

Karolinska Institutet
Department of Public Health Sciences
Division of Social Medicine
Norrbacka, 2nd Floor
SE-171 76 Stockholm
Sweden



2004

KI-REPORT 2004:2

Theses for Degree of Master in Safety Promotion

K A R O L I N S K A I N S T I T U T E T

Dr. Salim Mahmud Chowdhury



Curriculum Vitae

- Nationality:** Bangladeshi
- Present address:** C/O, Md. Abdul Ghafur, Managing Director, Fairdeal Enterprises BJA Bhaban (Ground floor) 77 Motijheel C/A, Dhaka - 1000, Bangladesh.
- E-mail:** smc@dhaka.net
- Working Place:** Bangladesh Safe Community Foundation House
No. – 25/20, Tajmohol Road. Block – C. Mohammadpur,
Dhaka, Bangladesh.
- University Education:**
- M.B.B.S. Faculty of Medicine, Dhaka Medical College. University of Dhaka, Dhaka, Bangladesh
 - Degree of Master in Safety Promotion, Karolinska Institutet, Stockholm, Sweden
- Job experience:** 7 years in different national and international organization in Bangladesh, specially in Injury Prevention and Safety Promotion field for last 4 years.
- Research area:** Un-intentional childhood injuries in Bangladesh.

Epidemiological Study of Fall Injuries among Young Children (0-17 years) in Bangladesh: Implication for the Preventive Intervention

Thesis defence: Salim Mahmud Chowdhury
Supervisor: Lars Gunnar Hörte

There is no specific study on fall injuries among young children in Bangladesh and it makes a knowledge gap about the epidemiology of fall injuries. Moreover, it is a neglected public health problem in Bangladesh. The study was carried out to determine the magnitude of the fall injuries- among young children (0-17 years) in Bangladesh, as well as to find out the associated factors of fall injuries. A population-based household survey was conducted during November 2002 to August 2003 in Bangladesh. Nationally representative data were collected from 171,366 households comprising of total 351,651 populations of this age group. Information included the number of deaths in the household during last 2 years and number of ill or injury in last 6 months. Three structured and standardized questionnaires were used to gather detailed information. Verbal autopsy was also done to elicit the cause of death. A total of 13 (7.3%) fall related death out of 178 injury deaths was documented. Fall related morbidity were recorded 1561(29%) out of 5381 injury morbidities. For all causes of morbidity fall was among the five leading causes in different age groups. Mostly affected age group was 5-9 years but age-sex differences were prominent. Most common mechanism of fall injury was accidental fall except neonatal age group. Injuries from the tree within home environment was the most common site. One of the most interesting finding was neonatal injury due to falls out side the home environment. This study has probably provided the first comprehensive assessment of fall injury among young children in Bangladesh. The result of the study may be an insight to the policy makers and public health planners to develop realistic and effective strategies to address this issue.

Key words: Epidemiology, Fall, Children, Bangladesh, Prevention.

Introduction

Fall is the most common mechanism for child injury¹. It accounts for a significant proportion of paediatric injuries and deaths². Though infectious diseases are still the chief cause of death among children in low-income countries but a definite increase in incident and related mortality due to trauma has been noted in the last decade³. The pattern and importance of fall injuries are varied from region to region. The types of falls mirror the developmental stages and activities of growing children. Both fall occurrence and injury are associated with children's physical, cognitive and social development, age and changing exposure to particular environments and products throughout different stages of life⁴. In Bangladesh from public health perspective this issue is becoming an emerging problem⁵.

Fall Injury as a Global Burden

Fall related injuries and their complications are a serious public health concern worldwide and is responsible for the largest number of hospital visits for non-fatal injuries especially for children and young adults⁶. Approximately 50% of the total number of DALYs (Disability Adjusted Life Years) lost globally to falls occurs in children under 15 years of age⁷. Falls in urban setting are a common cause for emergency room visit in children and adolescents in high-income countries⁸. The Global Burden of Disease Study estimated 5.8 millions people worldwide died from injuries in 1998 and falls are the leading cause of burden of disease for children aged 5-14 years and the 14th leading cause for all age groups⁹.

