaners and solvents. Most homes do not have special storage areas for drugs and poisons such as medicine cabinets which are common in developed countries, and poisonous liquids are commonly stored in used beverage containers.

Bangladesh does not have policies that require use of child-proof containers for poisonous substances, nor restrictions on selling or storage of particularly deadly agricultural chemicals such as organophosphate insecticides. Whether sold at somewhat lower concentrations for household use as insecticides, or in concentrated form to farmers as pesticides, these highly poisonous chemicals figure prominently in child poisoning in Bangladesh.

This chapter focuses only on accidental poisoning as all the fatal poisoning found by BHIS survey was intentional and has been included in chapter 16.

Non-fatal poisoning

As shown in Fig. 11.1 the non-fatal poisoning rate in children aged 0-17 years was 9.7/100,000.

The highest rate (24.7/100,000) was in infants followed by among children aged 1-4 years (21.6/100,000). The rates decreased in the older age groups. This pattern is consistent with unsafe storage of poisons in places in the household where infants and very young children can become accidentally poisoned while exploring their environments.

The sex pattern of poisoning is difficult to interpret due to sample power issues (rare events and small groups) as well as the uncertainty introduced by the association of poisoning and suicide attempts. The female predominance of accidental poisoning in the adolescent age groups may reflect this (Fig. 11.2).

Children can become accidentally poisoned while exploring their environments.
The rural predominance in infants is most likely due to the almost universal exposure of infants to agricultural chemicals often stored in the home, which is often only one room. This set of circumstances leads to high poisoning rates in infants as seen in the Fig. 1.3 above. It is unclear if the rural predominance in the early and late adolescent groups (10-14; 15-17) is due to the higher rates of attempted suicide in rural areas, with poisoning the common method.

As seen in Fig.1.4 one-third of non-fatal accidental poisonings were caused by insecticides followed by pesticides and detergent (19 percent in each category). Pesticides are used in agriculture, and insecticides are used in domestic settings. Pesticides are frequently more concentrated and are more lethal as a result. The occurrence of pesticides as the major agent in poisoning in the 15-17 age group provides compelling evidence that a number of the
poisonings claimed to be accidental are more likely attempted suicides.

The majority (60 percent) of non-fatal poisoning required hospitalisation for less than 10 days. More than one-tenth of the cases required hospitalisation for more than 10 days (Fig. 11.5).

Discussion

Clearly, homes in Bangladesh contain many hazardous substances for children, and these are often stored in a dangerous manner. As a result, according to the rates found in the BHIS, in the year prior to the survey, there were over 5,800 children poisoned or over 16 children each day. The lack of fatal poisonings found by the survey is almost certainly due to the lack of power of the survey to find these relatively rare events. The survey documented storage of poisons in households that were hazardous to children, with the toxic chemicals ranging from bleach and disinfectants to rat poisons and insecticides.

In Bangladesh, infants are especially vulnerable to accidental poisoning, as in this stage of life, the infant explores the world orally, by tasting and sucking on anything in its immediate environment. As the picture of the infants on the cover page shows, these infants have clearly sucked and licked their hands, which were heavily contaminated with blue aniline dye, which itself can be toxic. Throughout rural Bangladesh, infants are routinely placed on surfaces that have had farm chemicals such as pesticide prepared for use, and parents are not aware of the hazard this entails for poisoning their children.

Turning a hazardous home into a home safe from child poisonings can be done without new technology and quite cheaply and simply. Teaching parents to keep poisons like insecticides and rat poisons on high shelves will keep them out of the reach of crawling infants. Ensuring parents use locked cabinets or boxes to store drugs prevents drug overdoses, and teaching parents not to store household chemicals like bleach in empty beverage bottles prevents child poisoning from these chemicals.

Interventions such as these are cheap and effective, but to have an impact over a broad population, they must be part of an organised and broad Safe Home intervention. The earlier in the child’s life this starts, the more likely it is to prevent them from becoming a victim of poisoning. Thus, to be most effective in infants, which have high rates of poisoning with almost three per day (980 per year), any intervention should be implemented as part of an antenatal care programme. In the last several months of the ANC programme, mothers and fathers could be
educated regarding the risks to their infant from poisoning (as well as falls, cuts and other high-frequency infant injury issues) and given a checklist that allows them to "child-proof" their home in ways appropriate for their home's conditions and construction.

The other issue that is worthy of comment is that of the intention regarding many of these poisonings. Given the agents involved, and the female predominance in the late adolescent age groups, it is very likely that these events that are labelled as accidental are in reality unsuccessful suicide attempts. While there are many barriers to effective interventions for these, it is noteworthy that other countries with similar issues (China and India) have found in pilot programmes that interventions to decrease ready access to highly lethal pesticides through controlled distribution systems have successfully demonstrated that impulsive suicide attempts can be reduced.
Almost 2,600 children die from bites of animals each year. About half from dogs and half from snakes.
Animal Injury

Introduction

Animal injury is a very common cause of child injury in developing countries like Bangladesh. Most children live in rural areas, in households engaged in farming. This leads to the constant exposure of children to animals, both in the practice of assisting in farming activities, as well as pets and stray non-farm animals such as dogs. Animal injury can result from butting, impaling, being bitten or being stepped on, and the severity of these can range from minor to death. Dog bites that would not otherwise be serious often lead to death from rabies, as it is endemic in Bangladesh, and both hyper-immunglobulin and vaccine are costly and not available in many rural areas.

Fatal animal bite

The exposure rates of children to animals were high enough in all age groups to lead to significant injury rates in every age group. Rates were highest in middle childhood and late adolescence. The peak rate was 7.8/100,000 in 15-17 year old children (Fig. 12.1).

Males tended to have higher animal injury rates than females, especially in the adolescent age groups. The male predominance in these age groups is most likely due to the differing gender roles, with females working mainly inside the house (Fig. 12.2).

The fatal bites were all due to dogs and snakes, with an equal proportion of each, and all occurred in rural areas. This rural predominance was probably a combination of higher exposure rates to snakes and rabid dogs in rural areas, as well as less availability of anti-venom and rabies vaccine in rural areas.

As seen in Fig. 12.3 more than three-quarters (79%) of the bites were caused by unprovoked animals.

Non-fatal injury caused by animal

In general, the age distribution for non-fatal animal injury was similar to fatal animal injury, except it decreased in late adolescence, in...
contrast to fatal animal injury which peaked in that age group (Fig. 12.4).

Among all children the non-fatal animal bite rate was 98.4/100,000. The highest rate (120.1/100,000) of injury caused by animal bite occurred in children aged 10-14 years (Fig. 12.5).

There was a different pattern for animal injury in urban areas as compared to rural areas. In urban areas it peaked in young children and decreased as they grew older. This pattern is consistent with high bite rates in toddlers who do not know how to play safely with dogs and other pets, and then as the children grow older, the increasing knowledge and experience of the danger of animal bites leads to decreasing rates. In rural areas, the rates peak later in the child’s life due to the ever increasing exposure of children to animals as they help with work on the farm (Fig. 12.6).

Fig. 12.7 shows almost all (98 percent) non-fatal bites did not require hospitalisation. About 1 percent required hospitalisation for one to nine days, and another 1 percent was hospitalised for over 10 days. These were mainly the result of mauling by packs of stray dogs.

A large majority (87 percent) of non-fatal injuries caused by animals were the result of bites. The
majority of animal bites were from dogs. Infants were bitten exclusively by pet dogs, probably because they were mainly exposed to the family pet, as they were not walking and did not go outside alone and encounter strays. After infancy, dog bites were almost equally split between pet dogs and stray dogs across all age groups. Snake bites were a significant problem in most child age groups, and the lack of them in the 5-9 age group is likely due to the numbers being below the power of the survey, rather than there being no snake bites in this age group. Injury caused by cows were a significant problem in the younger child age groups as well (Fig. 12.8).

There is an almost equal chance of non-fatal animal injury for provoked and unprovoked cases (Fig. 12.9).

Discussion

Animal bites are a very serious cause of injury for children in Bangladesh. At the rates found in the BHIS, almost 2,600 children died from animal injury in 2003, mostly from bites, and of these, about half were bitten by venomous snakes, and the other half by rabid dogs. This is about seven children a day; a very high toll for a fatal injury that can be prevented with proper treatment. There were an additional 59,000 children who were non-fatally bitten, or over 160 per day. Together, this is almost 62,000 children injured or killed by animal injury, the vast majority of which were from dog and snake bites.

Given these staggering numbers, it is clear this is a problem that cannot be ignored. Behavioural studies carried out showed many unsafe beliefs that almost certainly contribute to a large proportion of the deaths resulting from the bites. The most common behaviour following a snake or dog bite was to seek help from a traditional healer. The varieties of advice given were almost all universally incorrect and contributed heavily to
the failure of the child to receive appropriate medical care. Undoubtedly there are economic issues complicating the picture, as anti-venom and rabies vaccine are costly, and not always available in rural areas. However, children and parents should be made aware of the need to seek proper medical care for children bitten by snakes and dogs.

This will likely be a fruitful area to address as part of a school based curricula for child safety. Knowing how to play with animals safely, how to avoid being bitten, how to seek proper care when bitten, are all a necessary part of a 'Skills for Life' programme for children. Given the frequency of animal injury for Bangladeshi children, an animal injury component of a Safe Home and Safe School programme that imparts these skills for children will be a central focus.

There is great potential for using the schools as a prevention measure against snake bites. The snake bites often occur following floods. Bangladesh has a very predictable seasonal pattern of weather that creates flooding. Much of Bangladesh is very close to sea level and the combination of this low level and the heavy rains and cyclonic storms means that as much as 20-30 percent of the country is flooded on an annual basis. As water rise and children and their parents converge on the high ground, so do snakes. Snake envenomation is a common cause of child death in flooding, and in the recent flood of 2004, many of the child deaths resulted from snake bites. Children bitten while trapped on high ground in close proximity to snakes are unable to seek medical care and anti-venom. Thus, floods and snakes are a fatal combination for children.

Given the predictability of this annual flooding, and the near certainty that many regions of the country will be flooded at least every five years, consideration should be given to creating a national network of safe havens from floods using the local schools. Constructed to last decades, and often build on high ground to withstand floods, these can serve as safe havens where snakes can be excluded and kept away from children. As safe havens they could be stocked with stores of anti-venom, emergency medical kits, emergency relief supplies such as plastic sheets and water purification equipment, high energy biscuits and other disaster relief foods. Used as part of a national natural disaster preparedness network, they could be an effective means of decreasing the large numbers of snake bites associated with floods. They would also serve to decrease drownings, and the later diarrhoeal disease deaths associated with floods.

A Safe School programme conducted in a school-based disaster preparedness network would provide the opportunity to incorporate disaster preparedness skills in a 'Skills for Life' programme. Such a programme could use school children to ensure that their homes have adequate preparations for flooding.
Chapter 13

Electrocution

More than 800 children die from electrocution each year, over 2 per day.
Electrocution

Introduction

Injury from electrocution occurs as a result of man-made electricity or from lightning. Man-made electricity is usually distributed from the power grid, but in developing countries, electricity is often used for fishing, to stun the fish. In this case, it is usually generated from a powered generator taken to the fishing site. A generator producing high amperage current, and used around water presents a very real electrocution risk for children. An unusual source of electrocution is naturally occurring bio-generated electricity from fishes and eels. This is a relatively rare source of electrocution in Bangladesh; however, it is one that children are especially vulnerable to, due to their much lower body mass and increased susceptibility to fatal cardiac arrhythmia when electrocuted.

Fatal electrocution

During the survey, only five deaths were found due to electrocution among children and all of them were males in rural areas. Four were caused by exposed electric wires inside the house, and one from an exposed electric wire outside the house. The highest fatal electrocution rate (3.7/100,000) was found in children aged 5-9 years. Because of the relative few numbers of fatal electrocutions, occurring in only two age groups, the overall rates for child electrocution need to be interpreted with caution (Fig. 13.1).

Non-fatal electrocution

The non-fatal electrocution rate among children aged 1-17 years was 81.4/100,000. The highest rate (126.3/100,000) was observed among male children aged 5-9 years (Fig. 13.2 & 13.3).

Morbidity severity was generally low, in children injured due to electrocution, 3 percent required hospitalisation for less than 10 days. The vast majority had either, three days work or school loss.
and/or required medical care that did not result in hospitalisation.

Electrocution injury had a rural predominance in all age groups, with rural rates typically four or five times higher than urban rates (Fig. 13.4).

Most of the electrocutions occurred outside the home occurred through lightning strikes, especially in rural areas. Bangladesh is uniquely exposed to severe storms and weather associated with lightning and in rural areas, virtually no homes have lightning rods. There are almost no tall buildings or other structures to attract lightning strikes. People working in the fields are often the tallest feature on the landscape other than the occasional tree. They often are working with metal implements that are swung in use, like sickles and hoes. Most adults or children have no knowledge of ways to protect themselves when caught outside, and often take refuge under trees or continue working, swinging the metal farm tool. It is likely that a large number of these fatal and non-fatal electrocutions from lightning strikes could be avoided through providing knowledge and protection skills. Once again, this would be most easily and effectively addressed through a knowledge and skills-based programme as part of a Safe School programme.

Most of the other electrocutions occurred within homes, and were the result of hazardous exposures to electricity, in almost all cases through electrical systems that lacked grounding and the use of old, frayed extension cords or electric appliances around water sources. Providing grounded electrical systems is well beyond the scope of an affordable and sustainable “first response” intervention. However, providing knowledge about the hazards of an ungrounded electrical system, or safe use of electrical appliances or how to minimise overload risks with extension cords is well within the scope of an electricity safety module in a Safe Homes programme and a Safe School programme.

Discussion

Electrocution is not often given much attention as a cause of child death and morbidity in developing countries. However, it is a significant cause in Bangladesh. According to the rates given by the BHIS, there were over two children fatally electrocuted each day, and over 125 more injured by electrocution. In total, there were over 47,000 children killed or injured by electrocution.

Most of the non-fatal electrocutions outside the home occurred through lightning strikes, especially in rural areas. Bangladesh is uniquely exposed to severe storms and weather associated with lightning and in rural areas, virtually no homes have lightning rods. There are almost no tall buildings or other structures to attract lightning strikes. People working in the fields are often the tallest feature on the landscape other than the occasional tree. They often are working with metal implements that are swung in use, like sickles and hoes. Most adults or children have no knowledge of ways to protect themselves when caught outside, and often take refuge under trees or continue working, swinging the metal farm tool. It is likely that a large number of these fatal and non-fatal electrocutions from lightning strikes could be avoided through providing knowledge and protection skills. Once again, this would be most easily and effectively addressed through a knowledge and skills-based programme as part of a Safe School programme.

Most of the other electrocutions occurred within homes, and were the result of hazardous exposures to electricity, in almost all cases through electrical systems that lacked grounding and the use of old, frayed extension cords or electric appliances around water sources. Providing grounded electrical systems is well beyond the scope of an affordable and sustainable “first response” intervention. However, providing knowledge about the hazards of an ungrounded electrical system, or safe use of electrical appliances or how to minimise overload risks with extension cords is well within the scope of an electricity safety module in a Safe Homes programme and a Safe School programme.
Over 17,000 children are injured by machines each year, almost 50 per day,
Machine Injury

Introduction

Machine injury primarily relates to the mechanism of injury, and has been classified this way after lengthy discussion among the research team and policy-makers who will use the data. In developed countries, much of what is classified here as machine injury would come under the occupational injury category as most contact with powered machinery occurs in the workplace and usually does not involve children. Bangladesh is a predominantly rural country, and at present economic levels of development, children often work to support their families. For this reason, contact with powered machinery is ubiquitous. It occurs in rural areas where children work on farms or in processing food from the farm before shipping. Even very young children provide assistance in farming and crop production. Most rural dwellings consist of only one room, and it is common for machinery to be stored in close proximity to children. In urban areas, children often work in shops and light assembly factories using powered tools and other machines. Because of the almost universal exposure to machines, regardless of age and place of residence, it was deemed appropriate to have a classification that reflected this reality.

Machine injury

The occurrence of machine injury in all age groups underscores the universality of exposure of children to machines. As seen in Fig. 14.1 the risk of injury was highest in the age groups that were using the machines on a frequent basis, such as occurs with occupational activity. The non-fatal machine injury rate in all children was 29.6/100,000. The rate was highest (56.7/100,000) in children aged 15-17 years, followed by in children aged 10-14 years (38.8/100,000).

There was a marked sex difference in all age groups. Males had much higher rates than females and the difference increased dramatically in the older age groups. The rates among females stayed at relatively constant levels throughout the age groups. The pattern in females most likely represents a "background" exposure rate and the dramatic upsurge in males in adolescence is most likely due to gender differences with males having very high exposure rates as they begin to work with machines in an occupational setting (Fig. 14.2).

Figure 14.1: Non-fatal machine injury by age

Figure 14.2: Non-fatal machine injury by age and sex

Occupational injury exposure begins in early childhood in Bangladesh.
The same "background" effect can be seen in urban children, where in almost all ages there is a relatively constant exposure level to machines. Rural children have much higher rates of machine injury (Fig.14.3), primarily due to machines being used in planting and processing crops. In both groups, rates begin to increase sharply during adolescence. Younger children have lower exposure rates and thus lower injury rates because they are helping with chores on a part-time basis, and either going to school or playing. But older children are no longer at school and are helping in a full-time capacity and with subsequently higher injury rates.

As seen in Fig. 14.4 fourteen percent of the children injured by machines were hospitalised and a total of 6 percent had permanent disability. In the adolescent age groups where the rates were the highest, severity levels were high as well.

Shallow machines (self-propelled, wheel-mounted, diesel engines that serve as pumps, and power-takeoffs for farming chores) were the most common source of injury across all age groups. These, along with rice-mills, tractors and threshing machines are mainly found in rural areas. In contrast, machine tools, printing presses, sewing machines, and construction machines are mainly urban. Saws and welding machines are commonly found in both areas. Threshing and shallow machines were almost entirely responsible for injuries in 1-4 year old children, and mainly in rural areas. At the other end of the age spectrum, in the older child age groups (10-17) machine tools and sewing machines were frequent causes of injury in adolescents, and were mainly found in urban areas, where children were usually injured in occupational settings (Fig. 14.5).

Rice threshing machines are particularly dangerous for young children. All of the permanent disability caused by machine injury was caused by these machines. There is a great risk of children feeding the rice stalks into the threshing machines to have their hands and arms pulled into the machine, and consequently suffer a traumatic amputation. At the rates found by the BHIS, over a thousand children suffered permanent disability from threshing machines in the year prior to the survey. This was more than three children each day.

The majority (41 percent) of the children were injured at home. Occupational injury began occurring in the 5-9 age group and 15 percent of the machine injury in this age group occurred in factories and workshops; 18 percent of the
machine injury in the 10-14 age group occurred in factories and workshops; and over half (52 percent) of the machine injury in 15-17 year olds occurred in factories and workshops. One-quarter of all machine injuries in children aged 1-17 took place at factories and workshops (Fig. 14.6).

Discussion

At the rates found in the BHIS, over 19,000 children were injured in 2002 by machines. This was almost 50 children a day injured, three of them injured severely enough to be permanently disabled, and more than one killed each day.

It is clear that children in Bangladesh are at great risk of injury from machines, regardless of whether they live in urban areas or in rural ones. Just as clearly, rural areas are the most dangerous in this regard, and rural homes have very high exposure rates for children to farming machinery that is particularly dangerous. These machines are designed to cut, rip, thresh and tear, and almost universally lack even the most basic operator safety guards. Even those that do are designed with the assumption that they will be used by adults, who are aware of the potential hazards involved in their use. However, it is the norm for them to be used by children as young as primary school age.

The highly traumatic nature of machine injury, especially in cut injury and crush injury leads to very high permanent disability rates. Given the ubiquity of exposure, and the economic circumstances, it poses a considerable challenge to reduce these risks for children. Basic behavioural research is needed to understand the process of machine exposure and use in children, this is an area that would greatly benefit from...
behavioural study regarding the norms and knowledge, attitude and practices involved. A firm understanding of these will be a necessary component of any intervention aiming to successfully lower risks for children in rural Bangladesh from machine exposure. Children’s use and exposure to machines is deeply ingrained in the culture of both urban and rural Bangladesh. Simply telling parents about the risks involved is not likely to reduce children’s use and injury rates. While there are many potential areas for engineering improvements to the machines themselves, or for behavioural changes to reduce the exposure rates for children, to be effective in changing this deep-rooted cultural norm for children working with and around dangerous machinery, the interventions will have to be underpinned by a good understanding of the context of use and hazard exposure.

Given the likelihood that it will be difficult to rapidly reduce the exposure rates for children to these very hazardous machines, it is important to provide children with a set of first response skills that will reduce the ensuing severity of injury when it occurs. Hand and foot amputations from tilling machines or arterial lacerations from threshing machines require very rapid application of tourniquets to stop the massive bleeding, and delay is often fatal. Currently, children are injured in settings where they and their peers or adults working around them have no knowledge of how to do this. This is an area where a skills-based trauma response module as part of a first aid and safety curricula in a Safe Schools programme would be an enormous asset for Bangladeshi children.
Chapter 15

Suffocation

- Almost 1,200 infants suffocate each year; 3 infants each night.
Chapter 15: Suffocation

Introduction

Suffocation is a significant cause of death in infants, primarily due to the common practice of mothers and fathers sleeping with the infant in the same bed, often between them. Young infants are unable to sit up or roll over until about the sixth month of infancy, when motor development has progressed. Before this, they are relatively defenceless and unable to react if anything obstructs their breathing, whether bed clothes, covers or an unaware, sleeping adult who has rolled over on the infant, or placed an arm over the infants face. After the sixth month, the child can defend him/herself by kicking and thrashing, which often clears the obstructing bed cover or wakes the intruding adult. Thus, infant suffocations usually occur in the first half of infancy.