Significant differences are observed in different countries about the incidence and pattern of fall injuries. In Vietnam the rate of non-fatal injury for children and adolescents under 20 years of age is 4,901.5 per 100,000 and fall was the most prominent cause of non-fatal injury¹⁰. A study conducted in Nigeria about the severity and outcome of falls in children. The result of that study showed that falls accounted for 25% of childhood injuries¹¹. Another study in Tehran, Iran among children under 19 years of old trauma patients admitted in six major hospitals shows that fall was the most common cause of injury followed by road traffic accident¹².

Indeed, falls-related injury is a major cause of demands on the health system whether at primary health care level or the hospital level. The body knowledge about fall-related injury is increasing and a number of developments in this regard are also taking place in the high-income countries. They made significant improvements particularly in the prevention of falls related injuries. But in most of the low-income countries this issue is a neglected public health problem.

Fall Injuries in Bangladesh

Bangladesh, once recognized as the diarrhoeal disease capital of the world, has made significant progress in improving child health in the last few decades¹³. After successful immunization programme child mortality due to communicable diseases has declined but now a days unintentional injuries enter into the public health arena as an emerging problem. In a report from Orthopaedic Hospital of Bangladesh showed that 56.3% of all emergency patients were road traffic accident victims followed by fall victims (29.5%)¹⁴. A population-based epidemiological investigation in a local community of Bangladesh showed that falls was the most common cause of injury in all age groups except 15-34 years age group¹⁵. Another study conducted in Bangladesh on spinal cord lesions revealed that falling from height and falling while carrying heavy weight were the most common causes of

spinal cord injury. Common age group for this type of injury was 10-40 years¹⁶. In Bangladesh during last couple of years injuries due to drowning, road traffic accident and burn have drawn the attention of policy makers. But fall has been neglected due to people's perception about it as an unpreventable problem. Moreover it has neither been recognized nor been launched any preventive program to address this issue. Public health professionals and policy makers are not much aware about the extent and risk factors of the problem.

As there is no specific study on fall injuries among young children in Bangladesh, so there is a knowledge gap about the epidemiology of fall injuries. To fill up this knowledge gap the objective of the study is to determine the magnitude of the fall injuries among young children in Bangladesh and to identify the associated factors of fall injuries.

Materials and Methods

Study Design

For the whole survey (Bangladesh National Health and Injury Survey 2003) a descriptive cross sectional survey and a case-control study were conducted in 12 districts of Bangladesh. A qualitative study was also carried out in one district of the country between November 2002 and August 2003 for the survey. Cross-sectional survey was conducted to estimate the incidence and the proportional morbidity and mortality of children due to injury and other diseases. We have abstracted the data on injuries from the cross-sectional survey for our study purpose.

All household residents in the selected urban and rural areas of Bangladesh constituted the study population for the survey, but in this study we have only considered children of 0-17 years. Mothers were preferred as respondent; however, when a mother was not available the most knowledgeable member of the household present at the time of interview was selected as the respondent. In case of a household, when there was no respondent on first visit, a second visit was made. If no respondents available on repeated visit, that household was excluded from the study. Almost 100% cases mothers were found during first visit.

Sampling Technique

A multistage cluster sampling was used. In 1st step 12 out of 64 districts were randomly selected (At least one from each of the six divisions). The number of districts for each division was determined according to the total number of districts in each division. In each district to represent the rural community 1 upazlia (sub-district) was randomly chosen. In each upazila 2 unions (administrative lowest units comprising of ~ 20 000 population) were selected randomly and each union was considered as clusters. A total of 24 unions were randomly selected for the study. All the households of the union were included in the survey. The district headquarters were considered to be urban. The sample size comprises of 133,563 households of which 88,380 households were selected from the rural areas and 45,183 households were chosen from urban areas.

Research Instruments

The instruments of the Vietnam Multi-centre Injury Survey (VMIS 2001) were used as the starting point of developing instruments for the survey, because of similarity of socio-geographical context between Bangladesh and Vietnam. After pre-testing three structured and standardized questionnaires were developed for data collection.

Part I was screening form for identification of eligible cases and death in the household including age and sex characteristics. Part II form was for collecting information on the socio-economic characteristic of the head of the household, the site at which injury occurred and a description of the injury. Part III form covered the information on death due to injury, treatment history before death and post-mortem history. Verbal autopsy which is a valid instrument¹⁷⁻²² was done to determine the cause of death.

Quality Control and Data Management

A technical committee was formed to pay particular attention to quality control of data acquisition, data entry and analysis. From recruitment of forty eight data collectors to analyzing the data, every step was done strictly to control the quality of survey. The data collectors and supervisors were given extensive hands on training on rapport building with the rural population, techniques of interviewing, and keeping records. The data collection instruments were pre-tested and adjusted as required. On the spot supervision was done by the researchers in frequent field visits. The supervisors/investigators re-interviewed 5% of cases to check the reliability of the collected data. Data were double entered by two different groups of data enterers. Then two sets of data were compared for validation of data entry. If any differences were found during that time, it was adjusted after comparing with main interview file.

For this study we have separated the data from the main data file carefully. After that we analyzed it separately and finally compared the results to find out any differences. More over if any questions raised about the data during analysis, we checked the data from the interview file through principal investigator. This part of quality control was done to see whether there was any problem during abstraction of data from the main file.

Definitions

Falls:

Fall is defined as an event, which results in a person coming to rest inadvertently on the ground or floor or other lower level²³. In this study fall-related deaths and non-fatal injuries exclude those due to assault and intentional self-harm. Falls from burning buildings and transport vehicles, and falls into fire and machinery are also excluded. In the study falls were classified according to ICD-10 into two types – fall from the same level and fall from the different level.

Mortality:

Mortality due to falls were registered when the death occurred within last 2 years.

Morbidity:

In the study when injuries due to falls were serious enough to seek medical treatment or alter normal activities for at least 3 days were considered as morbidity. Morbidity for last 6 months were considered in the study.

Young children:

In the study children of 0-17 years age group was considered as young children. This age group is further subdivided in to 6 categories:

- Neonate age group
- Post-neonate age group
- 0-4 years age group
- 5-9 years age group
- 10-14 years age group
- 15-17 years age group

Household member:

A household member was defined as a member living in the same house including servants, long-term guests, etc and sharing meals and information for long time.

Severity:

A special scale was developed by an expert committee to measure the severity of the outcome from fall injuries. In the survey severity of the outcome was classified according to following criteria –

Moderate – Sought medical care but not admitted in a hospital; or had a three days work loss or absence from school. There is no permanent disability.

Major – Hospitalized for less than 10 days or treated for fracture and no permanent disability.

Serious – Hospitalized for 10 days or more and no permanent disability.

Severe – Permanently disabled.

This scale was followed in the study.

Results

A total of 13 fall related death out of 182 injury deaths among young children (0-17 years) was documented. Fall accounted for 29% (1561 cases) of the total injury morbidity and was the leading cause of morbidity among all unintentional injuries. According to figure 1 for all ages combined and all causes of morbidity fall was the 5th leading cause. If we consider every individual burden of disease separately, then fall injuries is the 3rd leading cause. It was the 3rd, 5th, 3rd, 1st, 1st and 2nd leading cause of morbidity among neonate, post-neonate, 1-4 years, 5-9 years, 10-14 years and 15-17 years respectively. Fall related mortality was the 3rd leading cause of injury mortality. As the sample size is representing nationally, so from the result of the study it is estimated that nationally fall related injury incidence rate was 447.60/100,000.