In developed countries there is a distinction made between adult overlayment deaths and sudden-infant death syndrome (SIDS, cot or crib death). But a SIDS diagnosis usually is made based on autopsy findings and forensic information which is unavailable in a survey such as the BHIS. Infant deaths were recalled retrospectively by laypersons, and the response “accidentally smothered the baby while sleeping” was most commonly used. Undoubtedly, some of the infant deaths occurring are SIDS deaths, but it is likely to be a small percentage.

In older children, suffocation is associated with inhaling foreign objects, being trapped in airtight spaces, or in cave-ins when digging wells or deep ditches. It is not unusual for children to suffocate from carbon monoxide, especially in the colder months when one-room homes are being heated by poorly ventilated heaters. Finally, children are often exposed to the risk of suffocation in occupational settings in cleaning out containers which had chemicals stored in them, such as railroad tank cars, silos or bilges. Children are preferentially used as they are small and able to get into tight places that larger adults could not.

Fatal suffocation

Fig. 15.1 shows death due to suffocation occurred mostly in infancy at a rate of 24.7/100,000. However, deaths (1.9/100,000) were also found among children aged 5-9 years. The lack of suffocation deaths in the other age groups is most likely due to the power of the survey being unable to measure the rate as a result of very small numbers. Suffocation undoubtedly occurs in the other child age groups as well.

The rates were about the same for males and females (Fig. 15.2).
As seen in Fig. 15.3 the main cause of infant suffocation was adult overlayment. A quarter was caused by bedcovers.

The causes of suffocation in the 5-9 age group were equally split between gas and foreign bodies.

Discussion

Suffocation is a major problem for infants. At the rate found in the BHIS, almost 1,200 infants suffocated in the year prior to the survey. This is about three infants each night. This is due to the universal practice of keeping the infant in the same bed as the mother and father. There are many benefits from bed-sharing in developing countries like Bangladesh, such as increased breast feeding rates. The benefits to the child from the increased likelihood of breast feeding are significant. However, bed-sharing is also a demonstrably hazardous practice to the infant, and the risk to the infant should be minimised.

The risks are not only for suffocation, but for falls as well, which is a significant cause of injury resulting in hospitalisation and deaths. Reducing the risk of suffocation and falls and maintaining the cultural tradition of infants and parents sharing a bed is possible. Safe bed-sharing devices can provide protection for an infant, while allowing the infant to sleep next to the mother or father. TASC is currently developing one called SleepSafe, and devices like this can be incorporated into a comprehensive programme that targets infant suffocation and falls. A programme that focused on expectant mothers during antenatal care to educate them to the need to share the bed safely with the infant, as well as to place the infant to sleep in the supine position or on its side would also reduce the rate of suffocation and falls.
Chapter 16

Intentional Injury

Everyday in Bangladesh at least 1 child dies and 66 children are injured by violence.

Six children commit suicide each day.
417 commit suicide in Jhenaidah in 2004

CORRESPONDENT

1 of 3,731 persons were and 43,396 injured in recent incidents throughout the year from January 1 to December 30 of 2004, the Bangladesh Human Rights Commission (BHRB) claimed. The total of 86 persons were killed in crossfire with Rapid Action Battalion (RAB), 11 with China and Cobra, and 81 with police.

Youth gets life for murder after rape

3731 murdered in 2004

417 commit suicide in Jhenaidah in 2004

College girl receives acid burn in Narasingdi

Acid attack on father, minor son in Comilla

Staff Reporter

In a college student commits suicide

Clubs, some 178 incidents of fire, 139 acid attack, 22 bomb attack, 1669 other rape, 700 women held under arrest, 215 for dowry, 2790 dacoity, 394 extortion, 79 death by police's negligence, 219 journalists, 62 killing by BSF in other areas, 2434 road and many other incidents.
Chapter 16: Intentional Injury

Introduction

Injuries are categorised according to whether or not they were deliberately inflicted and by whom. Commonly used categories are: unintentional (i.e. accidental), and intentional (i.e. deliberate). Intentional injuries result from most of the same mechanisms of unintentional injury (drowning, poisoning, cut injury, etc.), but can be further subclassified as to assault, homicide or suicide. Determining intentional injury rates is difficult due to the sensitive nature of the information that is being sought. In many cases, there are cultural, personal and legal disincentives to admitting an injury was intentional. Additionally, the technique of survey has an impact on the willingness of respondents to admit intentionality. In a door-to-door household survey, where there is no real privacy for the interview and little time to establish good rapport between the interviewer and the respondent, it is especially difficult to obtain valid information. Finally, in the case of the BHIS, the respondents for the questionnaire were not always the most knowledgeable regarding the intentionality of the injury. For these reasons, it is very likely that the intentional injury rates found in the BHIS are substantial underestimates.

Intentional Injury

The proportion of unintentional injury (59.7 percent) was higher among boys and the proportion of suicide (54 percent) was higher among girls (Fig. 16.1).

![Figure 16.1: Proportional fatal injury by intent and sex](image1)

In all children the proportion of unintentional injury (66 percent) and violence (87 percent) was higher among boys and the proportion of suicidal attempt (75 percent) was higher among girls (Fig. 16.2).

![Figure 16.2: Proportional non-fatal injury by intent and sex](image2)

As seen in Fig. 16.3 the vast majority of injury was unintentional in nature. The proportion of intentional injury increased with increasing age of the child.

![Figure 16.3: Intentionality of fatal injury by age](image3)
The nature of the intentional injury depended on age. In the age group 10-14, it was a mixture of violence and suicide but in the older age group, it was predominantly suicide (Fig. 16.4).

**Fatal Violence**

All fatal violence in the survey occurred in the adolescent age groups. Due to the small numbers, rates by gender were not appropriate (Fig. 16.5).

**Non-fatal Violence**

Non-fatal violence was much more common, and consequently was seen in all age groups of children. The rates were relative stable among the younger age children, and almost double in late adolescence (15-17). Among children 1-17 years old, the non-fatal violence rate was 42/100,000 (Fig. 16.6).

As seen in Fig. 16.7 there was a clear difference in rates and patterns between males and females. The rates in males were relatively similar in the early and middle child age groups. Post-puberty, in late adolescence, the rates basically doubled for males. In contrast, in females, the rates were lowest in young girls aged 1-4 and then basically increased by doubling in each age group after that. In all age groups, males had rates 3-10 times higher than females. The highest non-fatal violence rate (123.4/100,000) was observed in 15-17 year old males.

Rural violence rates were significantly higher than urban violence rates in all age groups. In each location, both rural and urban, the rates were relatively similar in the younger age groups and then almost doubled in the post-pubertal adolescents aged 15-17 (Fig. 16.8).
The level of severity for intentional injury was higher than unintentional injury. Almost a quarter (23 percent) of the injured children required hospitalisation. Moreover, 2 percent of the children had permanent disability caused by violence (Fig. 16.9).

In male children 10-14 years old, almost half (43 percent) of the perpetrators were friends or acquaintances of the child and mainly males. Friends or acquaintances were perpetrators in more than three-quarters (83 percent) of the violence directed at females and were mainly males (Fig. 16.10).

Female children aged 15-17 were assaulted about equally by spouses, neighbours and friends (one-third for each), and all of whom were known to the females. Males, in contrast were very rarely assaulted by their spouse, and about three-quarters of the time knew those assaulting them, and about a quarter of the time were assaulted by strangers (Fig. 16.11).
Suicide was an adolescent phenomenon. There were no suicides in children younger than 14 years old. Suicides began at 14 years and doubling each year after that. It was also predominantly a rural phenomenon; 8 percent of reported suicides were urban and 92 percent were rural (Fig. 16.12).

Over the 14-17 age group, females had higher rates of suicide than males. It is unclear if this is a real phenomenon in the lower age groups, as males and female suicide rates were similar in 15 and 16 year olds. There was a clear preponderance of females in the 17 year age group, but it is difficult to interpret whether this is a real gender difference in 17 year olds, given the similar rates for both genders in the 15 and 16 year old children (Fig. 16.13).

Fig. 16.14 shows the majority of the suicides took place at the residence of the children.

More than three-quarters (77 percent) of the suicides were due to poisoning (Fig. 16.15).
More than two-thirds (67 percent) of the adolescents used pesticides for suicide (Fig. 16.16).

Discussion

As noted at the beginning of this chapter, obtaining valid rates for intentional injury in a survey such as the BHIS is exceedingly difficult, due to the nature of intentional injury, as well as the interview process. It is most probable that the rates found by the BHIS for both violence and suicide are underestimates, and probably very large underestimates. Nonetheless, at the rates found by the BHIS, the numbers are large. In the year before the survey, over a thousand children were murdered or permanently disabled as a result of assault; this was three children each day. Over 24,000 children were injured seriously enough to seek medical care, or stay away from school or work for three days because of assault. This was 66 children each day.

The numbers for suicide were as striking, and all the more so in light of the numbers being entirely within a very small and narrow age range for children; from 14 to 17 years old. At the rates found by the BHIS, in the year prior to the study, over 2,200 children committed suicide; or over six children each day; nearly four a day were females.

Intentional injury, whether self-directed or directed at other children is a very difficult issue to address. There are social and cultural components that will make any intervention programme less effective and more costly to implement as compared to unintentional injury. However, given the scale and scope of the issue, especially in the late adolescent female group, it will have to be addressed.

Current efforts to mainstream girls and to elevate the status of women in general are likely to result in decreased rates of intentional injury in women, but it will take an inter-generational change and the establishment of new cultural norms. There are likely effective and culturally appropriate interventions that would help stem this dreadful loss of children as they stand on the cusp of adulthood. Many of the suicides are impulsive in nature, characteristic of this stage of life, and
operational research into providing support networks appropriate for urban and rural Bangladesh would be a positive and affirming approach to this most difficult issue in injury prevention. Hotlines have been shown to provide significant support mechanisms to help adolescents cope with emotional upsets in other developing countries. This is certainly one potential option for urban adolescents.

Rural culture and the lack of confidentiality in the village environment pose significant obstacles. However, there are the beginnings of an experience base in countries such as India and China on methods to provide support and develop coping skills for rural adolescents (and urban as well). At the very least, Bangladesh should begin to assess these, and consider how they might be implemented in the context of Bangladesh. As previously noted in the section on poisonings, interventions that reduce access to extremely lethal chemicals such as pesticides through a controlled access distribution system are beginning to establish a credible decrease in suicide attempts. These might be combined with other interventions in a pilot programme to gain experience in this new area.
Injury is the leading cause of children losing a mother, father or both in Bangladesh.

About 7,900 fathers and 4,300 mothers die from injury each year.
Introduction

It is easy to understand the toll of injury on children with a visit to any hospital. Most of the children in the emergency room and admitted to the surgical casualty wards will be the victims of injury. However, less appreciated, but just as important is the toll that injury exerts on children indirectly when it robs them of a parent. The leading cause of death of parents during the child-raising years is injury. Loss of a father, mother, or most tragically, both, has a devastating impact on a child’s future health and social well being.

To put injury orphanhood into perspective, it is helpful to compare the magnitude of the different causes of death for women in the maternal age groups. Injury is the leading cause of death for married women of reproductive age (Fig. 17.1).

The most critical time to lose a mother in the life of a child is in infancy. It has the most severe impact, as it usually leads to loss of continued breastfeeding, lower immunisation rates and poorer nutritional status of the infant as it enters the early childhood years, so important for growth and development. Over 600 married women aged 18-19 years die from injury annually. This means that about two infants each day lose their mothers because of injury. Suicide was the leading cause of infants losing their mothers (Fig. 17.2).

Almost 4,300 mothers died from injury, leaving about 22,000 fathers, infants and children in households without the primary caregiver. The leading cause of injury death for mothers was suicide, followed by RTA, and then violence (Fig. 17.3).

Injury is the leading cause of death for married women of reproductive age.
The figure 17.4 shows the rates of fatal injury from suicide, violence and RTA in women in the early and mid reproductive years. About 1200, 800 and 600 women aged 18-29 years died from suicide, violence and RTA respectively in the year prior to the BHIS survey.

More than one third (38 percent) fathers of children 0-17 years died due to injury (Fig.17.5). Fig. 17.6 shows almost 7,900 fathers died from injury, leaving about 30,000 mothers, infants and children (0-17) in households that lost the
primary economic earner. The leading cause of injury death in fathers of children was RTA, followed by violence and suicide.

Discussion

The leading cause of death in parents during the child-raising years is injury. Loss of a father, mother, or most tragically, both, has a devastating impact on a child’s future health and social well being. While this report has focused mainly on child injury, it also must make clear that implementing measures to make homes and communities in Bangladesh safe for children also help to make them safer for the parents of children. Clearly there is a need to reduce the toll of injury on children both directly as well as indirectly. It is equally clear from the causes of death or disability in the fathers and mothers of Bangladeshi children that a focus on accidental or unintentional injury only will not be enough. In both fathers and mothers, intentional injury—that is, homicide and suicide—is a leading killer. Given that intentional injury is a leading killer in the parental age groups, any significant reduction in mortality in these groups will require addressing this issue.

Injury robs children of their parents in large numbers of both genders. In that regard it is an equal opportunity killer and disabler. However, the impact of the loss of the primary caregiver or the primary economic earner is dramatically different depending on the socio-economic status of the family involved. Families that are well-off have options unavailable to poorer families. Poor families often cease to exist as a nuclear family when the father is killed or disabled. The mother
and children are taken into relatives families (at best) or forced into a lifestyle of transient and impermanent households. Infants and young children’s health outcomes are markedly poorer when they lose their mother, and are no longer breastfed or cared for. For older children, loss of a mother or father often results in them dropping out of school and taking over the lost earnings or care-giving role for the family. In either case, whether in early or later childhood, their physical health and continued development are placed in certain jeopardy. In most cases, their life trajectories are irrevocably truncated and Bangladesh incurs a major social cost. Children are a particularly vulnerable group in regards to injury; suffering an inequitable burden from injury regardless of being directly injured themselves, or indirectly through the loss of their parents. It is a major health and social equity issue.
Injury prevention can use very simple technologies developed from behavioural research. This child has a bell tied to his waist so that his wanderings can be audible to his mother.
The objective of this study was to get an in-depth understanding on the occurrence of injuries including the current situation and protection practices with a view to developing programmes for prevention of injuries.

Focus Group Discussions (FGD) were conducted among mothers, fathers, adolescents and local elites in both urban and rural areas of Narsingdi district. Separate discussion sessions were organised on six leading causes of fatal and non-fatal injuries among children, such as drowning, transport injury, burns, poisoning, falls and animal bites. The adolescent groups were further divided into boys and girls groups for discussions on burns and poisoning as these were expected to include gender sensitive issues.

The facilitator requested the group members to state a real event of the selected type of injury that they had observed or heard about. Once the storytelling was over and participants were comfortable for taking part in further discussions, the facilitator gradually explained the prescribed points of discussion and aided the participants to take part in the discussion spontaneously. The discussions and recommendations of different target groups are summarised and presented in the following sections.

**Drowning and Near-drowning**

**Life stories**

- A seven year old boy fell from a Shako (bamboo bridge) into the canal and no one was there to rescue him. In the evening, the grandfather of the drowned child pulled out the dead body using a fishing net.

- A two-year old child was drowning in a neighbouring pond. A four-year old child witnessed the incident, and rushed to the house and informed the mother of the drowning child. The mother then rescued the child.

- A young child was sinking in a ditch but nobody noticed him. A passer-by saw and rescued him.

- An announcement was made over a community loud speaker to alert people that a child was missing. The relatives of the child searched every pond in and around the house. At last the grandmother found the drowned child’s dead body in a pond by probing a bamboo stick into the water.

- One child went out to a riverside to play and fell into the water. His companions rushed back home to inform the mother of the child. At the mother’s hue and cry the local youths jumped into the river to rescue the child. After half an hour’s search the dead body of the drowned child was found.
Attitudes towards the event

In general, participants expressed great sympathy for drowned children and placed responsibility on the lack of awareness and supervision of family and neighbours. Their comments included:

- Drowning is more painful than normal death. Normal death can be acceptable.
- It is harrowing that my son is no more today. Nobody wants that God would dispense such type of accident on anyone.
- We think that these types of accidents should be given importance so that no more families suffer. We should always take care of the safety of children so that they do not fall into water.
- Such accidents are nothing but unnatural or premature death. We cherish a hope that our children will be well groomed and educated.
- An accident is an accident. Nonetheless, the condition of our country is such that we do not think of our responsibilities after a drowning case. We should avoid this sort of accident by adopting precautions. We should emphasise the importance of taking good care of children and should ensure that we are giving as much care as they need. Otherwise, our negligence will be the cause of deaths.

Common places of occurrence

The participants knowledge of places of drowning was consistent with the results of the quantitative data. The participants said that most drowning occurs outside the house, including ponds, ditches, canals, rivers and open water bodies. Only a few respondents mentioned that a small child may drown inside the house, in a water reservoir, dug well, open drain, big bucket, bowl or a trough containing water for cows.

Causes

The participants noted the limitations of mothers caring practices (many stated that the mothers preoccupation with household work, which left children unattended, was a cause of drowning). Absence or inadequacy of swimming skills was also stated as a cause of drowning. Most of the participants stated that the risk of drowning was greater for children with no swimming skills when they were in the proximity of water bodies like ponds, rivers or canals. Other causes of childhood drowning included children’s play activities, the natural curiosity of children, and the attraction of water to children, especially for young children.

Vulnerable groups and other risks

While the quantitative data shows that the highest risk of drowning is in the youngest children (peak age one year), the majority of the participants felt that children in the age group 5-10 years ran the highest risk of drowning. They observed that the children of this age group were vulnerable to drowning as they were more courageous, and dared to go to...
water sources such as ponds, rivers, canals, etc. to learn to swim or to play in the water. According to participants, girls are less vulnerable than boys. Many participants believed that most child drownings occurred at noon when mothers and other family members were busy with their household duties. Further, drownings were considered more frequent in the Bangla month of ‘Kartik’ (mid-October to mid-November) as they go out for fishing during this period.

**First aid practices and health seeking behaviour**

Following are the first aid responses mentioned by both rural and urban participants:

- The body of the rescued child is kept over the head of a person who then starts running and spins the child around.

- The body of the rescued child is laid straight on the ground and the whole body is rubbed and covered by ashes and/or salt so that the ash/salt would absorb the water and keep the body warm.

- The stomach of the child is pressed repeatedly to bring out water from the stomach.

- The rescued child’s mouth is cleaned by hand.

- The rescuer’s mouth is put on the child’s mouth to suck out water from the stomach.

- Rotten food (commonly rotten banana leaf), uncooked eggs or ‘kochur doga’ (arum stem) are forced into the child’s mouth to induce vomiting which would clear out water from the stomach.

A few of the participants in one rural area believed that ‘kabiraj’ (indigenous herbal medicine practitioners) knew how to treat near-drowning patients and favoured taking near-or drowned child to the kabiraj and then to a doctor. Other participants stated, “We will take the drowned child to a good doctor”. They unanimously said that a drowned child should be taken to a qualified medical doctor/health centre for treatment.

**Existing preventive practices**

There were almost no preventive practices in communities. Discussions revealed that people knew some preventive measures but they rarely practise any. Only a few believed that accidents were inevitable and pre-decided by God, and that it was not possible for the human beings to revert ‘God’s will’.

**Suggested preventive measures to be implemented**

These measures generally involved looking after children, preventing children from going near water, and teaching children how to swim under adult supervision. Specific suggestions were tying bells to children and placing obstructions around bodies of water. Keeping the main door or main gate closed was suggested by participants in urban areas.

"Children of 5-6 years who do not know how to swim die by drowning, when they want to learn swimming by themselves."
Roles of the community and community-level institutions identified by the participants are as follows:

- Ditches and drains should be filled up and vigilance is needed to protect children from drowning.
- Community organisations can identify the risks of drowning, organise meetings and take necessary initiatives to minimise the risks.
- The Imams of the mosques and teachers of schools and madrasas (religious schools) and community leaders should tell children not to go near water.
- The community could take the initiative and erect fences around ponds and water bodies to prevent children from drowning. This suggestion raised much discussion and debate regarding the material to be used for fencing, cost sharing, and maintenance etc.

The participants suggested that government could play an important role by making the environment safer through hazard reduction (cement covers to be placed on drains and manholes in urban areas, filling in unwanted water bodies or fencing around major ponds). Moreover, government should take measures to drain out accumulated water during rainy season. All children should be required to learn to swim as a necessary life skill and swimming competitions could be arranged for children to promote swimming practices. The Government could organise campaigns or use the mass media to raise awareness among the community.

**Burn Injury**

"Mothers should always be careful regarding children's whereabouts. When mothers will be busy, they should assign a responsible member of the family to take care of the child."

**Life stories**

Almost every one of the groups had either observed or heard about an incidence of burn in their home or in their community.