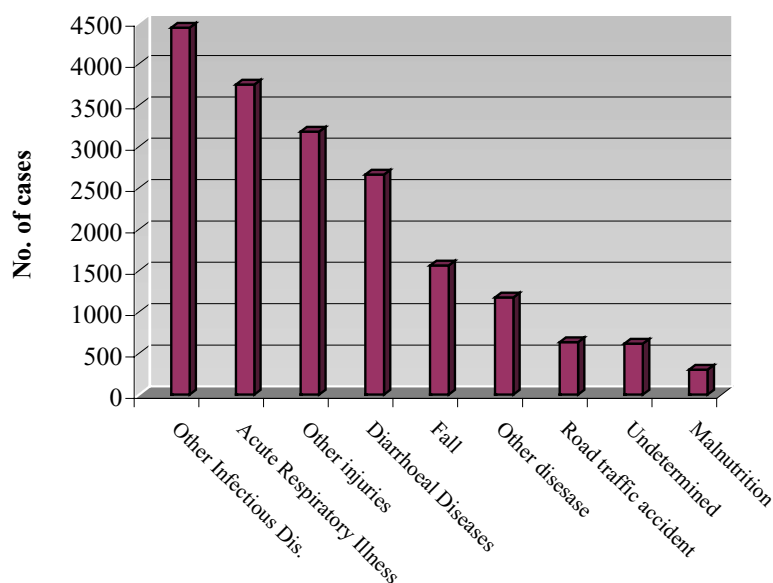


Figure 1. Fall injuries compared with other causes of morbidity

Demographic (Age and Sex) Distribution

Total 1574 number of fall injuries documented, out of which 13 cases were deaths. For all age and sex combined fall was the leading cause of injury incidence. A significant difference in the trend of injury incidence between male female was observed. There was an upward trend among male till 5-9 years age group, then it follows the downward trend. But in case of female children upward trend for injury incidence was observed up to 1-4 years and then it declines. Male children were the main victims of fall related mortality and morbidity and they accounted 68.5% of total injury. The ratio of risk between male than female children for injury incidence was 2.13:1. For both sex 5-9 years age group was mostly affected group. (Figure 2).