- A three-year old boy fell into a heap of ashes near the house of a neighbour that had a dormant fire inside. The uncle of the child saw and rescued him immediately.
- A one-year old baby was burnt while trying to reach an idle pot of fire which fell on it. The mother rescued the baby.
- A five-year old girl was asked by her mother to light a 'kupi' (an indigenous lamp) from the cooking stove. Her dress caught fire and she was seriously burnt.
- Twin brothers, Jewel and Jony fell into a large furnace where paddy (rice) parboiling was done. The grandmother saw this and called her son and daughter-in-law. They came and rescued the boys from the furnace, but they had severe burn injuries.
- One of the participants said that her three children, aged 4, 7 and 9 years, were burnt to death when another young child from the neighbouring house set fire to a stack of straw inside which the children were playing. They could not get out and couldn’t be rescued by their parents or neighbours despite their frantic efforts.
Attitudes towards the event

Generally, participants considered burns as a very serious issue for children as the following comments attest:

- The incidence is quite common. It may take place any time of the day or night and anywhere, in our own houses or in other people’s, in places where usually dormant fire is kept.
- It is a painful and horrifying incident and children are mostly the victims. These small innocent children suffer from painful burn injury for a long time. Often their faces, hands or limbs get maimed. The children may die also.
- In most cases, the parents or elderly household members keep the unused fire around in places without much care. As a result, children, who do not have much awareness about what may happen to them, unknowingly get into fires and get burns. This is awful.

Common places of occurrence

Most participants’ knowledge of places where burns occurred was consistent with the data from the quantitative research. Commonly cited places were:

- Kitchens, where ashes are piled up with dormant fire in it.
- In the large furnaces where parboiling of paddy is done.
- In the fire used to fight against cold in winter.
- In the cattle-house fire.
- Inside rooms where there is bad wiring or electric short circuits.
- Fire from gas burners and other hot objects in the kitchen.

Causes

According to the participants, the main reason for accidental burn injury is indifference of parents, especially mothers and other caretakers. Common comments were:

- The whole family environment is such that the children are treated as if they are old enough to take care of themselves. So they are allowed to move independently.
- Household members are indifferent about their children. They forget that the children need special care.

There was a special mention of intentional burn injury with acid, with adolescent girls being assaulted with acid as well as mention of occupational burns in factories (cracker and welding factories).

Vulnerable groups and other risks

The participants identified the highest risk age group as beginning in young childhood and increasing with age, and also noted the sex difference of older children, specifically mentioning the association of burn injury with cooking and kitchen activities in females. Burn occurs more in winter as people sit beside the fire to warm up their bodies and children like to play with fire.
First aid practices and health seeking behaviour

In general, the following measures were stated, with almost no differences between urban and rural participants:

- Using raw egg, rotten part of banana tree on the burn wound (for cooling).
- Soaking the wound with water continuously.
- Pasting the area of wound with mud.
- Applying coconut oil, lime water, raw potato mash, toothpaste, onion, ice or ice-cream on the wound.
- Applying kerosene oil to avoid water boil and pain.
- Giving Kabiraji medicine.
- Applying heat on the burn wound (as a measure to destroy poison with application of poison).
- Applying sesame oil on the burn wound to avoid scarring from wound.
- Using juice of Kapila leaves on the wound.
- Applying domestically prepared medicine by boiling milk, sesame oil and wax together.
- Applying herbal medicines made out of leaves of herbal plants.

There were very few mentions of the following measures like:

- Applying antiseptic powder.
- Giving medicine from medicine shop.
- Applying burn ointment.
- In acid burn cases plain cold water is applied as soon as the incidences happen.

Regarding use of emergency facilities a hierarchy of responses was mentioned: 1) Kabiraj, rural practitioners and use of herbal medicines were the first choice, 2) if the victim was not cured, then he was taken to a qualified doctor, private clinic or others if needed, and 3) in the case of an electric shock or acid burn, the victim is taken directly to the hospital.

Existing preventive practices

Preventive practices are rare in communities though people can identify the preventive measures to be undertaken.

Suggested preventive measures to be implemented

These generally involved looking after the children, preventing access to fire and hot objects, and repairing hazards such as faulty electric lines.

Participants identified the following roles of the community and community-level institutions:

- They should be motivated to select places for dumping ashes far from homes so as to keep children away from the dumping ground.
- Furnaces for parboiling rice or boiling date juice should be made far from dwellings so that children do not become victims of burn injuries by touching or getting into hot pans or caldrons.

“Children should not be assigned to do any activity that might cause them burn injuries.”
Awareness raising campaigns can be organised using slogans urging communities to turn off gas burners or other kitchen stoves when they are not being used.

Strong resistance must be encouraged against acid throwing.

The suggested initiatives to be taken by government are

- Government should stop buying and selling of acids and crackers and should execute strong laws against use, application and throwing of various types of explosives, such as firecrackers, acid etc.
- Government electricity service providers should check electric lines at regular intervals and faulty lines should be mended at once.
- Government agencies should be engaged in awareness raising activities through various media.
- A Fire Service Station should be established in every union.
- Health workers can check whether there are any risky places for burn injury.

Transport Injury

Life stories

- A ten-year old girl was travelling with her parents by bus. While she peeped out of the window to see something, another bus coming from the opposite direction brushed past the standing bus. The girl’s head was torn off her body and fell on the road. There was no scope to provide first aid. The police came and sent the body to the morgue.

- An adolescent girl described how her younger sister aged eight years, was crushed under the wheels of a car. The younger sister was picking up pebbles from the roadside when two cars trying to overtake each other came by and one of them knocked her down. People took her to the hospital where the doctors declared her dead.

- A rural elite participant described an accident which caused the death of his own son. A lot of people had gathered in his house on the occasion of a wedding. All the children rushed to the bus stand to see the groom. Among the children was his eight-year old son who was crushed by a speeding car. He died on the spot.

- A boy aged between 11 and 12 years was trying to hurriedly cross a railway line. He thought that he could make it. But he was knocked down by the train engine. He was taken to Narsingdi hospital from where he was referred to Dhaka. He died on the way.

- An urban adolescent described an accident that he heard from his mother. His uncle and other members of the family were travelling by bus to attend a wedding. They got down at a place to change the bus while the uncle went to the other side of the road to buy cigarettes. His son Imran, aged five or six years, followed him and was knocked down by a bus and was crushed under its wheels. He was immediately taken to the local hospital but died soon after.
Attitudes towards the event

Generally transport accidents were seen as road traffic accidents. They were regarded as very common events that were tragic in nature, as the following comments suggest:

- In our society such accidents happen quite often. People feel very sad when they see or hear this happening. Such accidents can destabilise a family socially and economically.
- It is extremely sorrowful when a near and dear one becomes a victim of an accident. If somebody is killed in an accident, he is gone; but if somebody is crippled by an accident it is more heart-rending.
- Such accidents leave an adverse effect on the mind. However, these also lead to increase in awareness of the people and members of the family.
- Such accidents are unfortunate and cause anguish in us because the child killed in the accident could have lived much longer.

Common places of occurrence

Participants noted highways, roads, small lanes, rivers, play fields, railroads, level crossings and bus stations. Mothers of under-five children in rural areas also mentioned canals and water bodies as places of occurrence of accidents.

Causes

The most frequently mentioned causes of accidents were:

- Carelessness of the rickshaw pullers and drivers of mechanised vehicles.
- Playing of children on the roads.
- Defects in roads, dense fog and slippery roads.
- Boarding and exiting buses while in motion.
- Taking passengers beyond the capacity of river craft.
- Head on collision of two river crafts.
- Mechanical problem or defect of buses and trucks.
- Peeping out or thrusting hands out of the bus windows.
- Derailment of trains/collision of two trains or collision of train with other vehicles.
- Inclement weather causing boats, launches and steamers to have accidents.
- Learning to ride bicycles, going to and from schools and markets.

Vulnerable groups and other risks

Participants identified older children as at the highest risk of transport accidents (especially road transport). They also noted the gender difference with males more at risk than females.

First aid practices and health seeking behaviour

Most participants listed actions that should be taken after road traffic accidents (not included drowning). Most suggested that cuts should first
be treated with Savlon (antiseptic cream). In the case of fractured bones, bones should be tied firmly to a hard substance and the injured person should be taken to the doctor as quickly as possible. It was commonly noted that in a major accident when administering first aid is difficult, the injured person should be taken immediately to a doctor. Other suggestions, common to most of the groups, were:

- Shaking of arms and legs.
- Pouring water on the head.
- Pouring water on the affected part of the body.
- Treating the injury with the sap of black arum stalk or grass.
- Applying a paste of lime, bamboo ash and oil to prevent bleeding.
- Applying Savlon cream to stop major bleeding.
- Applying garlic mixed along with lime on the wound.
- Pouring ice-cold water on cut injury to lessen pain.

Most of the participants said that the patient is taken to a doctor or a hospital when the condition does not improve. Mothers in rural areas said that accident victims are also taken to NGO clinics. However, in the case of major accidents they are always taken to government hospitals. It is worth noting that none of the participants mentioned taking a transport accident victim to an indigenous medical practitioner or a faith healer.

**Existing preventive practices**

Preventive practices such as urban mothers accompany their young children do exist. Parents also tell their children to be careful while they are on the roads, but they do not teach children safe road behaviour.

**Suggested preventive measures to be implemented**

- Everybody, especially parents should be aware of potential hazards.
- Traffic islands should be erected in front of schools.
- Roads should be repaired and provisions made for zebra crossings.
- Vehicles should not be allowed to take extra passengers.
- Parents should teach their school-going children how to cross the road.
- Signboards should be erected in front of schools so that drivers become careful.
- Children should be taught techniques for self-defence and prevention of accidents.
- Children should be taught not to get down from moving vehicles or get onto the roof or bumper of a vehicle.
- The children should be restrained from going near railway tracks.
- Motorcycle riders and passengers should wear helmets.
- Roads should be paved or made even by removing raised areas and pit holes.
- Speed breakers should be erected in front of schools and markets.

“Overloading of road and water transport vehicles and taking in passengers and goods in excess of a vehicle's capacity needs to be strictly controlled. Nobody should be allowed to travel on the roof of the bus.”
Vehicles with mechanical problems should not be allowed on the road.

Speeding vehicles should not be allowed and drivers should not be allowed to drive under the influence of liquor.

In general, participants identified clear responsibilities for government, particularly in law enforcement. However, there was little awareness of the role of the community in preventing transport accidents. The specific suggestions were:

- Traffic laws should be strictly enforced.
- Only trained drivers should be given a license to drive. Vehicles also should have a road worthy license.
- Each vehicle should have proper lights and the law in this respect should be enforced.
- The Union Parishad Chairperson and Members should be informed of the occurrence of any accident so that they may give assistance in legal matters subsequently.
- Proper signs should be displayed in case of low draught or char (islands) areas on riverine routes.
- Government should repair damaged or defective roads and bridges to ensure traffic safety.
- Government should increase community awareness of accident prevention.
- Traffic police should be posted in front of schools and market places.
- Traffic police force in greater numbers should be recruited, trained and deployed.

Poisoning

**Life stories**

Ten life stories were documented from participant’s experiences. Among these, three children took poisonous substances accidentally and the rests were suicides. The suicide victims were mostly adolescents and young adults, both males and females.

- Farzana, a six-year old girl, accidentally took a mosquito coil and her peers immediately informed the family. She was saved as she was immediately taken to the hospital. Similarly Mary, a two-year old urban girl drank Harpic (a toilet cleaner) and was about to die. Another boy of seven years drank insecticides brought to kill ants.

- Bilkis, an eighteen-year old girl, took endrin (one type of pesticide) to commit suicide when her father scolded her for not going to in-laws house. Bilkis’s mother and other relatives forcefully gave her raw egg and cow-dung into her mouth to induce vomiting. Then her family called a village doctor for medical care.
Attitudes towards the event

Generally, attitudes related to poisoning differed according to whether it was intentional (suicide) or unintentional (accidental). Suicide was usually described as tragic, but sinful. Accidental poisoning was seen as tragic and sad. The following illustrate many of the comments in the FGDs:

- Sudden death due to poisoning is a terrible and a sorrowful event. It is our responsibility to give proper attention so that no such incidences occur.

- It is a tragic event; the mother should take care of the child. There is every possibility of dying by poisoning. Children are the future of the nation, they should be given the opportunity to develop, but they are innocents and don’t realise the consequences of poisoning.

- Suicide by poisoning is a tragedy. It is also a great sin according to our religious point of view.

- Poisoning is an abnormal accident and one’s life can be spoiled unless proper treatment is given. There is no opportunity for proper treatment of poisoning victims in rural areas, and as a result, the victims are to sent to the upazila health complex. Due to delayed treatment the patient sometimes dies.

Place of occurrence

Village mothers noted that most poisoning cases took place at the children’s own home, at the home of neighbours or around their home. The village elites further added that most of the incidents take place in poor and/or illiterate families where poisonous objects are kept under the cot and young children can easily access them. Participants mentioned that fathers, when returning from the field after spraying insecticides sometimes leave insecticides in the courtyard.

Causes

Comments specific to suicide were as follows:

- Adolescents take poison out of anger

- Wives take poison if they are tormented by their husbands or in-laws

- Misunderstanding in love affairs

- Girls take poison out of shame or fear if rumours of a relationship with boys spread in the community

- Adolescents want to stay independent and any restrictions on this may prompt them to take poison

- Unemployment and frustrations regarding employment are also causes of suicides.

Vulnerable groups and other risks

Participants of all FGDs identified different ages at risk of poisoning from different causes, both intentional and accidental:

"Young children eat whatever they find and this habit continues up to the age of three years."
Infants and young children may mistakenly take endrine and insecticides considering these as medicine or other edible substances.

The infants sometimes mistakenly drink kerosene.

Children are fond of bright objects. Soap is bright and attractive, so they feel tempted to eat it.

As soon as infants start crawling they may pick up and take poisonous substances.

An overdose of sleeping pills, finis (ant-killer), harpic (toilet cleaner), and kerosene, were commonly mentioned poisons for suicide in adolescents.

First aid practices and health seeking behaviour

The first response to poisoning was to induce vomiting. The methods and the agents commonly used for the purpose were:

- Forcibly feeding victims sour things like tamarind, uncooked eggs and cow dung.
- Pushing the inside stem of banana stalks and human excreta into the mouth of the victim.
- Inserting a hand into the victim’s mouth to cause vomiting.
- Forcing rotten food and vegetables, parts of dead animals, mustard oil and kerosene.
- There were a few possibly helpful measures mentioned such as forcing the victim to drink a large quantity of water, olives, local berries (boroi) and juice of neem leaves, however this relied on a co-operative and conscious victim and also placed them at risk of aspiration of the emetic substance.

Usually those who provide first aid do so from their own experiences. The FGDs revealed that there was no trained person in the community to provide first aid to the poison victims. If the locally available first aid facilities were not sufficient, the patients were transferred to the upazila health complex, district hospital, rooms of renowned doctors, private clinics and nearby pharmacies, where experienced service providers were available. Comparatively serious patients were referred or sent to more renowned doctors or tertiary hospitals. None of the participants suggested sending a poison victim to a traditional healer (kabiraj, ojha, peer, fakir, etc.) for treatment.

Existing preventive practices and suggested practices to be implemented

Almost all participants of FGDs proposed that poison should be kept carefully out of reach of the children. Different categories of participants used different words to explain the phrase out of reach. Fathers said it meant “to keep poison up”, elites said “to keep poison in hidden place”, mothers said poisons should be kept “under lock and key”. However, some participants noted that in rural homes, especially poor ones, there were no shelves, drawers or cabinets.

“Young children are curious to try their mothers’ medicine.”
In the case of suicide, the following preventive measures were often cited:

- Campaign for education for all, especially female education.
- Ensure quality education and discouraging copying in examination.
- Creating job opportunities.
- Prevent violence against women, girls and disadvantaged members of the community, combating child trafficking, early marriage of girls, etc.
- Safe use of drugs, insecticides, manure, etc.
- Incentives for attainment of child rights.
- Discouraging divorce (broken family), second marriages, domestic violence, quarrels with parents, neighbours and relatives, etc.

Generally, participants identified individual parents and caregivers as being responsible for prevention. They specifically noted the following:

- Taking care and supervision of children: There is no alternative to the mother. She takes affectionate care of children. Mothers stay at home most of the time. Even working mothers stay at home for longer than working fathers. However, most of mothers remain busy with household work. In urban areas a good number of mothers were found to engage themselves with many outside activities. Therefore, it is not easy for them to take continuous care of the children. Further, the mother may take the child safety casually and with less seriousness if she is not aware of the risks and consequences of the poisoning. Appointing an adult female supervisor or caretaker for the child was strongly recommended in urban areas.

- Counsel and guide children: Parents and elder members of the family, community members and relatives should counsel and guide children so that they do not commit suicide. Elder members of the community have definite roles, but school teachers can play more significant roles in this regard. Currently elders are not well aware of the degree of harm brought about due to poisoning. Some may be aware but may not be serious about it. They may make sporadic efforts without any follow-ups. There is a lack of appropriate programmes to assist elders to play their due roles.

- Putting poisonous substances out of reach of young children: It needs little effort by parents and others. This practice, if sustained for a long time, would be a good habit for elder members of the family. But it is imperative to note that some parents have no idea where they should keep poisonous substances. Also in poor households there is little facility of storage, such as drawers, shelves, almirahs, etc., for safekeeping of poisonous substances.

Participants identified the role of government in the drafting and enforcement of laws that regulate the safe distribution and storage of medicines, pesticides and insecticides in particular.
Attitudes towards the event

Many participants think the lack of parents’ awareness about the situation and children’s movement to be an important reason for this kind of injury. Some participants specifically mentioned in this regard, “Parents, other elderly household members and also neighbours are not appropriately aware and conscious. As a result, children move about indiscriminately without their knowledge and as a result are often bitten by snakes, dogs and other animals or insects”.

Common places of occurrence

Almost all the participants stated that an animal or insect bite can take place anytime, any day or in any season. The most common places mentioned by the rural participants included, on roads, in fields, in forests, in water, on date trees or palm trees, in rats’ holes, in the corner of the room, in the haystack, in logged water in the jungles and bushes. On the other hand, urban people mentioned that bites occurred on the branch of trees, in the bushes, corners of rooms or kitchens, cracks of old walls, holes inside trees, in stacks of old bricks where insects and animals make their homes.

Causes

The overwhelming theme of comments on the causes was indifference and lack of awareness on the part of the victims. Some representative comments are:

- It appears that they forget their children when they are away. They do not even think of taking care of their children for their safety, not
because they do not want them to be safe but because they are ignorant and lack awareness about the consequences.

- Another form of carelessness and ignorance is reflected in the dumping of garbage indiscriminately inside and outside the households. The elder people of the households are not aware that this dumping may cause harm to their children.
- In many houses dogs, cats etc. are reared as pets. These pets often go mad as they are not given vaccines regularly.

Vulnerable groups and other risks

Two of the more common responses are listed below:

- The adults are vulnerable as they work outside home, catching fish, crop cultivation etc, in bushes or beside dumps of garbage and marshy land.
- Young children usually are victims of animal bites more frequently as they do not have fear of anything and get closer to certain animals, especially the dogs. Often they set their feet on the body of the dogs or pull by their tails. The dogs get annoyed and bite.

First aid practices and health seeking behaviour

The common first aid responses after animal bites are as follows:

In case of dog bites

- An enchanted plate is administered to see if the dog was mad. If the plate sticks to the back of the person, then the dog is to be considered mad. In that case, the victim should be taken to the doctor immediately for injections. If it is not mad, the victim is treated at home warm water and Savlon.
- Enchanted molasses or bananas are given to the victim of a dog bite to eat in the morning so that the victim does not have dog’s puppies in the womb.
- Leaves of trees are smashed and applied to the place of wound.
- Enchanted caustic soda, turmeric or molasses are used.
- The victim is taken to a Kabiraj who gives tablets.
- Hujur (religious leader) gives enchanted salt to eat.
- The victim is given pepper to eat. If the victim says it is hot, then it is to be understood that there is no venom in the body. If there is venom in the body, the opposite happens.
- If the hair is tied, then it has to be untied.
- Flower of brinjel is given to the victim to eat. The flower is mixed with blood of the bite wound and applied at the place of wound.
- Ginger and salt mixed with oil are given to the victim to eat and the victim is not allowed to eat any type of animal protein like, meat, fish or egg.

In case of snake bites

- People should ensure three tightly bound knots, two on the upper side and one knot below the wound with the help of jute or cord.
The victim is kept sitting outside the room because according to elder people the knots of the house and those used for snake bite become connected together leading to jeopardy.

An "Ojhaa" (traditional healer) brings out the venom from the victim.

An organ of a chicken or frog is cut to expose blood oozing and pressed at the wound. If the chicken or the frog dies, it is to be considered that the snake is dangerous. Victims of snake bite in some areas are not allowed to call 'mother' aloud, because it is said that if the victim calls mother the venom will spread all over the body leading to a fatal incidence. Instead, the victim is motivated to call his/her father. As a result, the snake becomes afraid.

Some participants stated there is medical treatment for bites of a poisonous snake.

**In case of other animal/insect bites**

- Applying lime on the wound of bee-bite or other insects’ bite and bringing out the sting by rubbing a knife and lime on the place of wound.

- Giving Kabiraji medicine.

- Often a pain relieving injection or paracetamol is also given.

- If a cat or a rat bites, usually, enchanted salt or molasses is given by the Hujur.

- The wound is washed clean and lime is applied.

- Following a bee-bite, lime and molasses is rubbed together on the wound with the help of hair.

- Lime is applied at the wound if rat or bee bites.

- Salt and ointment are applied on the wound, if it is a leech bite.

- The wound is washed well with soap and cleaned with Savlon.

- If a cat bites, the wound is cleaned with soap soon after the incidence. Then homeopathic medicine or roasted salt is administered.

Emergency measures are used depending on the intensity or seriousness of the biting:

- The victims are taken usually to rural practitioners, locally known as Ojhaa, Boddi, Hujur etc., and to homeopaths and drug sellers.

- The victims are taken to a qualified doctor (University or district hospital, NGO clinic, private practitioner, etc.) only when they are not cured by the rural practitioners. But the injections prescribed by the doctors are expensive and poor people can not afford them.

**Suggested preventive measures**

- The children should be kept away from domestic animals.

- Vigilant eyes should be kept on younger members of the family,
especially children. They should not be allowed to go to jungles and bushes and marshy areas.

- Insecticides should be sprayed in the jungles and bushes to kill poisonous insects.

- Common dumping grounds in neighbourhoods should be kept clean so that snakes, rats or any other insects cannot stay safely and become a threat to people in the neighbourhood. They should be motivated to create the dumping ground away from dwellings at a safer distance.

- Ditches or marshes in the neighbourhood should be managed properly and kept clean so that they do not turn into breeding grounds for mosquitoes, snakes or leeches. This will definitely reduce the biting incidences in the neighbourhood.

Government should play the following roles, as identified by the participants:

- Government should strictly execute existing laws for killing mad dogs and appropriate measures should be taken if there is any need to review laws.

- Government should also take appropriate measures locally to seal up holes and stop water logging.

- Government can pass necessary orders to the relevant local authorities for keeping the environment clean and health friendly.

### Fall Injury

**Life stories**

- An adolescent participant of FGD described that she fell from a mango tree 2-3 years back and her leg was broken. Her mother cleaned the wound with savlon and applied the juice of banana tree. Then she pulled the broken part to straighten it. Later the girl was taken to a village doctor. She recovered from the injury but still suffers from occasional pains.

- A 5 year old girl fell on a slippery courtyard and her wrist was broken and dislocated. She started crying and returned home. Her mother pulled the hand to fix it up. She wrapped the area with cloth and started pouring water on the cloth. She was later taken to a Kabiraj (traditional healer) and after three days to a village doctor. But unfortunately she still faces difficulties in using her hand.

- A 12 year old boy was playing in the school playground with his peers. During playing he jumped on one of his friends and fell on the ground. As a result there was a fracture in his leg and he became unconscious. His playmates started shouting for help and the nearby people rushed to the place and carried him to his house. His parents poured water on his head for about half an hour and then he was taken to a private clinic. He was under treatment for one and a half month and gradually recovered from the injury.
Attitudes towards the event

The following statements express their concerns and feelings about such incidences:

- Falls are a very common phenomenon. When it results in a fractured or broken bone, it is very painful and takes a long time to be healed depending on the nature of the fracture.

- The incidence can damage a person for life if proper treatment is not given. Children can suffer from serious injuries after falls and these may hamper their education and working abilities in the long run.

- The guardians often fail to understand the importance of giving proper treatment to children after a fall. After the incidence, we massage their wounds and rub oil on those. This often leads to a continuing injury and a costlier medical treatment.

- Injuries from falls could damage children's brains, resulting in paralysis or permanent disability and even death. These injuries might lead to tetanus.

- One participant said that a child could develop pneumonia or breathing problems as a result of a fall and another participant said that a fall might weaken the heart of a child.

Common Places of Occurrences

Falls can occur anywhere; in and around the house, at school, in a playground, in a workplace or outside their own community. Falls occur when, mostly boys, indulged themselves in climbing trees or in dangerous games.

Causes

The following are the most commonly mentioned causes of falls:

- The earthen roads in rural areas become slippery in the rainy season and cause a number of fall incidences involving both children and adults.

- Serious injuries also occur from falling on slippery concrete slabs placed around a tube-well.

- Children fall from their beds and cots or slip from the lap of another child. Young children often fall when they learn to walk.

Other causes given included plucking fruits from high branches of trees (especially in the rainy season when the branches are wet and slippery); taking part in risky games (football, cricket, kabadi or high-diving); bicycle or rickshaw accidents; slipping from high roofs, embankments, walls, poles, stairs; jumping from a running vehicle; slipping by stepping on banana skins; being tripped by other children; chasing a dog or a cat; presence of the evil spirits during noon etc.

Vulnerable groups and other risks

Most of the participants thought that boys (aged 8-12 years) were more likely to be a victim of a fall than girls. They felt that boys were...
adventurous and restless by nature and take part in tree-climbing and risky games more frequently. A few participants said that afternoon is the most likely time for falls to occur as this is the time when most of the children play outside. Falls occur more in rainy season.

First Aid practice and health seeking behaviour

The urban participants had a better understanding of first aid than their rural counterparts. It was also apparent that health care awareness was better in urban participants than in rural participants. Rural participants largely depend on indigenous treatments, but in general, both rural and urban participants seemed to have faith in the power of secret spells and sacred pendants in healing fractured or broken bones.

Rural Areas

- After a fall, participants said that they tried to find out whether the child had a fractured bone or had a sprain. If it was a sprain, they rubbed oil and garlic on it. If bones were dislocated, they tried to put the bones back in place. The child was taken to the doctor only when the case seems to be very serious.
- In the case of bleeding wounds, herb paste, grass paste, kerosene or lime is rubbed on the wounds to stop the bleeding. According to the participants, paste of 'Manpata' and bamboo ashes can stop bleeding immediately.
- Some participants said that there were people who knew secret spells and could use those to heal injuries, fractures and broken bones. They took their children to these 'learned men' for treatment.
- A few participants said that there were Kabiraj and quacks who specialised in the treatment of broken bones, and many people took their children to these Kabiraj and quacks after a fall. Some victims were cured, while some were not. There were even some victims who received the wrong treatment and became disabled forever.
- Some participants said that they applied disinfectant onto the wounds first and then took the child to a doctor.

Urban Areas

- Most participants said that they clean up the wounds with water and a clean piece of cloth and applied a disinfectant. If the wound was severe, they took the child to a doctor after covering the wound tightly with a clean piece of cloth, so that it did not get infected.
- In the case of broken bones, they put ice or a wet cloth on the injured part and tied a bamboo stick to keep it from moving until a doctor attended the child. They said that they did not massage the injured organ as it might worsen the situation.
- In case of sprains, they put ice and wet clothes. A few participants said that sprained organs should be massaged with mustard oil and salt.
- Some participants stated that if a child hurt its head, someone has to strike the child on its back as part of the treatment.
- Some participants were aware of the fact that a child with a broken or fractured bone has to be taken to an orthopaedic specialist.
As in rural areas, the applying molasses, extracts of grass or bamboo-ashes, lime, extracts of marigold and herbs to the wound is common. Some participants believed that “tabij” (sacred pendants) and “harbhangar tel” (oil for healing broken bones) should be tried first or the child should remain under the supervision of a Kabiraj with qualified doctors consulted later if the injury lingers or becomes complicated. A few participants strongly opined that the medicines given by the Kabiraj and the oil produced by a company named Manda is effective for healing broken and fractured bones.

Existing Preventive Practices

Some of the participants opined that such accidents can be prevented by taking some pragmatic, precautionary measures, while others felt that prevention was not possible at all as the prime vulnerable group was often beyond complete control. They did not have a very systematic pattern of ideas about prevention of accidents. Others still believed that even if accidents could not be totally prevented, the magnitude and the associated risks could be substantially reduced. However, the present level of knowledge in the community about accident prevent is not of optimum level. One participant reported that he nailed spikes on the trees so that children do not climb them. Another participant said, “I regularly clean the concrete slab below my tube-well so that it does not get slippery”. There was a distinct gap between people’s knowledge and prevalent practices.

Suggested preventive measures to be implemented

The suggestions for prevention are common in rural and urban areas and include the following:

- All members of the family should remain careful. The children mostly do not understand the risk of injury and breaking bones from a fall. If family members remain alert and vigilant this kind of accident can be averted.

- Parents must advise their children not to climb high trees and to avoid slippery roads and surfaces while walking, running or cycling.

- Guardians must make sure that their children are holding the hoods of a rickshaw while travelling, so that they do not fall out of a rickshaw if it jerks or collides with another rickshaw.

- Parents must not ask children to climb the trees to collect firewood or to pluck fruits. They themselves can do these jobs or can ask the children to do those from the ground with the help of long wooden sticks.

- Parents must ensure that the shoes worn by their children are not slippery.

- Parents must make sure that the roofs of their houses have protective railings.

- Everyone in the neighbourhood must make sure that his or her yard is not slippery and in the rainy season, bricks, sawdust or sands are put over the slippery surfaces.
Everyone in the neighbourhood has to make sure that banana skins are taken away from the roads.

The participants identified the following roles for the community:

- The community has to take steps to level the uneven plains and roads in their locality.
- Members of the community must come forward to help the victim or the family of the victim after the accident.

The participants suggested some ways in which government can help prevent death from fall:

- Government must maintain the roads so that the roads do not get uneven or slippery and cause accidents.
- Government can telecast programmes through national media to make children and their parents aware of the dangers of falls and the preventive measures.
- Government can build more children’s parks or playgrounds in both rural and urban areas where children can play safely.

**Discussion**

The qualitative portion of the research revealed, that in general, there was a disconnect between the predominant beliefs and the knowledge of the community regarding injury causes and risk groups. In some cases, such as drowning, the misperceptions that young children were not at risk played a role in the very high drowning rates found in the survey for young children. Mothers and other caregivers who do not recognise the risk of drowning in late infancy and early childhood cannot take preventive measures. The generalised lack of accurate factual information concerning the risk of serious and fatal injury for children indicates the need for broad and comprehensive communications activities to correct misperceptions and educate people about the causes and child groups at risk.

A similar situation exists with injury that has already occurred and thus cannot be prevented. Once injury has occurred the main focus must be on appropriate first response and then definitive treatment with the goal of minimising the seriousness of injury and preventing permanent disability or death. There was the same wide gap in correct knowledge and appropriate practice between what first aid or first response actions should be taken and what actions were actually taken. With the exception of injury due to road transport, generally most of the actions reported as commonly taken were largely ineffective. In the cases of drowning, poisoning, burns, and animal bites, most of the commonly mentioned responses are actually harmful and either increase the severity of the injury incurred or increase the risk that permanent disability or death will result.
Given that the Government does not have the resources for out of hospital emergency medical response at the community level, the real burden of response to injury must, by necessity, be placed on the community and the inhabitants of the community. This means that teaching first aid and appropriate first response activities should be a major focus of any injury prevention and control programme. Given the very high rates of serious and fatal injury for children, it is clear that first aid should become a basic, necessary life skill for all children, and should be a focus of injury prevention activities in any community-based intervention.

The overall conclusion that is clearly evident from the qualitative portion of the research is that as a general rule, in all groups surveyed, there was a lack of awareness regarding the level of risks for child injury, as well as a general lack of knowledge of appropriate measures to be taken once injury has occurred. It was also clear that most of the respondents saw external forces and factors beyond their individual control as being both the cause of injury as well as the factors important in preventing it. This "locus of control" issue will need to be addressed in any injury prevention programme. The reality of any successful community based injury control programme is that it is based on the sum of the knowledge, attitudes and practices in the individuals in that community. Thus community safety is dependent on individual awareness and adoption of behaviours and practices that contribute to safety. This is directly analogous to the "herd effect" noted with community rates of communicable disease. It is also directly analogous at the level of the individual family, as the risk of injury for any child is largely determined by the risk awareness and safety behaviours of that child’s parents and caregivers. To protect children from injury, it is necessary to broadly focus on their parents and caretakers, and this mandates broad-based, comprehensive awareness and behavioural change communication activities.
Chapter 19

Conclusions & Recommendations

The time to act for the children of Bangladesh is NOW.
Conclusions & Recommendations

Conclusion One

There is an epidemic of child injury and the response to it needs to begin now.

One definition of an epidemic commonly used by epidemiologists is the occurrence of an adverse health event in more than 1 percent of the population. Using this definition, the overall conclusion of the survey has to be that there is an epidemic of child injury occurring in Bangladesh. The survey documented an overall child injury rate of 1,592/100,000 children. This means that almost two in every hundred children in Bangladesh were injured significantly enough to require medical care, or lose three days of school or work in the year prior to the survey.

This epidemic has been unrecognised until now, which explains why there are few, if any programmes which attempt to prevent childhood injury, or prevent permanent disability once the injury has occurred. The BHIS provides this recognition, as well as much of the information necessary to develop the interventions that are so clearly needed. While there is a need for further research in some areas, a great deal can be done with what is known now. We know that drowning is a leading cause of child mortality, and increasing responsible supervision of toddlers, and teaching older children to swim will reduce drowning rates considerably. We know that homes in Bangladesh are full of risks of burns, scalds, poisons, cuts, falls and other major causes of injury, and that they can be made safer. We know that schools and the walk or ride to and from them can be very hazardous to children, and we can ensure that the schools are safer as well as the journey to and from them. It is important to start now. Each day’s delay means paying a dreadful toll in children’s lives and futures.

Conclusion Two

Injury is the leading killer of children after infancy.

There were over 30,000 children fatally injured in the year before the survey. This is about 83 children each day, or about three per hour.

- Drowning was the single leading cause of death of children after infancy (1-17).
- Almost one third of all child deaths in the 1-4 age group were caused by injury.
- Over half of the deaths in the children over five (5-17) were caused by injury.

Injury is also the leading killer of the parents of Bangladeshi children.

- About two infants each day lose their mothers because of injury with suicide the leading cause.
- About 11 children lose their mothers each day due to injury with suicide, RTA and violence the leading causes.
- About 21 children lose their fathers each day to injury with RTA, violence and suicide as the leading causes.

Conclusion Three

Injury is a leading cause of morbidity, and the impact of serious and severe morbidity exceeds that of fatal injury.

There were almost a million (955,000) children injured in the year prior to the survey. This is about 2,600 per day, 108 children each hour, and almost two children each minute.

- Injury is one of the leading cause of disability for children in Bangladesh with over 13,000 permanently disabled each year, or 36 children per day.

All children count, and they must be counted.
Permanent disability is only the “tip of the iceberg” for non-fatal injury.

- For each permanent disability, two children are hospitalised for more than 10 days, four children are hospitalised for one to nine days, and 64 children seek care or miss three days of work or school.

The direct, indirect and social costs of non-fatal injury far outstrip that of fatal injury.

Conclusion Four

It is a simple issue but a complex problem.

These simple facts stand out very clearly. However, the epidemic of child injury is a complex one. Different age groups had different patterns of injury, and the patterns depended on the stage of life of the child, and the environment around the child.

The data speaks for itself. One doesn’t have to be a trained epidemiologist to see that falls, drowning and suffocation are the major issues in infancy; that drowning is the overwhelming issue in early childhood; that middle childhood and early adolescence have a more complex set of injury issues; and that suicide is the overwhelming issue in late adolescence.

The BHIS data have a very clear message. Given the complexity of the problem, and its magnitude in all age groups and stages of the child’s life, the overall programmatic response will require a comprehensive programme to make Bangladesh’s homes, schools and local communities safer for children.

Conclusion Five

All children count, and they must be counted.

Within injury of all causes, there are some that are almost entirely age-related. Suffocation is mainly an issue of infancy, and suicide is wholly an issue of adolescence. The numbers are equally important regardless of the cause and the age of the child. All children count, and deaths of all children must be counted and used to benchmark the pace of progress in reducing child mortality. It is time that deaths of all children, from infants to 17 year olds, are counted, and a child mortality rate that includes the older children becomes a basic, standard benchmark for child survival programmes.

The development community has maintained a laser-like focus on the under-five age group and in large part helped achieve the epidemiological transition as a direct result of it. We now need to recognise that this success has meant a great deal of preventable child mortality is now occurring in the over-fives, where 40 percent of the child deaths after infancy are now occurring.

The BHIS shows that injury is an issue in each stage of the child’s life, and that its toll increases...
as the child becomes older. The distribution of injury, throughout the stages of life of the child mandates that it be addressed in each stage. Any discussions regarding this must be framed with the preface that deaths which occur in children over-five are equally important under the United Nations Conventions on the Rights of the Child.

Conclusion Six
The problem is of equal urgency with other programmatic priorities.

Bangladesh, like most other developing countries, has a gross imbalance between the number of major health issues needing to be addressed, and the amount of the resources available. Hence, it is important that the resources be allocated as efficiently as possible. One of only ways to ensure this is to base the decisions for resource allocation on data that accurately portrays the reality of the health situation. The BHIS shows conclusively that using facility-based data, or models derived from other countries or regions misrepresents the reality of health in children and their parents in Bangladesh. Policy makers will need to carefully review the BHIS data and compare it to the data currently used in resource allocation decisions. It is clear that Bangladesh has made enormous progress over the last several decades and the current leading causes of child death are very different from what they used to be.

It is helpful to use HIV/AIDS as a recently-emerging priority issue as a comparative benchmark for the importance of injury in children and their parents.

This figure uses HIV/AIDS as a benchmark for comparison of the public health priority of injury. In the graph, the 2002 rates of HIV/AIDS from Thailand, which is acknowledged as one of the major hotspots for HIV/AIDS in Asia, are applied to the Bangladesh population. The yellow bars show what the numbers of deaths from AIDS would be if Bangladesh had a "Thai-like" epidemic (all available information shows that HIV is not yet a significant problem in Bangladesh). The red bars represent the current injury death rates as determined by the BHIS. HIV/AIDS has been identified as a major priority for the Government and its development partners, and currently an estimated 35 million USD are being programmed for HIV/AIDS prevention. It is clear from the graph that injury deaths in almost all age groups are orders of magnitude larger than those from HIV/AIDS. HIV/AIDS is a particularly cogent benchmark, as injury and HIV share many commonalities:

- They both have no vaccines or 'magic bullets' for prevention and require multi-sectoral responses.
- They both require education and behavioural change as a main prevention strategy.
- They both require ‘harm reduction’ approaches for most effective prevention.
- They both require environmental risk reduction and individual protection strategies for best effect.

Given the dramatic differences in the numbers of deaths currently attributable to each of them, it is clear that injury also needs to be reflected in funding, planning for programme implementation, and development of a broad consortia of partners for a national intervention strategy.

Conclusion Seven
The MDGs will not be met without addressing injury.

The Millennium Development Goals guide policy
decisions as we cross the midpoint of the time period they refer to, and begin to focus on 2015. To achieve them, it will take more than rededication and working harder on what has been done in Bangladesh over the last twenty years. It will require doing what has not been done before; preventing injury in under-fives, specially among 1-4 years would reduce the U5MR substantially. This would ensure that Bangladesh meets the two-thirds reduction that is specified by 2015.

It will be necessary to maintain the same single-mindedness in ensuring that all pregnant women have antenatal care and a clean delivery; that their infants are breastfed and fully-immunized; and that their daughters go to schools just like their sons. However, injury prevention needs to be integrated into the programmatic infrastructure of child survival, so that the neonate who was protected from tetanus is also protected from suffocation; the infant who is protected from measles is protected from drowning, and the child who was breastfed to get a good start in life continues along that path, and is not killed later as a pedestrian walking to school.

In May 2002, the United Nations Special Session on Children recognised that to meet the MDGs, working harder on the current focus was necessary, as was working smarter with a new mandate. Hence, the passage of the Plan of Action with a specific tasking to, "Reduce child injuries due to accidents or other causes through the development and implementation of appropriate preventive measures," was adopted.

**Recommendation**

The central finding of the BHIS is that an epidemiological transition has occurred in Bangladesh. From this survey it is clear that in some child age groups injury is the single leading cause of death and disability, and a significant cause of death and disability in all age groups. In order to continue the downward pressure on child death and morbidity rates, injury will have to be targeted as determinedly and effectively as the previous leading causes of child death. It is time to begin developing injury prevention, control and rehabilitation interventions as integral parts of Bangladesh’s development efforts. In the new millennium, for which the MDGs were crafted, child health programmes cannot be considered to be complete without injury prevention, with control and rehabilitation being major, integral parts. The time to act for the children of Bangladesh is now.
References


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9 Health and Demographic Surveillance System, Matlab: Registration of Health and Demographic Events, 2000; Volume 33, ICDDR,B, Centre for Health and Population Research.


19 Hoque M. M. Understanding Road accident Problems and Their Remedies, Road Safety Training Course 2003.


### Appendices

- **A. Glossary**
- **B. Tables**
- **C. Population characteristics**
- **D. Contributors**
Glossary

Injury: Physical damage due to the transfer of energy. Injury occurs when the amount of energy transfer exceeds the host organism’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 frequently called accidents or accidental in common usage.

Intentional Injuries: Intentional or violent injuries are injuries purposively inflicted by an aggressor or self inflicted by the victim.

Injury severity:
- Moderate: Sought medical care but not admitted to hospital; or had at least a three-day work loss or absence from school; and no permanent disability.
- Major: Hospitalised for less than 10 days; but no permanent disability.
- Serious: Hospitalised for 10 days or more; but no permanent disability.
- Severe: Permanently disabled (loss of vision, hearing, handling, ambulation, or mentation).

Accident: An unexpected, unplanned occurrence which may involve injury.

Infection: The entry and development or multiplication of an infectious agent in the body.

Non-Communicable Diseases: Diseases not capable of being directly or indirectly transmitted from person to person.

Epidemic: The unusual occurrence in a community or region of disease, specific health-related behaviour or health-related events clearly in excess of expected occurrence.

Infant Mortality Rate: The ratio of infant (under one year of age) deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births.

Neonatal Mortality Rate: The ratio of neonatal (under 28 days of age) deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births.

Post-neonatal Mortality Rate: The ratio of post-neonatal (from 29 days to under one year of age) deaths registered in a given year to the total number of live births registered in the same year, usually expressed as a rate per 1000 live births.

Child Death Rate: The number of deaths of children aged one to four years (before completion of the 5th birthday) per 1000 children of same age group.

Under-Five Mortality: Number of deaths under the age of five years per 1000 live births.

Crude Death Rate: Number of deaths per 1000 population per year in given community.