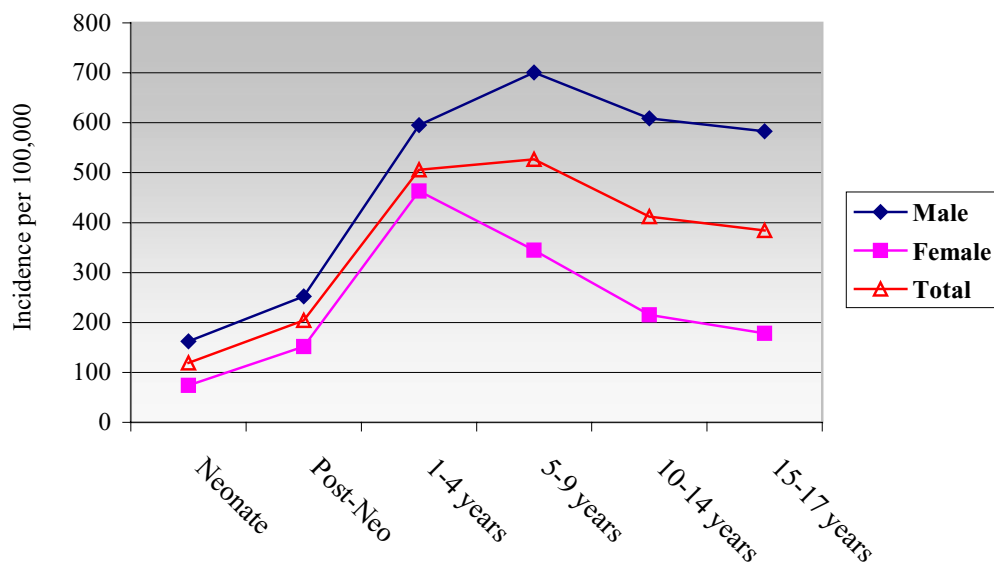


Figure 2. Distribution of fall injuries in different age group stratified by sex

Relation with Family Income

Family income was divided into 5 groups based on the local currency. 100% of fatal outcomes following fall were within the BD.0-5000.00 taka (1 USD = approx. 58BDT) per month income group. The scenario was the same for morbidity (Figure 3) and 69.2% fall-related morbidity occurred in this age group.

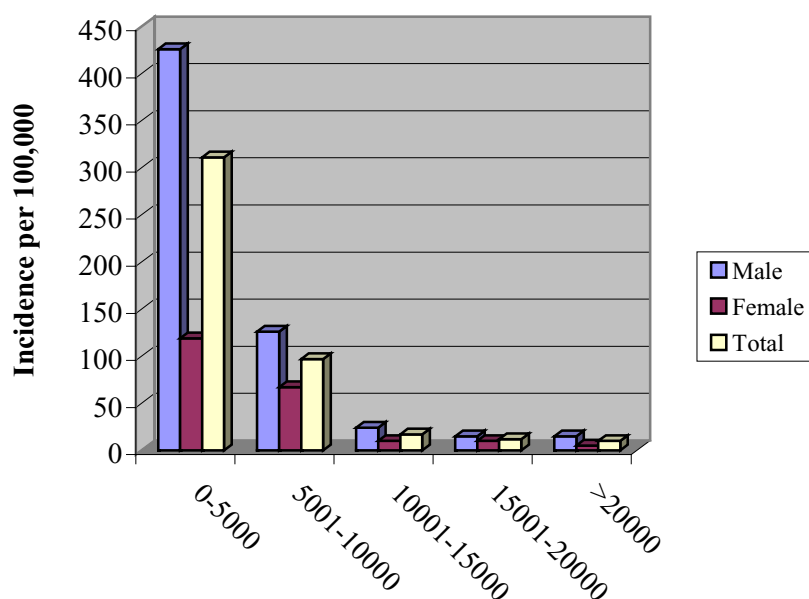


Figure 3. Incidence of fall injury per 100,000 according family income per month in BDT stratified by sex (* 1 USD = approx. 58 BDT.)

Rural and Urban Distribution

Most of the fall related injuries were identified in the rural areas and the ratio of incidence in the urban and rural area was 1:2.9. This ratio corresponds to the demographic distribution in Bangladesh. Table 1 describes that most of the male children from the rural areas experienced fall injuries from different level.

Table 1. Distribution of incidence per 100,00 among rural and urban children stratified by different age groups

Geographic area	Incidence per 100,000					
	Same level		Different level		Total	
	Male	Female	Male	Female	Male	Female
Rural	185.6	83.6	265.8	126.9	451.5	210.5
Urban	75.7	34.6	78.5	39.8	154.2	74.4
Total	261.3	118.2	344.3	166.7	606.7	284.9

Mechanism of Injury

Fall related injury mechanism is described in Table 2. It is showed that accidental fall was the most common mechanism of injury followed by stumbling, pushing and slipping. For accidental injuries 1-4 years age group was most vulnerable followed by 5-9 years age group. The table also describes that the most common mechanism for different age group was accidental fall except neonatal age group. For neonatal age group pushing was the most common mechanism of fall injury.