Violence: Use of physical force with the intent of causing injury or death.

Drowning: Death due to asphyxia (lack of oxygen reaching the body tissues) caused by immersion in fluid, usually water.

Near-drowning: Near-drowning is the term for survival after suffocation caused by submersion in water or another fluid. Some experts exclude cases of temporary survival that end in death within 24 hours from this definition; these they prefer to classify as drowning, or fatal near-drowning.

Suicide: The termination of an individual’s life resulting directly or indirectly from an act of the victim themselves which they know will produce this fatal result.

Attempted Suicide: The term "attempted suicide", in its broadest sense, refers to actions taken by an individual with the intention of self-destruction but which are not fatal.

Upazila: Sub district.

Union: Lowest administrative unit at rural area. Several unions constitute one upazila.

Ward: Lowest administrative unit at urban area. Each ward consists of several mohallas.
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### Mortality Overview

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Mortality Overview

Cause specific mortality

Table 3.3: Child mortality rates (per 100,000) and proportional mortality by cause and age

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<th>Infant n = 854</th>
<th>1-4 n = 247</th>
<th>5-9 n = 98</th>
<th>10-14 n = 42</th>
<th>15-17 n = 33</th>
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<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
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<tr>
<td>Injury</td>
<td>92.6</td>
<td>2</td>
<td>95.7</td>
<td>29</td>
<td>44.0</td>
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<td>NCD</td>
<td>2655.5</td>
<td>50</td>
<td>62.0</td>
<td>19</td>
<td>7.5</td>
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<tr>
<td>Infection</td>
<td>2525.8</td>
<td>48</td>
<td>175.3</td>
<td>53</td>
<td>40.2</td>
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</table>

11%, 11%, 16%, 26% and 21% of infant, 1-4 yrs, 5-9 yrs, 10-14 yrs and 15-17 yrs deaths respectively did not have enough information reported to be classifiable by cause

Leading causes of child deaths (Top 10 causes are listed)

Table 3.4: Leading causes of deaths in infants, rates (per 100,000) and proportions

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<th>Female n = 386</th>
<th>Both n = 854</th>
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<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>LBW/Preterm</td>
<td>1394.6</td>
<td>25</td>
<td>1206.3</td>
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<td>Pneumonia</td>
<td>1298.4</td>
<td>23</td>
<td>1193.7</td>
</tr>
<tr>
<td>Birth asphyxia</td>
<td>1033.9</td>
<td>18</td>
<td>888.9</td>
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<td>Diarrhoea</td>
<td>480.9</td>
<td>9</td>
<td>368.3</td>
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<td>Septicaemia</td>
<td>384.7</td>
<td>7</td>
<td>381.0</td>
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<td>Diarr + Pneu</td>
<td>252.5</td>
<td>4</td>
<td>177.8</td>
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<td>Meningitis</td>
<td>240.4</td>
<td>4</td>
<td>152.4</td>
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<td>180.3</td>
<td>3</td>
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<td>Chicken pox</td>
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<td>38.1</td>
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<td>Fall</td>
<td>12.0</td>
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<td>38.1</td>
</tr>
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</table>
### Table 3.5: Leading causes of deaths in children 1-4, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 118</th>
<th></th>
<th>Female n = 129</th>
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<th>Both n = 247</th>
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</tr>
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<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Drowning</td>
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<td>29</td>
<td>82.5</td>
<td>23</td>
<td>86.3</td>
<td>26</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>82.0</td>
<td>26</td>
<td>68.8</td>
<td>20</td>
<td>75.5</td>
<td>23</td>
</tr>
<tr>
<td>Malnutrition</td>
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<td>13</td>
<td>68.8</td>
<td>20</td>
<td>53.9</td>
<td>16</td>
</tr>
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<td>Diarrhoea</td>
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<td>14</td>
<td>22.0</td>
<td>6</td>
<td>33.7</td>
<td>10</td>
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<tr>
<td>Meningitis</td>
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<td>6</td>
<td>27.5</td>
<td>8</td>
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<td>7</td>
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<tr>
<td>Diarr + Pneu</td>
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<td>4</td>
<td>16.5</td>
<td>5</td>
<td>14.8</td>
<td>4</td>
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<td>Septicaemia</td>
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<td>3</td>
<td>5.5</td>
<td>2</td>
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<td>Transport injuries</td>
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<td>2</td>
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<td>Dengue</td>
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<td>0</td>
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</table>

### Table 3.6: Leading causes of deaths in children under five, rates (per 100,000) and proportions

<table>
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<th>Causes</th>
<th>Male n = 587</th>
<th></th>
<th>Female n = 514</th>
<th></th>
<th>Both n = 1101</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>301.3</td>
<td>24</td>
<td>269.1</td>
<td>23</td>
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<td>23</td>
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<td>LBW/Preterm</td>
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<td>214.8</td>
<td>18</td>
<td>233.5</td>
<td>19</td>
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<td>Birth Asphyxia</td>
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<td>15</td>
<td>158.3</td>
<td>14</td>
<td>172.6</td>
<td>14</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>123.6</td>
<td>10</td>
<td>83.7</td>
<td>7</td>
<td>104.0</td>
<td>9</td>
</tr>
<tr>
<td>Malnutrition</td>
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<td>88.2</td>
<td>8</td>
<td>76.4</td>
<td>6</td>
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<td>72.4</td>
<td>6</td>
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<td>6</td>
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<td>49.7</td>
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<td>54.2</td>
<td>4</td>
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<tr>
<td>Diarr + Pneu</td>
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<td>4</td>
<td>45.2</td>
<td>4</td>
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<td>4</td>
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<td>6.8</td>
<td>1</td>
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<td>1</td>
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### Table 3.7: Leading causes of deaths in children 5-9, rates (per 100,000) and proportions

<table>
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<tr>
<th>Causes</th>
<th>Male</th>
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<th>Female</th>
<th></th>
<th>Both</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Drowning</td>
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<td>30</td>
<td>21.0</td>
<td>28</td>
<td>26.2</td>
<td>29</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>18.3</td>
<td>18</td>
<td>11.5</td>
<td>15</td>
<td>15.0</td>
<td>17</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>9.1</td>
<td>9</td>
<td>3.8</td>
<td>5</td>
<td>6.5</td>
<td>7</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>3.7</td>
<td>4</td>
<td>9.6</td>
<td>13</td>
<td>6.5</td>
<td>7</td>
</tr>
<tr>
<td>Chicken pox</td>
<td>3.7</td>
<td>4</td>
<td>5.7</td>
<td>8</td>
<td>4.7</td>
<td>5</td>
</tr>
<tr>
<td>Animal bite</td>
<td>5.5</td>
<td>5</td>
<td>3.8</td>
<td>5</td>
<td>4.7</td>
<td>5</td>
</tr>
<tr>
<td>Meningitis</td>
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<td>1.9</td>
<td>3</td>
<td>3.7</td>
<td>4</td>
</tr>
<tr>
<td>Electrocution</td>
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<td>0</td>
<td>3.7</td>
<td>4</td>
</tr>
<tr>
<td>Malnutrition</td>
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<td>4</td>
<td>1.9</td>
<td>3</td>
<td>2.8</td>
<td>3</td>
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<td>Diarr + Pneu</td>
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### Table 3.8: Leading causes of deaths in children 10-14, rates (per 100,000) and proportions

<table>
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<tr>
<th>Causes</th>
<th>Male</th>
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<th>Female</th>
<th></th>
<th>Both</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>11.6</td>
<td>24</td>
<td>3.9</td>
<td>13</td>
<td>7.8</td>
<td>20</td>
</tr>
<tr>
<td>Pneumonia</td>
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<td>0.0</td>
<td>0</td>
<td>3.9</td>
<td>10</td>
</tr>
<tr>
<td>Fall</td>
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<td>12</td>
<td>1.9</td>
<td>6</td>
<td>3.9</td>
<td>10</td>
</tr>
<tr>
<td>Drowning</td>
<td>5.8</td>
<td>12</td>
<td>0.0</td>
<td>0</td>
<td>2.9</td>
<td>7</td>
</tr>
<tr>
<td>Animal Bite</td>
<td>5.8</td>
<td>12</td>
<td>0.0</td>
<td>0</td>
<td>2.9</td>
<td>7</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>0.0</td>
<td>0</td>
<td>3.9</td>
<td>13</td>
<td>1.9</td>
<td>5</td>
</tr>
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<td>Meningitis</td>
<td>1.9</td>
<td>4</td>
<td>1.9</td>
<td>6</td>
<td>1.9</td>
<td>5</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>1.9</td>
<td>4</td>
<td>1.9</td>
<td>6</td>
<td>1.9</td>
<td>5</td>
</tr>
<tr>
<td>Diarr + Pneu</td>
<td>0.0</td>
<td>0</td>
<td>3.9</td>
<td>13</td>
<td>1.9</td>
<td>5</td>
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<tr>
<td>Tuberculosis</td>
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### Table 3.9: Leading causes of deaths in children 15-17, rates (per 100,000) and proportions

<table>
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<tr>
<th>Causes</th>
<th>Male ( n = 20 )</th>
<th>Female ( n = 13 )</th>
<th>Both ( n = 33 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Suicide</td>
<td>19.3</td>
<td>25</td>
<td>27.7</td>
</tr>
<tr>
<td>Animal bite</td>
<td>11.6</td>
<td>15</td>
<td>4.0</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>11.6</td>
<td>15</td>
<td>0.0</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>3.9</td>
<td>5</td>
<td>4.0</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>3.9</td>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>3.9</td>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>Drowning</td>
<td>3.9</td>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>Violence</td>
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</table>

### Table 3.10: Leading causes of deaths in children under 18, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male ( n = 689 )</th>
<th>Female ( n = 585 )</th>
<th>Both ( n = 1274 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>83.6</td>
<td>22</td>
<td>70.4</td>
</tr>
<tr>
<td>LBW/Pre-term</td>
<td>65.1</td>
<td>17</td>
<td>54.8</td>
</tr>
<tr>
<td>Birth asphyxia</td>
<td>48.2</td>
<td>13</td>
<td>40.4</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>38.1</td>
<td>10</td>
<td>26.0</td>
</tr>
<tr>
<td>Drowning</td>
<td>30.8</td>
<td>8</td>
<td>23.6</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>19.1</td>
<td>5</td>
<td>23.6</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>19.6</td>
<td>5</td>
<td>18.5</td>
</tr>
<tr>
<td>Meningitis</td>
<td>17.4</td>
<td>5</td>
<td>13.8</td>
</tr>
<tr>
<td>Diarr + Pneu</td>
<td>15.7</td>
<td>4</td>
<td>12.7</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>6.2</td>
<td>2</td>
<td>4.0</td>
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### Table 3.11: Leading causes of death rates (per 100,000) in children 1-17 by sex

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 221</th>
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<th>Female n = 199</th>
<th></th>
<th>Both n = 420</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>95% CI Lower</td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Rate</td>
<td>95% CI Lower</td>
</tr>
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<td>Drowning</td>
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<td>23.1</td>
<td>16.7</td>
<td>24.8</td>
<td>28.6</td>
<td>22.2</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>24.1</td>
<td>16.3</td>
<td>10.4</td>
<td>16.9</td>
<td>20.6</td>
<td>15.2</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>11.2</td>
<td>6.2</td>
<td>10.0</td>
<td>16.3</td>
<td>13.7</td>
<td>9.5</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>16.5</td>
<td>10.2</td>
<td>5.0</td>
<td>9.7</td>
<td>13.1</td>
<td>9.0</td>
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<tr>
<td>Meningitis</td>
<td>6.5</td>
<td>2.9</td>
<td>3.4</td>
<td>7.3</td>
<td>6.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>6.5</td>
<td>2.9</td>
<td>2.2</td>
<td>5.4</td>
<td>6.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Diarr + Pneu</td>
<td>4.1</td>
<td>1.5</td>
<td>1.8</td>
<td>4.8</td>
<td>4.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Suicide</td>
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<td>0.8</td>
<td>1.5</td>
<td>4.2</td>
<td>3.6</td>
<td>1.7</td>
</tr>
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<td>Animal bite</td>
<td>5.3</td>
<td>2.2</td>
<td>0.3</td>
<td>1.8</td>
<td>3.6</td>
<td>1.7</td>
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<td>0.3</td>
<td>1.8</td>
<td>1.5</td>
<td>0.4</td>
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<td>0.1</td>
<td>1.2</td>
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### Age specific causes of injury mortality

#### Table 3.12: Type-specific injury mortality rates (per 100,000) and proportions, infants

<table>
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<tr>
<th>Injury type</th>
<th>Male n = 8</th>
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<th>Female n = 7</th>
<th></th>
<th>Both n = 15</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Suffocation</td>
<td>36.1</td>
<td>37</td>
<td>25.4</td>
<td>29</td>
<td>30.9</td>
<td>33</td>
</tr>
<tr>
<td>Fall</td>
<td>12.0</td>
<td>13</td>
<td>38.1</td>
<td>43</td>
<td>24.7</td>
<td>27</td>
</tr>
<tr>
<td>Drowning</td>
<td>24.0</td>
<td>25</td>
<td>12.7</td>
<td>14</td>
<td>18.5</td>
<td>20</td>
</tr>
<tr>
<td>Burn</td>
<td>12.0</td>
<td>13</td>
<td>0.0</td>
<td>0</td>
<td>6.2</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>12.0</td>
<td>12</td>
<td>12.7</td>
<td>14</td>
<td>12.4</td>
<td>13</td>
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</tbody>
</table>

#### Table 3.13: Type-specific injury mortality rates (per 100,000) and proportions, children 1-4

<table>
<thead>
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<th>Injury type</th>
<th>Male n = 35</th>
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<th>Female n = 35</th>
<th></th>
<th>Both n = 70</th>
<th></th>
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</thead>
<tbody>
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<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Drowning</td>
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<td>97</td>
<td>82.5</td>
<td>85</td>
<td>86.3</td>
<td>91</td>
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<td>Transport injury</td>
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<td>5.5</td>
<td>6</td>
<td>2.7</td>
<td>3</td>
</tr>
<tr>
<td>Falls</td>
<td>0.0</td>
<td>0</td>
<td>2.8</td>
<td>3</td>
<td>1.3</td>
<td>1</td>
</tr>
<tr>
<td>Burn</td>
<td>2.6</td>
<td>3</td>
<td>0.0</td>
<td>0</td>
<td>1.3</td>
<td>1</td>
</tr>
<tr>
<td>Animal bite</td>
<td>0.0</td>
<td>0</td>
<td>2.8</td>
<td>3</td>
<td>1.3</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>0.0</td>
<td>0</td>
<td>2.8</td>
<td>3</td>
<td>1.3</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 3.14: Type-specific injury mortality rates (per 100,000) and proportions, children 5-9

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 28</th>
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<th>Female n = 19</th>
<th></th>
<th>Both n = 47</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Drowning</td>
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<td>61</td>
<td>21.0</td>
<td>58</td>
<td>26.2</td>
<td>60</td>
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<td>Transport injury</td>
<td>3.7</td>
<td>7</td>
<td>9.6</td>
<td>26</td>
<td>6.5</td>
<td>15</td>
</tr>
<tr>
<td>Animal bite</td>
<td>5.5</td>
<td>10</td>
<td>3.8</td>
<td>11</td>
<td>4.7</td>
<td>11</td>
</tr>
<tr>
<td>Electrocution</td>
<td>7.3</td>
<td>14</td>
<td>0.0</td>
<td>0</td>
<td>3.7</td>
<td>8</td>
</tr>
<tr>
<td>Suffocation</td>
<td>1.8</td>
<td>4</td>
<td>1.9</td>
<td>5</td>
<td>1.9</td>
<td>4</td>
</tr>
<tr>
<td>Falls</td>
<td>1.8</td>
<td>4</td>
<td>0.0</td>
<td>0</td>
<td>0.9</td>
<td>2</td>
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### Table 3.15: Type-specific injury mortality rates (per 100,000) and proportions, children 10-14

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 17</th>
<th></th>
<th>Female n = 4</th>
<th></th>
<th>Both n = 21</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Transport injury</td>
<td>11.4</td>
<td>35</td>
<td>3.9</td>
<td>50</td>
<td>7.8</td>
<td>38</td>
</tr>
<tr>
<td>Fall</td>
<td>5.7</td>
<td>18</td>
<td>1.9</td>
<td>25</td>
<td>3.9</td>
<td>19</td>
</tr>
<tr>
<td>Drowning</td>
<td>5.7</td>
<td>18</td>
<td>0.0</td>
<td>0</td>
<td>2.9</td>
<td>14</td>
</tr>
<tr>
<td>Animal bite</td>
<td>5.7</td>
<td>18</td>
<td>0.0</td>
<td>0</td>
<td>2.9</td>
<td>14</td>
</tr>
<tr>
<td>Electrocution</td>
<td>1.9</td>
<td>6</td>
<td>0.0</td>
<td>0</td>
<td>1.0</td>
<td>5</td>
</tr>
<tr>
<td>Homicide</td>
<td>1.9</td>
<td>6</td>
<td>0.0</td>
<td>0</td>
<td>1.0</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table 3.16: Type-specific injury mortality rates (per 100,000) and proportions, children 15-17

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 12</th>
<th></th>
<th>Female n = 9</th>
<th></th>
<th>Both n = 21</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Suicide</td>
<td>19.3</td>
<td>42</td>
<td>27.7</td>
<td>78</td>
<td>23.5</td>
<td>57</td>
</tr>
<tr>
<td>Animal bite</td>
<td>11.6</td>
<td>25</td>
<td>4.0</td>
<td>11</td>
<td>7.8</td>
<td>19</td>
</tr>
<tr>
<td>Transport injury</td>
<td>11.6</td>
<td>25</td>
<td>0.0</td>
<td>0</td>
<td>5.9</td>
<td>14</td>
</tr>
<tr>
<td>Drowning</td>
<td>3.9</td>
<td>8</td>
<td>0.0</td>
<td>0</td>
<td>2.0</td>
<td>5</td>
</tr>
<tr>
<td>Homicide</td>
<td>0.0</td>
<td>0</td>
<td>4.0</td>
<td>11</td>
<td>2.0</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 3.17: Type-specific injury rates (per 100,000), children 1-17

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 92</th>
<th></th>
<th>Female n = 67</th>
<th></th>
<th>Both n = 159</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI</td>
<td>Rate</td>
<td>95% CI</td>
<td>Rate</td>
<td>95% CI</td>
</tr>
<tr>
<td>Drowning</td>
<td>32.4</td>
<td>23.1-45.2</td>
<td>24.8</td>
<td>16.7-36.5</td>
<td>28.6</td>
<td>22.2-36.8</td>
</tr>
<tr>
<td>Transport injury</td>
<td>6.5</td>
<td>2.9-13.7</td>
<td>5.4</td>
<td>2.2-12.5</td>
<td>6.0</td>
<td>3.3-10.4</td>
</tr>
<tr>
<td>Animal bite</td>
<td>5.9</td>
<td>2.5-13.0</td>
<td>3.0</td>
<td>0.8-9.1</td>
<td>4.5</td>
<td>2.3-8.5</td>
</tr>
<tr>
<td>Suicide</td>
<td>2.9</td>
<td>0.0-8.9</td>
<td>4.8</td>
<td>1.8-11.7</td>
<td>3.9</td>
<td>1.9-7.7</td>
</tr>
<tr>
<td>Falls</td>
<td>2.4</td>
<td>0.5-8.0</td>
<td>1.2</td>
<td>0.1-6.4</td>
<td>1.8</td>
<td>0.6-4.9</td>
</tr>
<tr>
<td>Electrocution</td>
<td>2.9</td>
<td>0.8-8.9</td>
<td>0.0</td>
<td>0.0-0.0</td>
<td>1.5</td>
<td>0.4-4.5</td>
</tr>
<tr>
<td>Homicide</td>
<td>0.6</td>
<td>0.0-5.2</td>
<td>1.2</td>
<td>0.1-6.4</td>
<td>0.9</td>
<td>0.2-3.6</td>
</tr>
<tr>
<td>Suffocation</td>
<td>0.6</td>
<td>0.0-5.2</td>
<td>0.6</td>
<td>0.0-5.4</td>
<td>0.6</td>
<td>0.1-3.1</td>
</tr>
<tr>
<td>Burn</td>
<td>0.6</td>
<td>0.0-5.2</td>
<td>0.0</td>
<td>0.0-0.0</td>
<td>0.3</td>
<td>0.0-2.7</td>
</tr>
<tr>
<td>Others</td>
<td>0.0</td>
<td>0.0-0.0</td>
<td>0.6</td>
<td>0.0-5.4</td>
<td>0.3</td>
<td>0.0-2.7</td>
</tr>
</tbody>
</table>

Morbidity Overview
Cause specific morbidity

Table 4.4: Cause-specific morbidity rates (per 100,000) and proportions, all children

<table>
<thead>
<tr>
<th>Causes</th>
<th>Infant n = 1821</th>
<th>1-4 n = 6882</th>
<th>5-9 n = 4487</th>
<th>10-14 n = 3547</th>
<th>15-17 n = 1647</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Injury</td>
<td>691.7</td>
<td>6</td>
<td>2389.3</td>
<td>26</td>
<td>1666.7</td>
</tr>
<tr>
<td>NCD</td>
<td>1086.9</td>
<td>10</td>
<td>775.3</td>
<td>8</td>
<td>401.2</td>
</tr>
<tr>
<td>Infection</td>
<td>9467.1</td>
<td>84</td>
<td>6114.8</td>
<td>66</td>
<td>2128.8</td>
</tr>
</tbody>
</table>

4-5% of childhood morbidity of different age groups did not have enough information reported to be classifiable by cause.
Leading causes of child morbidity (Top 10 causes are listed)

Table 4.5: Leading causes of illness in infants, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 1091</th>
<th>Female n = 730</th>
<th>Both n = 1821</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>ARI/Pneumonia</td>
<td>6119.3</td>
<td>47</td>
<td>4304.8</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>2825.2</td>
<td>22</td>
<td>1854.0</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>709.3</td>
<td>5</td>
<td>482.5</td>
</tr>
<tr>
<td>Fever</td>
<td>637.2</td>
<td>5</td>
<td>520.6</td>
</tr>
<tr>
<td>Fall</td>
<td>444.8</td>
<td>3</td>
<td>190.5</td>
</tr>
<tr>
<td>Skin disease</td>
<td>252.5</td>
<td>2</td>
<td>355.6</td>
</tr>
<tr>
<td>ARI and Diarrhoea</td>
<td>276.5</td>
<td>2</td>
<td>165.1</td>
</tr>
<tr>
<td>Measles</td>
<td>180.3</td>
<td>1</td>
<td>266.7</td>
</tr>
<tr>
<td>Burn</td>
<td>252.5</td>
<td>2</td>
<td>177.8</td>
</tr>
<tr>
<td>Meningitis</td>
<td>192.4</td>
<td>1</td>
<td>114.3</td>
</tr>
<tr>
<td>Asthma</td>
<td>144.3</td>
<td>1</td>
<td>139.7</td>
</tr>
</tbody>
</table>

Table 4.6: Leading causes of illness in children 1-4, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 3966</th>
<th>Female n = 2916</th>
<th>Both n = 6882</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>ARI/Pneumonia</td>
<td>2451.7</td>
<td>23</td>
<td>2076.9</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>2020.6</td>
<td>19</td>
<td>1438.7</td>
</tr>
<tr>
<td>Burn</td>
<td>901.9</td>
<td>9</td>
<td>657.4</td>
</tr>
<tr>
<td>Fever</td>
<td>764.3</td>
<td>7</td>
<td>742.7</td>
</tr>
<tr>
<td>Fall</td>
<td>648.0</td>
<td>6</td>
<td>426.4</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>404.6</td>
<td>4</td>
<td>407.1</td>
</tr>
<tr>
<td>Near drowning</td>
<td>431.1</td>
<td>4</td>
<td>368.6</td>
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<tr>
<td>Measles</td>
<td>354.4</td>
<td>3</td>
<td>412.6</td>
</tr>
<tr>
<td>Skin disease</td>
<td>359.7</td>
<td>3</td>
<td>225.6</td>
</tr>
<tr>
<td>ARI and Diarrhoea</td>
<td>253.9</td>
<td>2</td>
<td>167.8</td>
</tr>
</tbody>
</table>
Table 4.7: Leading causes of illness in children 5-9, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 2701</th>
<th></th>
<th>Female n = 1786</th>
<th></th>
<th>Both n = 4487</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Fall</td>
<td>726.5</td>
<td>15</td>
<td>354.0</td>
<td>10</td>
<td>544.4</td>
<td>13</td>
</tr>
<tr>
<td>Fever</td>
<td>629.5</td>
<td>13</td>
<td>401.8</td>
<td>12</td>
<td>518.2</td>
<td>12</td>
</tr>
<tr>
<td>ARI/Pneumonia</td>
<td>481.3</td>
<td>10</td>
<td>468.7</td>
<td>14</td>
<td>475.1</td>
<td>11</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>351.3</td>
<td>7</td>
<td>308.0</td>
<td>9</td>
<td>330.2</td>
<td>8</td>
</tr>
<tr>
<td>Burn</td>
<td>307.4</td>
<td>6</td>
<td>189.4</td>
<td>6</td>
<td>249.7</td>
<td>6</td>
</tr>
<tr>
<td>Measles</td>
<td>248.9</td>
<td>5</td>
<td>244.9</td>
<td>7</td>
<td>246.9</td>
<td>6</td>
</tr>
<tr>
<td>Cut injury</td>
<td>318.4</td>
<td>6</td>
<td>164.5</td>
<td>5</td>
<td>243.2</td>
<td>6</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>290.9</td>
<td>6</td>
<td>133.9</td>
<td>4</td>
<td>214.2</td>
<td>5</td>
</tr>
<tr>
<td>Asthma</td>
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<td>3</td>
<td>105.2</td>
<td>3</td>
<td>123.5</td>
<td>3</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>117.1</td>
<td>2</td>
<td>114.8</td>
<td>3</td>
<td>116.0</td>
<td>3</td>
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<tr>
<td>Electrocution</td>
<td>126.3</td>
<td>3</td>
<td>105.2</td>
<td>3</td>
<td>116.0</td>
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</table>

Table 4.8: Leading causes of illness in children 10-14, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 2197</th>
<th></th>
<th>Female n = 1350</th>
<th></th>
<th>Both n = 3547</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Fever</td>
<td>564.1</td>
<td>13</td>
<td>414.5</td>
<td>16</td>
<td>489.3</td>
<td>14</td>
</tr>
<tr>
<td>Fall</td>
<td>637.8</td>
<td>15</td>
<td>228.6</td>
<td>9</td>
<td>433.1</td>
<td>13</td>
</tr>
<tr>
<td>ARI/Pneumonia</td>
<td>380.0</td>
<td>9</td>
<td>275.1</td>
<td>11</td>
<td>327.5</td>
<td>10</td>
</tr>
<tr>
<td>Cut injury</td>
<td>325.7</td>
<td>8</td>
<td>93.0</td>
<td>4</td>
<td>209.3</td>
<td>6</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>255.9</td>
<td>6</td>
<td>149.2</td>
<td>6</td>
<td>202.5</td>
<td>6</td>
</tr>
<tr>
<td>Measles</td>
<td>201.6</td>
<td>5</td>
<td>186.0</td>
<td>7</td>
<td>193.8</td>
<td>6</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>312.1</td>
<td>7</td>
<td>52.3</td>
<td>2</td>
<td>182.2</td>
<td>5</td>
</tr>
<tr>
<td>Skin disease</td>
<td>131.8</td>
<td>3</td>
<td>155.0</td>
<td>6</td>
<td>143.4</td>
<td>4</td>
</tr>
<tr>
<td>Animal Bite</td>
<td>160.9</td>
<td>4</td>
<td>79.4</td>
<td>3</td>
<td>120.1</td>
<td>3</td>
</tr>
<tr>
<td>Jaundice</td>
<td>126.0</td>
<td>3</td>
<td>100.7</td>
<td>4</td>
<td>113.4</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 4.9: Leading causes of illness in children 15-17, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 979</th>
<th></th>
<th>Female n = 668</th>
<th></th>
<th>Both n = 1647</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Fever</td>
<td>432.0</td>
<td>11</td>
<td>499.0</td>
<td>19</td>
<td>465.1</td>
<td>14</td>
</tr>
<tr>
<td>Fall</td>
<td>497.6</td>
<td>13</td>
<td>154.5</td>
<td>6</td>
<td>328.3</td>
<td>10</td>
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<tr>
<td>ARl/Pneumonia</td>
<td>285.5</td>
<td>8</td>
<td>257.4</td>
<td>10</td>
<td>271.6</td>
<td>8</td>
</tr>
<tr>
<td>Transport injuries</td>
<td>428.2</td>
<td>11</td>
<td>67.3</td>
<td>3</td>
<td>250.1</td>
<td>8</td>
</tr>
<tr>
<td>Cut injury</td>
<td>270.0</td>
<td>7</td>
<td>95.1</td>
<td>4</td>
<td>183.7</td>
<td>6</td>
</tr>
<tr>
<td>Diarrhoal diseases</td>
<td>192.9</td>
<td>5</td>
<td>154.5</td>
<td>6</td>
<td>173.9</td>
<td>5</td>
</tr>
<tr>
<td>Measles</td>
<td>135.0</td>
<td>4</td>
<td>178.2</td>
<td>7</td>
<td>156.3</td>
<td>5</td>
</tr>
<tr>
<td>Jaundice</td>
<td>235.3</td>
<td>6</td>
<td>55.4</td>
<td>2</td>
<td>146.6</td>
<td>5</td>
</tr>
<tr>
<td>Malaria</td>
<td>123.4</td>
<td>3</td>
<td>99.0</td>
<td>4</td>
<td>111.4</td>
<td>3</td>
</tr>
<tr>
<td>Burn</td>
<td>54.0</td>
<td>1</td>
<td>110.9</td>
<td>4</td>
<td>82.1</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4.10: Leading causes of illness in children 1-17, rates (per 100,000)

<table>
<thead>
<tr>
<th>Causes</th>
<th>Male n = 9842</th>
<th></th>
<th>Female n = 6720</th>
<th></th>
<th>Both n = 16562</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>ARl/Pneumonia</td>
<td>859.6</td>
<td>807.0</td>
<td>915.5</td>
<td>729.3</td>
<td>680.4</td>
<td>781.8</td>
</tr>
<tr>
<td>Diarrhoal diseases</td>
<td>668.4</td>
<td>622.1</td>
<td>718.0</td>
<td>483.4</td>
<td>443.7</td>
<td>526.6</td>
</tr>
<tr>
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<td>566.0</td>
<td>657.6</td>
<td>495.5</td>
<td>455.3</td>
<td>539.2</td>
</tr>
<tr>
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<td>647.8</td>
<td>602.3</td>
<td>696.6</td>
<td>300.3</td>
<td>269.3</td>
<td>334.9</td>
</tr>
<tr>
<td>Burn</td>
<td>325.4</td>
<td>293.4</td>
<td>360.7</td>
<td>256.8</td>
<td>228.2</td>
<td>288.9</td>
</tr>
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<td>240.6</td>
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<td>271.4</td>
<td>253.2</td>
<td>224.8</td>
<td>285.1</td>
</tr>
<tr>
<td>Cut injury</td>
<td>294.2</td>
<td>263.9</td>
<td>327.9</td>
<td>129.9</td>
<td>109.9</td>
<td>153.5</td>
</tr>
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<td>Transport injuries</td>
<td>288.9</td>
<td>258.9</td>
<td>322.3</td>
<td>96.7</td>
<td>79.6</td>
<td>117.3</td>
</tr>
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<td>Malnutrition</td>
<td>164.7</td>
<td>142.3</td>
<td>190.6</td>
<td>151.1</td>
<td>129.4</td>
<td>176.3</td>
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<td>190.6</td>
<td>132.9</td>
<td>112.7</td>
<td>156.7</td>
</tr>
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</table>
### Injury morbidity rates

**Table 4.11: Age and sex–specific injury morbidity rates (per 100,000)**

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 3741</th>
<th>Female n = 1857</th>
<th>Both n = 5598</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>853.6</td>
<td>635.4</td>
<td>1142.3</td>
</tr>
<tr>
<td>1-4</td>
<td>2835.2</td>
<td>2635.4</td>
<td>3049.4</td>
</tr>
<tr>
<td>5-9</td>
<td>2168.4</td>
<td>2022.5</td>
<td>2324.5</td>
</tr>
<tr>
<td>10-14</td>
<td>1841.7</td>
<td>1703.4</td>
<td>1990.7</td>
</tr>
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<td>15-17</td>
<td>1789.9</td>
<td>1600.0</td>
<td>2001.6</td>
</tr>
<tr>
<td>1-17</td>
<td>2159.8</td>
<td>2076.4</td>
<td>2246.6</td>
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</table>

### Injury severity

**Table 4.12: Injury severity rates (per 100,000) and proportions by age**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Infant n = 112</th>
<th>1-4 n = 1773</th>
<th>5-9 n = 1778</th>
<th>10-14 n = 1311</th>
<th>15-17 n = 624</th>
<th>1-17 n = 5486</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Severe</td>
<td>18.5</td>
<td>3</td>
<td>20.6</td>
<td>1</td>
<td>28.1</td>
<td>2</td>
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<tr>
<td>Serious</td>
<td>55.6</td>
<td>8</td>
<td>33.7</td>
<td>2</td>
<td>58.1</td>
<td>5</td>
</tr>
<tr>
<td>Major</td>
<td>129.7</td>
<td>19</td>
<td>85.1</td>
<td>5</td>
<td>94.0</td>
<td>7</td>
</tr>
<tr>
<td>Moderate</td>
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<td>70</td>
<td>1523.6</td>
<td>92</td>
<td>1090.0</td>
<td>86</td>
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</table>

### Table 4.13: Injury severity rates (per 100,000), children 1-17 by sex

<table>
<thead>
<tr>
<th>Severity</th>
<th>Male n = 2669</th>
<th>Female n = 1817</th>
<th>Both n = 5486</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Severe</td>
<td>31.2</td>
<td>22.1</td>
<td>43.8</td>
</tr>
<tr>
<td>Serious</td>
<td>61.8</td>
<td>48.5</td>
<td>78.5</td>
</tr>
<tr>
<td>Major</td>
<td>125.3</td>
<td>105.9</td>
<td>148.2</td>
</tr>
<tr>
<td>Moderate</td>
<td>1939.8</td>
<td>1860.7</td>
<td>2022.2</td>
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</table>
## External causes of non-fatal injury

### Table 4.14: Specific non-fatal injury rates (per 100,000) and proportions, infants

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 72</th>
<th></th>
<th>Female n = 40</th>
<th></th>
<th>Both n = 112</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Fall</td>
<td>444.8</td>
<td>55</td>
<td>190.5</td>
<td>38</td>
<td>321.1</td>
<td>48</td>
</tr>
<tr>
<td>Burn</td>
<td>252.5</td>
<td>31</td>
<td>177.8</td>
<td>35</td>
<td>216.1</td>
<td>32</td>
</tr>
<tr>
<td>Near drowning</td>
<td>48.1</td>
<td>6</td>
<td>38.1</td>
<td>7</td>
<td>43.2</td>
<td>6</td>
</tr>
<tr>
<td>Poisoning</td>
<td>12.0</td>
<td>1</td>
<td>38.1</td>
<td>7</td>
<td>24.7</td>
<td>4</td>
</tr>
<tr>
<td>Animal bite</td>
<td>12.0</td>
<td>1</td>
<td>38.1</td>
<td>7</td>
<td>24.7</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>48.1</td>
<td>6</td>
<td>25.4</td>
<td>5</td>
<td>37.1</td>
<td>6</td>
</tr>
</tbody>
</table>

### Table 4.15: Specific non-fatal injury rates (per 100,000) and proportions, children 1-4

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 1073</th>
<th></th>
<th>Female n = 700</th>
<th></th>
<th>Both n = 1773</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Burn</td>
<td>901.9</td>
<td>31.7</td>
<td>657.4</td>
<td>34.0</td>
<td>782.1</td>
<td>32.6</td>
</tr>
<tr>
<td>Fall</td>
<td>648.0</td>
<td>22.8</td>
<td>426.4</td>
<td>22.0</td>
<td>539.3</td>
<td>22.5</td>
</tr>
<tr>
<td>Near drowning</td>
<td>431.1</td>
<td>15.1</td>
<td>368.6</td>
<td>19.1</td>
<td>400.5</td>
<td>16.7</td>
</tr>
<tr>
<td>Cut injury</td>
<td>230.1</td>
<td>8.1</td>
<td>156.8</td>
<td>8.1</td>
<td>194.2</td>
<td>8.1</td>
</tr>
<tr>
<td>Transport injury</td>
<td>161.3</td>
<td>5.7</td>
<td>126.5</td>
<td>6.5</td>
<td>144.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Animal bite</td>
<td>140.2</td>
<td>4.9</td>
<td>46.8</td>
<td>2.4</td>
<td>94.4</td>
<td>3.9</td>
</tr>
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<td>103.1</td>
<td>3.6</td>
<td>33.0</td>
<td>1.7</td>
<td>68.8</td>
<td>2.9</td>
</tr>
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<td>Falling object</td>
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<td>44.0</td>
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<td>56.6</td>
<td>2.4</td>
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<td>1.0</td>
<td>37.8</td>
<td>1.6</td>
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<tr>
<td>Poisoning</td>
<td>23.8</td>
<td>0.9</td>
<td>19.3</td>
<td>0.6</td>
<td>21.6</td>
<td>0.9</td>
</tr>
<tr>
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<td>26.4</td>
<td>1.4</td>
<td>11.0</td>
<td>2.1</td>
<td>18.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Others</td>
<td>39.7</td>
<td>2.0</td>
<td>41.3</td>
<td>0.1</td>
<td>40.5</td>
<td>1.7</td>
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### Table 4.16: Specific non-fatal injury rates (per 100,000) and proportions, children 5-9

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 1182</th>
<th>Female n = 596</th>
<th>Both n = 1778</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Fall</td>
<td>726.5</td>
<td>33.5</td>
<td>354.0</td>
</tr>
<tr>
<td>Burn</td>
<td>307.4</td>
<td>14.2</td>
<td>189.4</td>
</tr>
<tr>
<td>Cut injury</td>
<td>318.4</td>
<td>14.7</td>
<td>164.5</td>
</tr>
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<td>Transport injury</td>
<td>290.9</td>
<td>13.4</td>
<td>133.9</td>
</tr>
<tr>
<td>Electrocution</td>
<td>126.3</td>
<td>5.8</td>
<td>105.2</td>
</tr>
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<td>Animal bite</td>
<td>142.7</td>
<td>6.6</td>
<td>67.0</td>
</tr>
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<td>86.0</td>
<td>4.0</td>
<td>61.2</td>
</tr>
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<td>Falling object</td>
<td>62.2</td>
<td>2.9</td>
<td>9.6</td>
</tr>
<tr>
<td>Violence</td>
<td>58.6</td>
<td>2.7</td>
<td>5.7</td>
</tr>
<tr>
<td>Machine injury</td>
<td>29.3</td>
<td>1.4</td>
<td>7.7</td>
</tr>
<tr>
<td>Poisoning</td>
<td>3.7</td>
<td>0.2</td>
<td>7.7</td>
</tr>
<tr>
<td>Others</td>
<td>16.5</td>
<td>0.8</td>
<td>36.4</td>
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</table>

### Table 4.17: Specific non-fatal injury rates (per 100,000) and proportions, children 10-14

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 950</th>
<th>Female n = 361</th>
<th>Both n = 1311</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Fall</td>
<td>637.8</td>
<td>34.7</td>
<td>228.6</td>
</tr>
<tr>
<td>Cut injury</td>
<td>325.7</td>
<td>17.7</td>
<td>93.0</td>
</tr>
<tr>
<td>Transport injury</td>
<td>312.1</td>
<td>17.0</td>
<td>52.3</td>
</tr>
<tr>
<td>Animal bite</td>
<td>160.9</td>
<td>8.7</td>
<td>79.4</td>
</tr>
<tr>
<td>Burn</td>
<td>58.2</td>
<td>3.2</td>
<td>114.3</td>
</tr>
<tr>
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<td>100.8</td>
<td>5.5</td>
<td>32.9</td>
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<tr>
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<td>4.5</td>
<td>44.6</td>
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<td>3.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Violence</td>
<td>62.0</td>
<td>3.4</td>
<td>11.6</td>
</tr>
<tr>
<td>Near drowning</td>
<td>5.8</td>
<td>0.3</td>
<td>21.3</td>
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<td>Poisoning</td>
<td>0.0</td>
<td>0.0</td>
<td>9.7</td>
</tr>
<tr>
<td>Others</td>
<td>25.2</td>
<td>1.4</td>
<td>1.9</td>
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</table>
### Table 4.18: Specific non-fatal injury rates (per 100,000) and proportions, children 15-17

<table>
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<tr>
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<th>Male</th>
<th>Female</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>Fall</td>
<td>497.6</td>
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<td>154.5</td>
</tr>
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<td>428.2</td>
<td>24</td>
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</tr>
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<td>15</td>
<td>95.1</td>
</tr>
<tr>
<td>Burn</td>
<td>54.0</td>
<td>3</td>
<td>110.9</td>
</tr>
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<td>Violence</td>
<td>123.4</td>
<td>7</td>
<td>31.7</td>
</tr>
<tr>
<td>Falling object</td>
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<td>23.8</td>
</tr>
<tr>
<td>Animal bite</td>
<td>104.2</td>
<td>6</td>
<td>31.7</td>
</tr>
<tr>
<td>Electrocutation</td>
<td>54.0</td>
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<td>59.4</td>
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<tr>
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<td>Near drowning</td>
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</tr>
<tr>
<td>Others</td>
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</table>

### Table 4.19: Specific non-fatal injury rates (per 100,000), children 1-17

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<th>Female</th>
<th></th>
<th>Both</th>
<th></th>
</tr>
</thead>
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<td>Rate</td>
<td>95% CI</td>
<td>Rate</td>
<td>95% CI</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td>Lower</td>
<td>Upper</td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Fall</td>
<td>647.8</td>
<td>602.3</td>
<td>696.6</td>
<td>300.3</td>
<td>269.3</td>
<td>334.9</td>
</tr>
<tr>
<td>Burn</td>
<td>325.4</td>
<td>293.4</td>
<td>360.7</td>
<td>256.8</td>
<td>228.2</td>
<td>288.9</td>
</tr>
<tr>
<td>Cut injury</td>
<td>295.9</td>
<td>265.5</td>
<td>329.8</td>
<td>129.9</td>
<td>109.9</td>
<td>153.5</td>
</tr>
<tr>
<td>Transport injury</td>
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<td>322.3</td>
<td>97.9</td>
<td>80.7</td>
<td>118.7</td>
</tr>
<tr>
<td>Near drowning</td>
<td>125.3</td>
<td>105.9</td>
<td>148.2</td>
<td>110.6</td>
<td>92.2</td>
<td>132.5</td>
</tr>
<tr>
<td>Animal bite</td>
<td>141.8</td>
<td>121.1</td>
<td>165.9</td>
<td>61.0</td>
<td>47.7</td>
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<tr>
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<td>59.2</td>
<td>46.1</td>
<td>75.9</td>
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<td>Falling object</td>
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<td>30.2</td>
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<td>42.9</td>
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<tr>
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<td>90.3</td>
<td>11.5</td>
<td>6.3</td>
<td>20.4</td>
</tr>
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<td>Machine injury</td>
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<td>65.3</td>
<td>10.3</td>
<td>5.5</td>
<td>18.8</td>
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<tr>
<td>Poisoning</td>
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<td>2.9</td>
<td>13.7</td>
<td>11.5</td>
<td>6.3</td>
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<td>17.2</td>
<td>36.9</td>
<td>19.3</td>
<td>12.3</td>
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</table>
### Permanent disability from injury