Table 2. Relationship between fall injury mechanisms per 100,000 stratified by different age groups

Age group	Incidence rate per 100,000 by mechanism (No.)						
	Stumbling	Slipping/ tripping	Push	Accidental	Jump	Unknown	Others
Neonate	17.9 (3)	17.9 (3)	47.8 (8)	29.9 (5)	0	0	0
Post-Neo	18.5 (3)	0	30.9 (5)	123.5 (20)	0	18.5 (3)	6.2 (1)
1-4 years	102.5 (76)	55.3 (41)	33.7 (25)	258.9 (192)	26.9 (20)	5.4 (4)	21.6 (16)
5-9 years	86 (92)	66.4 (71)	81.4 (87)	229.2 (245)	38.3 (41)	3.8 (4)	23.4 (25)
10-14 years	70.7 (73)	47.5 (49)	46.5 (48)	198.6 (205)	24.2 (25)	0	23.2 (24)
15-17 years	54.7 (28)	70.3 (36)	60.6 (31)	109.4 (56)	1.9 (1)	0	15.6 (8)
Total	78.2 (275)	56.9 (200)	58 (204)	205.6 (723)	24.7 (87)	3.13 (11)	21 (74)

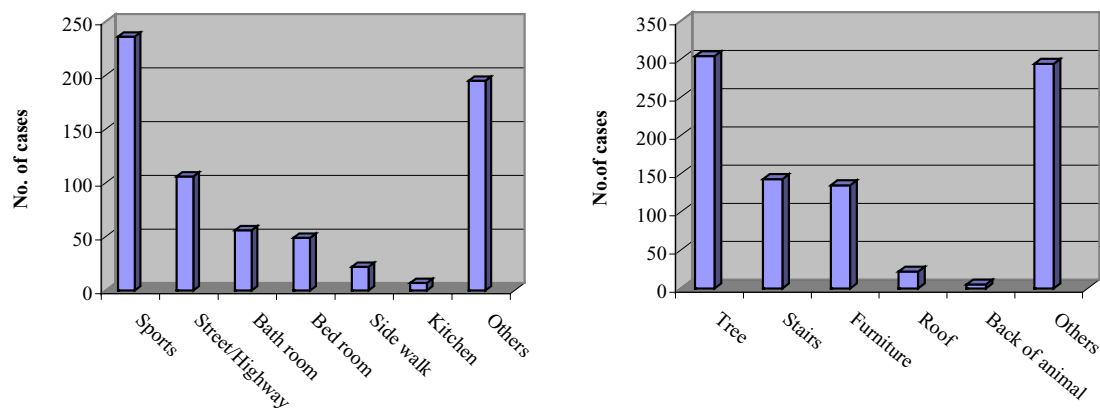
Place of Injury

Most of the injury occurred within home environment (Table.3). But the 2nd leading environment involved was not same for different age groups. One of the most interesting finding of the table is that there was a evidence of neonatal injury due to falls in sports field and school environment. It might be that due to carelessness of the accompanying person was the case of injury incidence in that environment.

Table 3. Fall injury incidence per 100,000 in different environment stratified by age groups

Environment	Age Groups						Total
	Neonate	Post-Neo	1-4 years	5-9 years	10-14 years	15-17 years	
Home	71.7	185.3	370.8	296.5	183.1	95.7	248
Highway/ Street	0	18.5	48.5	84.2	53.3	46.9	59.1
Sports area	17.9	0	37.7	41.1	63	50.8	47.2
School	29.9	0	4	15.9	36.8	29.3	29
Agriculture/ Farm field	0	0	9.4	38.3	30	11.7	17.3
Water reservoir	0	0	14.8	17.8	12.6	17.6	14.8
Others	0	0	20.2	33.7	32.7	54.7	32.1

Most common site of injury in the same level was sports area (35.17%) which includes sports within sports area, school area and home environment (Fig.4). Tree (33.67%) was the most common site for injury from different level and was followed by stairs (15.84%) and furniture (14.95%).



Fall injury from the same level

Fall injury from the different level

N.B. Here sports includes sports within sports area, school area and home environment.

Figure 4. Incidence of fall injury from different places stratified by level

Height and Out Come

In the study it was found that in most of the cases severity of the out comes following fall was moderate among non-fatal injuries from different level (Table 4).