#### Table 4.20: Permanent disability due to injury in children 1-4, rates (per 100,000) and proportions

<table>
<thead>
<tr>
<th>Injury type</th>
<th>Male n = 9</th>
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<th></th>
<th>Female n = 7</th>
<th></th>
<th></th>
<th>Both n = 16</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
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<tr>
<td>Fall</td>
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<td>56</td>
<td>2.8</td>
<td>14</td>
<td>9.4</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burn</td>
<td>2.6</td>
<td>11</td>
<td>8.3</td>
<td>43</td>
<td>5.4</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport injury</td>
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#### Table 4.21: Permanent disability due to injury in children 5-9, rates (per 100,000) and proportions

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<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
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<tr>
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<td>0</td>
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<td>22</td>
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#### Table 4.22: Permanent disability due to injury in children 10-14, rates (per 100,000) and proportions

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<th></th>
<th>Both n = 29</th>
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<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
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<td>Falling object</td>
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<td>30</td>
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<td>10</td>
<td></td>
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</table>
Table 4.23: Permanent disability due to injury in children 15-17, rates (per 100,000) and proportions

| Injury type      | Male  
|                 | Rate | % | Female  
|                 | Rate | % | Both  
|                 | Rate | % |
| Transport injury| 11.6 | 43| 0.0 | 0| 5.9 | 43|
| Fall            | 11.6 | 43| 0.0 | 0| 5.9 | 43|
| Falling object  | 3.9  | 14| 0.0 | 0| 2.0 | 14|

Table 4.24: Permanent disability due to injury in children 1-17, rates (per 100,000) and proportions

| Injury type       | Male  
|                  | Rate | % | Female  
|                  | Rate | % | Both  
|                  | Rate | % |
| Fall             | 12.4 | 39| 0.6 | 4| 6.6 | 29|
| Burn             | 5.9  | 20| 4.2 | 36| 5.1 | 25|
| Cut injury       | 1.8  | 6 | 4.2 | 32| 3.0 | 13|
| RTA              | 2.9  | 9 | 1.8 | 14| 2.4 | 11|
| Machine injury   | 3.5  | 11| 0.0 | 0| 1.8 | 8 |
| Falling objects  | 1.2  | 3 | 1.8 | 14| 1.5 | 6 |
| Violence         | 1.8  | 6 | 0.0 | 0| 0.9 | 4 |
| Others           | 1.8  | 6 | 0.0 | 0| 0.9 | 4 |

Table 4.25: Permanent disability rates (per 100,000) due to injury in children by age and sex

| Age (Years) | Male  
|         | Rate | 95% CI Lower | 95% CI Upper | Female  
|         | Rate | 95% CI Lower | 95% CI Upper | Both  
|         | Rate | 95% CI Lower | 95% CI Upper |
| Infant  | 0.0  | 0.0 | 0.0 | 38.1 | 6.6 | 153.5 | 18.5 | 3.2 | 74.7 |
| 1-4     | 29.1 | 13.0 | 61.7 | 13.8 | 3.9 | 41.4 | 21.6 | 11.2 | 40.3 |
| 5-9     | 27.4 | 13.9 | 52.3 | 13.4 | 4.7 | 34.3 | 20.6 | 11.9 | 35.0 |
| 10-14   | 36.8 | 20.3 | 65.3 | 19.4 | 8.3 | 42.6 | 28.1 | 17.5 | 44.6 |
| 15-17   | 27.0 | 9.5  | 69.1 | 0.0  | 0.0 | 0.0  | 13.7 | 4.8  | 35.0 |
| 1-17    | 30.6 | 21.6 | 43.1 | 13.3 | 7.7 | 22.6 | 22.1 | 16.5 | 29.4 |
### Table 5.3: Drowning rates (per 100,000) by age and sex

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<th>Age (Years)</th>
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<th></th>
<th>Female n = 42</th>
<th></th>
<th></th>
<th>Both n = 99</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>Upper</td>
<td>Rate</td>
<td>95% CI Lower</td>
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<td>Infant</td>
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<td>12.6</td>
<td>12.7</td>
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### Table 5.4: Drowning rates (per 100,000) and proportions by year of age

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<th>Female n = 42</th>
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<td>%</td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
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</table>
### Table 5.5: Near drowning rates (per 100,000) and proportions by age

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### Table 5.6: Drowning rates (per 100,000) among children, Urban and Rural

<table>
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<th>Age (Years)</th>
<th>Urban  n = 14</th>
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### Transport Injuries

#### Transport injury types

#### Table 6.1: Fatal RTA rates (per 100,000) by age and sex

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<th>Age (Years)</th>
<th>Male n = 11</th>
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<th>Female n = 9</th>
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<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
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<td>19.3</td>
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<td>2.7</td>
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</tr>
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#### Table 6.2: Non-fatal RTA rates (per 100,000) by age and sex

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<th>Age (Years)</th>
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<th>Both n = 654</th>
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<tbody>
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<td>Rate 95% CI</td>
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<td>259.4</td>
<td>322.9</td>
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#### Table 6.3: Non-fatal RTA rates (per 100,000) by age and place of residence

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<th>Age (Years)</th>
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<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
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## Burns

**Burn injury pattern**

### Table 7.1: Non-fatal burn injury rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 574</th>
<th>Female n = 439</th>
<th>Both n = 1013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>252.5 143.7 434.6</td>
<td>177.8 88.0 346.2</td>
<td>216.1 140.8 328.8</td>
</tr>
<tr>
<td>1-4</td>
<td>901.9 790.5 1028.4</td>
<td>657.4 561.3 769.5</td>
<td>782.1 707.2 864.7</td>
</tr>
<tr>
<td>5-9</td>
<td>307.4 254.3 371.2</td>
<td>189.4 147.7 242.5</td>
<td>249.7 215.0 289.9</td>
</tr>
<tr>
<td>10-14</td>
<td>58.2 36.5 91.6</td>
<td>114.3 82.5 157.7</td>
<td>86.2 66.3 111.9</td>
</tr>
<tr>
<td>15-17</td>
<td>54.0 26.7 105.2</td>
<td>110.9 68.4 177.5</td>
<td>82.1 55.6 120.3</td>
</tr>
<tr>
<td>1-17</td>
<td>325.4 293.4 360.7</td>
<td>256.8 228.2 288.9</td>
<td>291.5 269.8 315.0</td>
</tr>
</tbody>
</table>

### Table 7.2: Non-fatal burn injury rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 161</th>
<th>Rural n = 852</th>
<th>Both n = 1013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>85.4 27.4 234.6</td>
<td>316.4 197.0 501.8</td>
<td>216.1 140.8 328.8</td>
</tr>
<tr>
<td>1-4</td>
<td>239.1 179.7 317.2</td>
<td>1189.2 1067.6 1324.2</td>
<td>782.1 707.2 864.7</td>
</tr>
<tr>
<td>5-9</td>
<td>110.2 77.5 155.9</td>
<td>356.1 301.5 320.4</td>
<td>249.7 215.0 289.9</td>
</tr>
<tr>
<td>10-14</td>
<td>25.8 12.0 53.0</td>
<td>135.9 102.3 180.0</td>
<td>86.2 66.3 111.9</td>
</tr>
<tr>
<td>15-17</td>
<td>65.8 34.2 122.8</td>
<td>96.8 58.6 157.7</td>
<td>82.1 55.6 120.3</td>
</tr>
<tr>
<td>1-17</td>
<td>104.1 85.4 126.7</td>
<td>441.2 405.4 480.0</td>
<td>291.5 269.8 315.0</td>
</tr>
</tbody>
</table>

## Falls

**Fall injury pattern**

### Table 8.1: Fatal fall injury rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 5</th>
<th>Female n = 5</th>
<th>Both n = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>12.0 0.1 107.1</td>
<td>38.1 6.6 153.5</td>
<td>24.7 5.8 84.0</td>
</tr>
<tr>
<td>1-4</td>
<td>0.0 0.0 0.0</td>
<td>2.8 0.0 24.5</td>
<td>1.3 0.0 12.0</td>
</tr>
<tr>
<td>5-9</td>
<td>1.8 0.0 16.3</td>
<td>0.0 0.0 0.0</td>
<td>0.9 0.0 8.3</td>
</tr>
<tr>
<td>10-14</td>
<td>5.8 1.0 23.5</td>
<td>1.9 0.0 17.3</td>
<td>3.9 0.9 13.2</td>
</tr>
<tr>
<td>15-17</td>
<td>0.0 0.0 0.0</td>
<td>0.0 0.0 0.0</td>
<td>0.0 0.0 0.0</td>
</tr>
<tr>
<td>1-17</td>
<td>2.4 0.5 8.0</td>
<td>1.2 0.1 6.4</td>
<td>1.8 0.6 4.9</td>
</tr>
</tbody>
</table>
Table 8.2: Nonfatal fall injury rates (per 100,000) by age and sex

| Age (Years) | Male  
| n = 1137 | | | | Female  
| n = 512 | | | | Both  
| n = 1649 | | | |
|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
|           | Rate 95% CI | Rate 95% CI | Rate 95% CI |
| Infant    | 444.8 293.4 668.3 | 190.5 96.8 362.6 | 321.1 226.8 452.3 |
| 1-4       | 648.0 554.3 756.9 | 426.4 350.0 518.9 | 539.3 477.6 608.9 |
| 5-9       | 726.5 643.0 820.5 | 354.0 295.5 423.6 | 544.4 709.7 867.5 |
| 10-14     | 637.8 557.6 729.2 | 228.6 182.1 286.5 | 433.1 386.0 485.8 |
| 15-17     | 497.6 400.6 617.3 | 154.5 103.0 229.8 | 328.3 217.6 396.5 |
| 1-17      | 647.2 601.7 696.0 | 300.3 269.6 334.9 | 476.1 448.2 505.7 |

Table 8.3: Non-fatal fall injury rates (per 100,000) by age and place of residence

| Age (Years) | Urban  
| n = 493 | | | | Rural  
| n = 1156 | | | | Both  
| n = 1649 | | | |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|
|           | Rate 95% CI | Rate 95% CI | Rate 95% CI |
| Infant    | 113.8 43.5 274.3 | 480.1 328.4 696.9 | 321.1 226.8 452.3 |
| 1-4       | 437.4 354.9 538.2 | 615.8 529.4 715.9 | 539.3 477.6 608.9 |
| 5-9       | 350.2 288.7 424.3 | 692.5 615.0 779.4 | 544.4 709.7 867.5 |
| 10-14     | 270.7 217.3 336.8 | 566.5 494.4 648.8 | 433.1 386.0 485.8 |
| 15-17     | 238.5 171.7 329.9 | 409.6 323.6 517.5 | 328.3 217.6 396.5 |
| 1-17      | 326.4 292.3 364.4 | 596.1 554.4 640.8 | 476.1 448.2 505.7 |
### Cut Injury

**Non-fatal cut injury**

#### Table 9.1: Non-fatal cut injury rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 502</th>
<th>95% CI</th>
<th>Female n = 218</th>
<th>95% CI</th>
<th>Both n = 720</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate Lower</td>
<td>Upper</td>
<td>Rate Lower</td>
<td>Upper</td>
<td>Rate Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>36.1 6.2</td>
<td>145.4</td>
<td>0.0 0.0</td>
<td>0.0</td>
<td>18.5 3.2</td>
<td>74.7</td>
</tr>
<tr>
<td>1-4</td>
<td>230.1 176.3</td>
<td>29.5</td>
<td>156.8 112.5</td>
<td>217.5</td>
<td>194.2 158.1</td>
<td>238.1</td>
</tr>
<tr>
<td>5-9</td>
<td>318.4 264.3</td>
<td>383.2</td>
<td>170.3 130.9</td>
<td>221.0</td>
<td>246.0 211.8</td>
<td>286.9</td>
</tr>
<tr>
<td>10-14</td>
<td>325.7 269.4</td>
<td>393.3</td>
<td>93.0 64.7</td>
<td>132.9</td>
<td>209.3 177.1</td>
<td>247.1</td>
</tr>
<tr>
<td>15-17</td>
<td>270.0 200.5</td>
<td>362.5</td>
<td>95.1 56.3</td>
<td>158.0</td>
<td>183.7 142.2</td>
<td>236.7</td>
</tr>
<tr>
<td>1-17</td>
<td>293.6 263.3</td>
<td>327.3</td>
<td>131.7 111.6</td>
<td>155.4</td>
<td>213.7 196.2</td>
<td>234.0</td>
</tr>
</tbody>
</table>

#### Table 9.2: Non-fatal cut injury rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 198</th>
<th>95% CI</th>
<th>Rural n = 522</th>
<th>95% CI</th>
<th>Both n = 720</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate Lower</td>
<td>Upper</td>
<td>Rate Lower</td>
<td>Upper</td>
<td>Rate Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>0.0 0.0</td>
<td>0.0</td>
<td>32.7 5.7</td>
<td>131.9</td>
<td>18.5 3.2</td>
<td>74.7</td>
</tr>
<tr>
<td>1-4</td>
<td>138.4 94.7</td>
<td>201.1</td>
<td>235.9 184.2</td>
<td>301.7</td>
<td>194.2 158.1</td>
<td>238.1</td>
</tr>
<tr>
<td>5-9</td>
<td>155.6 116.0</td>
<td>208.1</td>
<td>314.9 263.7</td>
<td>375.8</td>
<td>246.0 211.8</td>
<td>286.9</td>
</tr>
<tr>
<td>10-14</td>
<td>122.5 87.9</td>
<td>169.9</td>
<td>280.6 230.9</td>
<td>340.7</td>
<td>209.3 177.1</td>
<td>247.1</td>
</tr>
<tr>
<td>15-17</td>
<td>102.8 61.5</td>
<td>169.2</td>
<td>256.9 190.3</td>
<td>345.7</td>
<td>183.7 142.2</td>
<td>236.7</td>
</tr>
<tr>
<td>1-17</td>
<td>133.0 111.7</td>
<td>158.2</td>
<td>278.2 250.0</td>
<td>309.5</td>
<td>213.7 196.2</td>
<td>234.0</td>
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</table>
## Falling Objects

Non-fatal injury caused by falling objects

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 136</th>
<th>Female n = 50</th>
<th>Both n = 186</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td></td>
<td>Lower Upper</td>
<td>Lower Upper</td>
<td>Lower Upper</td>
</tr>
<tr>
<td>1-4</td>
<td>68.8 41.6 112.0</td>
<td>44.0 22.9 82.1</td>
<td>56.6 38.4 83.0</td>
</tr>
<tr>
<td>5-9</td>
<td>62.2 40.2 95.3</td>
<td>9.6 2.7 28.8</td>
<td>36.5 24.3 54.3</td>
</tr>
<tr>
<td>10-14</td>
<td>83.4 56.7 121.7</td>
<td>44.6 26.1 74.9</td>
<td>63.9 47.0 86.7</td>
</tr>
<tr>
<td>15-17</td>
<td>127.3 81.8 196.2</td>
<td>23.8 7.6 65.3</td>
<td>76.2 50.8 113.4</td>
</tr>
<tr>
<td>1-17</td>
<td>80.0 64.8 98.7</td>
<td>30.2 21.2 42.9</td>
<td>55.4 46.3 66.3</td>
</tr>
</tbody>
</table>

## Poisoning

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 12</th>
<th>Female n = 22</th>
<th>Both n = 34</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td></td>
<td>Lower Upper</td>
<td>Lower Upper</td>
<td>Lower Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>12.0 0.1 107.1</td>
<td>38.1 6.6 153.5</td>
<td>24.7 5.8 84.0</td>
</tr>
<tr>
<td>1-4</td>
<td>23.8 9.7 54.6</td>
<td>19.3 6.8 49.3</td>
<td>21.6 11.2 40.3</td>
</tr>
<tr>
<td>5-9</td>
<td>3.7 0.4 19.3</td>
<td>7.7 1.8 26.0</td>
<td>5.6 1.8 15.4</td>
</tr>
<tr>
<td>10-14</td>
<td>0.0 0.0 0.0</td>
<td>9.7 2.7 29.2</td>
<td>4.8 1.4 14.6</td>
</tr>
<tr>
<td>15-17</td>
<td>0.0 0.0 0.0</td>
<td>11.9 2.1 47.9</td>
<td>5.9 1.0 23.6</td>
</tr>
<tr>
<td>1-17</td>
<td>6.5 2.9 13.7</td>
<td>11.5 6.3 20.4</td>
<td>8.9 5.6 14.1</td>
</tr>
</tbody>
</table>
### Table 11.2: Non-fatal poisoning rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 13</th>
<th>Rural n = 21</th>
<th>Both n = 34</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>14.2 0.1 126.8</td>
<td>32.7 5.7 131.9</td>
<td>24.7 5.8 84.0</td>
</tr>
<tr>
<td>1-4</td>
<td>22.0 7.8 56.3</td>
<td>21.2 8.6 48.7</td>
<td>21.6 11.2 40.3</td>
</tr>
<tr>
<td>5-9</td>
<td>8.6 2.0 29.4</td>
<td>3.3 0.3 17.4</td>
<td>5.6 1.8 15.4</td>
</tr>
<tr>
<td>10-14</td>
<td>2.1 0.0 19.2</td>
<td>7.1 1.6 24.0</td>
<td>4.8 1.4 14.6</td>
</tr>
<tr>
<td>15-17</td>
<td>0.0 0.0 0.0</td>
<td>11.2 1.9 45.0</td>
<td>5.9 1.0 23.6</td>
</tr>
<tr>
<td>1-17</td>
<td>8.1 3.7 16.7</td>
<td>9.6 5.2 17.4</td>
<td>8.9 5.6 14.1</td>
</tr>
</tbody>
</table>

### Animal Injury

#### Fatal animal bite

### Table 12.1: Fatal animal bite rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 10</th>
<th>Female n = 4</th>
<th>Both n = 14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>1-4</td>
<td>0.0 0.0 0.0</td>
<td>2.8 0.0 24.5</td>
<td>1.3 0.0 12.0</td>
</tr>
<tr>
<td>5-9</td>
<td>5.5 1.0 22.1</td>
<td>3.8 0.4 20.2</td>
<td>4.7 1.3 14.1</td>
</tr>
<tr>
<td>10-14</td>
<td>5.7 1.0 32.5</td>
<td>0.0 0.0 0.0</td>
<td>2.9 0.5 11.7</td>
</tr>
<tr>
<td>15-17</td>
<td>11.6 2.6 46.7</td>
<td>4.0 0.0 35.3</td>
<td>7.8 1.8 26.6</td>
</tr>
<tr>
<td>1-17</td>
<td>5.9 2.5 13.0</td>
<td>2.4 0.6 8.2</td>
<td>4.2 2.1 8.1</td>
</tr>
</tbody>
</table>

### Non-fatal injury caused by animal

### Table 12.2: Non-fatal injury rates (per 100,000) caused by animal by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 242</th>
<th>Female n = 104</th>
<th>Both n = 346</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
<td>Rate 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>12.0 0.1 107.1</td>
<td>38.1 6.6 153.5</td>
<td>24.7 5.8 84.0</td>
</tr>
<tr>
<td>1-4</td>
<td>140.2 99.3 196.9</td>
<td>46.8 24.9 85.7</td>
<td>94.4 70.1 126.8</td>
</tr>
<tr>
<td>5-9</td>
<td>142.7 107.7 188.7</td>
<td>67.0 43.6 101.9</td>
<td>105.7 83.8 133.2</td>
</tr>
<tr>
<td>10-14</td>
<td>160.9 122.6 211.0</td>
<td>79.4 53.5 117.0</td>
<td>120.1 96.2 149.8</td>
</tr>
<tr>
<td>15-17</td>
<td>104.2 63.7 168.1</td>
<td>31.7 12.1 76.4</td>
<td>68.4 44.5 104.1</td>
</tr>
<tr>
<td>1-17</td>
<td>141.8 121.1 165.9</td>
<td>61.0 47.7 78.0</td>
<td>102.0 89.3 116.3</td>
</tr>
</tbody>
</table>
### Table 12.3: Non-fatal injury rates (per 100,000) caused by animal by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 97</th>
<th>Rural n = 249</th>
<th>Both n = 346</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
</tr>
<tr>
<td>Infant</td>
<td>14.2 0.1 126.8</td>
<td>32.7 5.7 131.9</td>
<td>24.7 5.8 84.0</td>
</tr>
<tr>
<td>1-4</td>
<td>91.2 56.8 144.8</td>
<td>96.7 65.2 142.5</td>
<td>94.4 70.1 126.8</td>
</tr>
<tr>
<td>5-9</td>
<td>75.7 49.3 115.1</td>
<td>128.6 97.0 170.0</td>
<td>105.7 83.8 133.2</td>
</tr>
<tr>
<td>10-14</td>
<td>49.4 28.9 83.1</td>
<td>178.2 139.3 227.6</td>
<td>120.1 96.2 149.8</td>
</tr>
<tr>
<td>15-17</td>
<td>37.0 15.0 84.9</td>
<td>96.8 58.6 157.7</td>
<td>68.4 44.5 104.1</td>
</tr>
<tr>
<td>1-17</td>
<td>64.5 50.1 82.9</td>
<td>131.9 112.8 154.1</td>
<td>102.0 89.3 116.3</td>
</tr>
</tbody>
</table>

**Electrocution**

**Non-Fatal electrocution**

### Table 13.1: Non-fatal electrocution rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 174</th>
<th>Female n = 99</th>
<th>Both n = 273</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
</tr>
<tr>
<td>1-4</td>
<td>103.1 68.8 153.4</td>
<td>33.0 15.3 67.9</td>
<td>68.8 48.4 97.3</td>
</tr>
<tr>
<td>5-9</td>
<td>126.3 93.5 169.9</td>
<td>105.2 75.0 146.9</td>
<td>116.0 92.9 144.6</td>
</tr>
<tr>
<td>10-14</td>
<td>100.8 71.2 142.1</td>
<td>32.9 17.5 60.3</td>
<td>66.9 49.5 90.0</td>
</tr>
<tr>
<td>15-17</td>
<td>54.0 26.7 105.2</td>
<td>59.4 30.2 113.2</td>
<td>56.7 35.3 90.0</td>
</tr>
<tr>
<td>1-17</td>
<td>102.4 85.0 123.2</td>
<td>59.8 46.6 76.6</td>
<td>81.4 70.2 94.3</td>
</tr>
</tbody>
</table>

### Table 13.2: Non-fatal electrocution rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 37</th>
<th>Rural n = 236</th>
<th>Both n = 273</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
<td>Rate Lower 95% CI</td>
</tr>
<tr>
<td>1-4</td>
<td>22.0 7.8 56.3</td>
<td>103.8 71.0 150.8</td>
<td>68.8 48.4 97.3</td>
</tr>
<tr>
<td>5-9</td>
<td>34.6 18.0 64.6</td>
<td>178.1 140.3 225.5</td>
<td>116.0 92.9 144.6</td>
</tr>
<tr>
<td>10-14</td>
<td>19.3 7.9 44.4</td>
<td>105.9 76.7 145.7</td>
<td>66.9 49.5 90.0</td>
</tr>
<tr>
<td>15-17</td>
<td>20.6 5.8 61.9</td>
<td>89.4 52.9 148.6</td>
<td>56.7 35.3 90.0</td>
</tr>
<tr>
<td>1-17</td>
<td>24.8 16.4 37.4</td>
<td>126.5 107.9 148.3</td>
<td>81.4 70.2 94.3</td>
</tr>
</tbody>
</table>
Machine Injury

Table 14.1: Non-fatal machine injury rates (100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 86</th>
<th>Female n = 18</th>
<th>Both n = 104</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>95% CI Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>12.0</td>
<td>0.1</td>
<td>107.1</td>
</tr>
<tr>
<td>1-4</td>
<td>26.4</td>
<td>11.3</td>
<td>58.3</td>
</tr>
<tr>
<td>5-9</td>
<td>29.3</td>
<td>15.2</td>
<td>54.6</td>
</tr>
<tr>
<td>10-14</td>
<td>67.9</td>
<td>44.2</td>
<td>103.2</td>
</tr>
<tr>
<td>15-17</td>
<td>92.6</td>
<td>54.8</td>
<td>153.9</td>
</tr>
<tr>
<td>1-17</td>
<td>50.0</td>
<td>38.2</td>
<td>65.3</td>
</tr>
</tbody>
</table>

Table 14.2: Non-fatal machine injury rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 22</th>
<th>Rural n = 82</th>
<th>Both n = 104</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>95% CI Upper</td>
</tr>
<tr>
<td>Infant</td>
<td>14.2</td>
<td>0.1</td>
<td>126.8</td>
</tr>
<tr>
<td>1-4</td>
<td>9.4</td>
<td>1.6</td>
<td>38.1</td>
</tr>
<tr>
<td>5-9</td>
<td>6.5</td>
<td>1.1</td>
<td>26.2</td>
</tr>
<tr>
<td>10-14</td>
<td>21.5</td>
<td>9.2</td>
<td>47.3</td>
</tr>
<tr>
<td>15-17</td>
<td>20.6</td>
<td>5.8</td>
<td>61.9</td>
</tr>
<tr>
<td>1-17</td>
<td>14.1</td>
<td>8.0</td>
<td>24.3</td>
</tr>
</tbody>
</table>

Suffocation

Fetal suffocation

Table 15.1: Suffocation fatality rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 3</th>
<th>Female n = 3</th>
<th>Both n = 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>95% CI Upper</td>
</tr>
<tr>
<td>Neonate</td>
<td>11.6</td>
<td>0.1</td>
<td>103.2</td>
</tr>
<tr>
<td>Post-neonate</td>
<td>12.0</td>
<td>0.1</td>
<td>107.1</td>
</tr>
<tr>
<td>Infant</td>
<td>24.0</td>
<td>2.3</td>
<td>126.7</td>
</tr>
<tr>
<td>5-9 yrs</td>
<td>1.8</td>
<td>0.0</td>
<td>16.3</td>
</tr>
</tbody>
</table>
### Intentional Injury

#### Intent of injury

<table>
<thead>
<tr>
<th>Intent</th>
<th>U5 n = 85</th>
<th>5-9 n = 48</th>
<th>10-14 n = 22</th>
<th>15-17 n = 21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Unintentional</td>
<td>93.9</td>
<td>100</td>
<td>44.0</td>
<td>98</td>
</tr>
<tr>
<td>Suicide</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Violence</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Undetermined</td>
<td>0.0</td>
<td>0</td>
<td>0.9</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Table 16.2: Intentional fatal injury rates (per 100,000) by age

<table>
<thead>
<tr>
<th>Intent</th>
<th>10-14 n = 22</th>
<th>15-17 n = 21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
</tr>
<tr>
<td>Suicide</td>
<td>1.0</td>
<td>50</td>
</tr>
<tr>
<td>Violence</td>
<td>1.0</td>
<td>50</td>
</tr>
</tbody>
</table>

### Fatal Violence

#### Table 16.3: Fatal violence rates (per 100,000) by age

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 1</th>
<th>Female n = 1</th>
<th>Both n = 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>%</td>
<td>Rate</td>
</tr>
<tr>
<td>10-14</td>
<td>1.9</td>
<td>100</td>
<td>0.0</td>
</tr>
<tr>
<td>15-17</td>
<td>0.0</td>
<td>0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

### Non-fatal violence

#### Table 16.4: Non-fatal violence rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 123</th>
<th>Female n = 18</th>
<th>Both n = 141</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate</td>
<td>95% CI Lower</td>
<td>95% CI Upper</td>
</tr>
<tr>
<td>1-4</td>
<td>71.4</td>
<td>33.2-110.3</td>
<td>115.4-160.2</td>
</tr>
<tr>
<td>5-9</td>
<td>58.6</td>
<td>33.2-110.3</td>
<td>115.4-160.2</td>
</tr>
<tr>
<td>10-14</td>
<td>62.0</td>
<td>33.2-110.3</td>
<td>115.4-160.2</td>
</tr>
<tr>
<td>15-17</td>
<td>123.4</td>
<td>33.2-110.3</td>
<td>115.4-160.2</td>
</tr>
<tr>
<td>1-17</td>
<td>72.4</td>
<td>33.2-110.3</td>
<td>115.4-160.2</td>
</tr>
</tbody>
</table>
Table 16.5: Non-fatal violence rates (per 100,000) by age and place of residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban n = 38</th>
<th>95% CI</th>
<th></th>
<th>Rural n = 103</th>
<th>95% CI</th>
<th></th>
<th>Both n = 141</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>15.7</td>
<td>4.4</td>
<td>47.4</td>
<td>54.3</td>
<td>31.7</td>
<td>91.2</td>
<td>37.8</td>
<td>23.3</td>
</tr>
<tr>
<td>5-9</td>
<td>17.3</td>
<td>6.6</td>
<td>41.7</td>
<td>44.5</td>
<td>27.2</td>
<td>71.9</td>
<td>32.7</td>
<td>21.3</td>
</tr>
<tr>
<td>10-14</td>
<td>19.3</td>
<td>7.9</td>
<td>44.4</td>
<td>51.2</td>
<td>31.9</td>
<td>81.2</td>
<td>36.8</td>
<td>24.4</td>
</tr>
<tr>
<td>15-17</td>
<td>65.8</td>
<td>34.2</td>
<td>122.8</td>
<td>89.4</td>
<td>52.9</td>
<td>148.6</td>
<td>78.2</td>
<td>52.4</td>
</tr>
<tr>
<td>1-17</td>
<td>25.5</td>
<td>16.9</td>
<td>38.2</td>
<td>55.2</td>
<td>43.3</td>
<td>70.4</td>
<td>42.0</td>
<td>34.2</td>
</tr>
</tbody>
</table>

Suicide

Table 16.6: Suicide rates (per 100,000) by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male n = 5</th>
<th>95% CI</th>
<th></th>
<th>Female n = 7</th>
<th>95% CI</th>
<th></th>
<th>Both n = 12</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.1</td>
<td>0.1</td>
<td>89.9</td>
<td>5.2</td>
<td>0.1</td>
</tr>
<tr>
<td>15</td>
<td>9.3</td>
<td>0.1</td>
<td>82.5</td>
<td>10.0</td>
<td>0.1</td>
<td>89.5</td>
<td>9.6</td>
<td>0.9</td>
</tr>
<tr>
<td>16</td>
<td>22.4</td>
<td>2.2</td>
<td>118.3</td>
<td>21.7</td>
<td>2.1</td>
<td>114.1</td>
<td>22.0</td>
<td>5.1</td>
</tr>
<tr>
<td>17</td>
<td>32.1</td>
<td>3.1</td>
<td>169.3</td>
<td>49.5</td>
<td>8.6</td>
<td>199.5</td>
<td>40.7</td>
<td>11.4</td>
</tr>
</tbody>
</table>

Injury orphanhood

Table 17.1: Leading causes of death rates (per 100,000) for mothers of children 0-17

<table>
<thead>
<tr>
<th>Mother Age (Years)</th>
<th>Suicide Rate</th>
<th>Violence Rate</th>
<th>RTA Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–19</td>
<td>6.2</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>20–24</td>
<td>12.3</td>
<td>4.9</td>
<td>2.4</td>
</tr>
<tr>
<td>25–29</td>
<td>4.9</td>
<td>2.4</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Slight differences in numbers are due to the weighting factor and the rounding process.
### Population Characteristics

#### Table 1: Distribution of population by age and sex

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male</th>
<th>Female</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>&lt;1</td>
<td>8,318</td>
<td>2.0</td>
<td>7,875</td>
</tr>
<tr>
<td>1-4</td>
<td>37,811</td>
<td>9.1</td>
<td>36,353</td>
</tr>
<tr>
<td>5-9</td>
<td>54,649</td>
<td>13.1</td>
<td>52,267</td>
</tr>
<tr>
<td>10-14</td>
<td>51,584</td>
<td>12.4</td>
<td>51,623</td>
</tr>
<tr>
<td>15-17</td>
<td>25,923</td>
<td>6.2</td>
<td>25,248</td>
</tr>
<tr>
<td>18+</td>
<td>238,522</td>
<td>57.2</td>
<td>229,256</td>
</tr>
</tbody>
</table>

#### Table 2: Distribution of population by age and residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Urban</th>
<th>Rural</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>&lt;1</td>
<td>7,028</td>
<td>9,165</td>
<td>16,193</td>
</tr>
<tr>
<td>1-4</td>
<td>31,782</td>
<td>42,382</td>
<td>74,164</td>
</tr>
<tr>
<td>5-9</td>
<td>46,264</td>
<td>60,652</td>
<td>106,916</td>
</tr>
<tr>
<td>10-14</td>
<td>46,543</td>
<td>56,664</td>
<td>103,207</td>
</tr>
<tr>
<td>15-17</td>
<td>24,317</td>
<td>26,854</td>
<td>51,171</td>
</tr>
<tr>
<td>18+</td>
<td>228,897</td>
<td>238,881</td>
<td>467,778</td>
</tr>
<tr>
<td>Total</td>
<td>384,831</td>
<td>434,598</td>
<td>819,429</td>
</tr>
</tbody>
</table>

#### Table 3: Distribution of population by age, sex and residence

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male</th>
<th>Urban</th>
<th>Female</th>
<th>Both</th>
<th>Male</th>
<th>Rural</th>
<th>Female</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>&lt;1</td>
<td>3,587</td>
<td>3,441</td>
<td>7,028</td>
<td>4,731</td>
<td>4,434</td>
<td>9,165</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>16,135</td>
<td>31,782</td>
<td>46,264</td>
<td>31,028</td>
<td>29,624</td>
<td>60,652</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-9</td>
<td>23,621</td>
<td>26,643</td>
<td>46,543</td>
<td>30,240</td>
<td>27,924</td>
<td>58,164</td>
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</tr>
<tr>
<td>10-14</td>
<td>22,844</td>
<td>23,699</td>
<td>46,543</td>
<td>28,740</td>
<td>27,924</td>
<td>56,664</td>
<td></td>
<td></td>
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<tr>
<td>15-17</td>
<td>11,652</td>
<td>12,665</td>
<td>24,317</td>
<td>14,271</td>
<td>12,583</td>
<td>26,854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18+</td>
<td>117,231</td>
<td>111,666</td>
<td>228,897</td>
<td>121,291</td>
<td>117,590</td>
<td>238,881</td>
<td></td>
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</tr>
<tr>
<td>Total</td>
<td>195,070</td>
<td>189,761</td>
<td>384,831</td>
<td>221,437</td>
<td>213,161</td>
<td>434,598</td>
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</tr>
<tr>
<td>District</td>
<td>Urban</td>
<td>Rural</td>
<td>Both</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sherpur</td>
<td>4,870</td>
<td>25.5</td>
<td>14,212</td>
<td>74.5</td>
<td>19,082</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comilla</td>
<td>6,619</td>
<td>38.0</td>
<td>10,812</td>
<td>62.0</td>
<td>17,431</td>
<td>100.0</td>
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</tr>
<tr>
<td>Sirajganj</td>
<td>2,305</td>
<td>20.7</td>
<td>8,844</td>
<td>79.3</td>
<td>11,149</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habiganj</td>
<td>2,013</td>
<td>24.5</td>
<td>6,204</td>
<td>75.5</td>
<td>8,217</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pirojpur</td>
<td>1,502</td>
<td>24.6</td>
<td>4,606</td>
<td>75.4</td>
<td>6,108</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khulna</td>
<td>8,152</td>
<td>53.0</td>
<td>7,243</td>
<td>47.0</td>
<td>15,395</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jessore</td>
<td>3,077</td>
<td>24.6</td>
<td>9,442</td>
<td>75.4</td>
<td>12,519</td>
<td>100.0</td>
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<td></td>
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<tr>
<td>Thakurgaon</td>
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<td>5,178</td>
<td>66.5</td>
<td>7,790</td>
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<td></td>
</tr>
<tr>
<td>Chittagong</td>
<td>6,545</td>
<td>56.3</td>
<td>5,074</td>
<td>43.7</td>
<td>11,619</td>
<td>100.0</td>
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<td></td>
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<tr>
<td>Narsingdi</td>
<td>1,948</td>
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<td>88,380</td>
<td>51.6</td>
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<td><strong>Total</strong></td>
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</tbody>
</table>
**Contributors**

**Research Team**

**Principal Investigators**

AKM Fazlur Rahman, Associate Professor, Department of Epidemiology and Biostatistics, ICMH, Dhaka.
Aminur Rahman, Assistant Professor, Department of Epidemiology and Biostatistics, ICMH, Dhaka.

**Co-investigators**

Pravat Chandra Barua, Professor, Department of Community Medicine, Chittagong Medical College, Chittagong.
ARM Luthful Kabir, Professor, Department of Paediatrics, ICMH, Dhaka.

**Research Associates**

SM Saidur Rahman Mashreky, Assistant Professor, Centre for Medical Education, Dhaka.
Salim Mahmud Chowdhury, PhD Student, Karolinska Institutet, Stockholm, Sweden.
MS Giashuddin, Statistician, Department of Epidemiology and Biostatistics, ICMH, Dhaka.

**Technical Advisors**

Michael Linnan, Technical Director, TASC, Bangkok, Thailand.
Monjur Hossain, Project Officer, Health and Nutrition, UNICEF Bangladesh.
Shumona Shafinaz, Assistant Project Officer, Health and Nutrition, UNICEF Bangladesh.

**Reviewers**

Dr. A K M Shamsuddin, Director, Administraion, DGHS.
Dr. Mohd. Mahbubur Rahman, Director PHC & Line Director ESD, DGHS.
Dr. Md. Moazzam Hossain, Director, MIS, DGHS.
Dr. Alia Akhter Begum, Director, Homeo and Traditional Medicine, DGHS.
Dr. Md. Abdur Rashid, Director, Hospital & Clinics, DGHS.
Dr. Kaniz Fatema, Director, Planning and Research, DGHS.
Dr. Md. Mazharul Hoque, Professor, Civil Engineering, BUET and Director, ARC.
Prof. M Kabir, Professor, Department of Statistics, Jahangirnagar University, Dhaka.
Prof. Shafique Uddin Ahamed, Professor and Head of Neurosurgery Department, Dhaka Medical College.
Md. Nowsher Alam, Project Director, SVRS, Bangladesh Bureau of Statistics.
Mr. Muhammad Shuaib, Associate Professor, Institute of Statistical Research and Training, Dhaka University.
Dr. Zahidur Rahman, Assistant Professor, National Institute of Preventive & Social Medicine (NIPSOM).
Dr. Z M Zahurul Islam, Assistant Director, DGHS.
Dr. Md. Mossarof Hossain, Assistant Director, DGHS.
Dr. A T M Mustafa Kamal, Assistant Director, DGHS.
Dr. Md. Jahir Uddin, Assistant Director, DGHS.
Dr. Md. Siddiquur Rahman, Deputy Programme Manager, DGHS.
Dr. Taufiqur Rahman, Research Officer, DGHS.
Dr. Syed Azam Mohammad, Medical Officer, Planning, DGHS.
Dr. Md. Faruque Hossain, Medical Officer, DGHS.
Mr. Md. Didarul Alam, Assistant Programmer, ARC.
Dr. Salamat Khandker, Medical Officer, World Health Organization.
Dr. Shams El Arifeen, Head, Child Health Programme, ICDDR,B.
Dr. Lauren Blum, Social Scientist, ICDDR,B.
Dr. Rosella Morelli, Senior Project Coordinator, UNICEF Bangladesh.
Mr. James Jennings, Chief, Education, UNICEF Bangladesh.
Dr. Harriet Torlesse, Project Officer, Nutrition, UNICEF Bangladesh.
Dr. SM Asib Nasim, Project Officer, Health, UNICEF Bangladesh.
Dr. Nawshad Ahmed, Project Officer, Planning, Monitoring and Evaluation, UNICEF Bangladesh.
Ms. Birgitte Van Delft, Project Officer, Protection, UNICEF Bangladesh.
Mr. Jose Paulo Arujo, Project Officer, Protection, UNICEF Bangladesh.
Ms. A Laleh Ebrahimian, Project Officer, Protection, UNICEF Bangladesh.

Paediatricians of ICMH who analyzed the Verbal Autopsy and Verbal Diagnosis

Prof. ARM Luthful Kabir, Prof. Soofia Khatoon, Dr. Shafi Uddin Ahmed (Associate Professor), Dr. SM Shahnawaz Bin Tabib (Associate Professor), Dr. Selim Ahmed (Assistant Professor), Dr. M Quamrul Hassan (Assistant Professor), Dr. Md Al-Amin Mirzha (Registrar), Dr. Wahida Khanam (Registrar), Dr. Nasima Akter (Registrar), Dr. Zahid Arefin (Registrar), Dr. M A Mannan (Registrar), Dr. Shahin Akter (Assistant Registrar).

Field Staff

Research Manager: Md. Sekander Ali


**Behavioural Research**
Conducted in collaboration with PIACT, Bangladesh

**Photography**
Shefali Akter Shetu, Abul Kashem, Hamida Akter Bristi, Iqbal Hossain, Pintu Sikder, Foysal Ahmed Dador, Rabeya Sarkar Rima, Zohirul Shekh Falan, Rafanoor Akter Moly, Shopna Akter, Zakir Hossain/Out of Focus/DRIK/UNICEF.

Akash, Azizur Rahim Peu, Shehzad Noorani, Shafiqul Alam Kiron, Shumona Shafinaz/Unicef

**Graphic Design**
Dhrupadi
email: dhrupadi@gononet.com
The Bangladesh Health and Injury Survey (BHIS) is 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. The survey, conducted between January and December of 2003, included all age groups; 43 percent (351,651) of the surveyed population were children.

The BHIS addresses all causes of death and helps characterise the causes within each age group. Communicable and non-communicable disease is still considered a major concern for children, especially infants. However, a newly identified threat is significantly challenging the placement of this concern. Injury, as documented by this survey, now accounts for 38 percent of all classifiable deaths in children aged 1-17.

In addition to the quantitative survey providing hard data documenting the extent of the problem, the survey also conducted a qualitative study to capture the cultural and behavioural factors related to the perception of risk, prevention and practices related to injuries. Taken together they provide a road map for future action designed to promote an agenda of safety for children of all ages in