Table 4. Severity of fall injury (%) from different level according to height involvement

Severity	Height of fall from different level in meters			
	<1	1-5	6-10	>10
Severe	0.34	0.34	0	0.34
Serious	1.57	0.78	1.46	0
Major	0.56	3.36	2.57	0.78
Moderate	27.66	39.42	15	5.49
Total	30.12	43.90	19.15	6.83

Most of the fall happened from 1-5 meters followed by less than 1 meter. For serious out come most common height involved was less than 1 meter, was an interesting finding.

Discussion

Methodology

There are numerous methodological limitations of injury epidemiology, injury prevention and safety promotion concept is still a researchable arena²⁴. In most of the developed countries they use hospital based data to describe the epidemiology of fall related injury. These data are valid and well accepted in the developed countries as almost 100% of victims with fall injuries visited hospital for seeking medical care. But in developing countries like Bangladesh only few of the fall related injured person visited hospital due to social, economic and other problems. Though hospital based survey is well accepted method in developed countries but there are some limitations. In hospital data only serious cases enough to require hospital admission are captured. These data are not reflecting the situation as a whole, as large portion of the fall related non-fatal injuries do not require hospitalization. Other reasons such as factors related to physician referral, screening and admission practices may explain changes in the data over time²⁵. On the other hand multi-stage sampling avoids having to compile exhaustive lists of every single person in the population. In many developing countries like Bangladesh list of all individual population members (sample frame) is rarely available. In multi-stage sampling researchers begin by sampling relative large units, working their way down to smaller and smaller units. In this method population units (e.g. households) are chosen in the last stage. If there is no specific population data a household survey provides population-based injury incidence data and desired information on circumstances in a representative sample²⁶.

However in household survey data on fall related injury may be subjected to errors in recall, over or under reporting because of perception of people about fall injury, social desirability or errors from proxy reporting. In a household survey, the sample size should be as big as to cover significant number of death and serious injuries and in our study we took all households of the last stage of clustering to overcome this problem.

Before drawing conclusion however the limitations of the study must be addressed. First, the study relied on data of the survey, which was self-reporting data by the respondents. The veracity of their answers could not be verified. There is probably a tendency to under-report. Recall periods of between 1 and 3 months are recommended for survey settings^{27,28}. But in the survey the recall time used for considering for morbidity was 6 months and mortality was 2 years. So, there was also some possibilities of under reporting due to recall bias as fall is not considered a memorable event in rural community. But in Bangladesh any death is considered as a major event and well remembered²⁸. So the chance for recall bias for fall related morbidity was limited. Second, the interviewers collected information in the local language on the questionnaire during survey. So the dependency on the description of the interviewers may cause some errors in the determination of mechanism and other risk factors of fall injury. Nevertheless, to describe fall related injury in a particular community in developing countries, a household survey is more representative than hospital-based survey²⁹.

Comparison of the Key Finding Findings

There are lot of studies on fall injuries among children in high-income countries^{30,31,32,33,34}, but in low-income countries there is only few studies^{35,36,37}. Socio-demographic and geographic factors are not constant for all countries through out the world. So it is difficult to compare the result of the study with other studies. Nevertheless, there are similarities in different findings. For example fall injury is the most common cause of injury^{38,39,40,41}

mechanism and more common in male children. One of the interesting finding was 1-4 years female children was the most vulnerable group, but for male children it was 5-9 years age group. Majority of the injury took place within home environment, but one of the interesting findings was that there was evidence of neonatal injury out side home environment. In the study injuries were more frequently found in the rural areas and low-income families, which may be due to normal geographic and economic distribution. Due to adventurous and carelessness nature of the children most common injury mechanism was accidental fall. Another interesting finding of the study was that most of the serious out come was due to fall from less than 1 meter height.

The study has limited scope in depicting the pattern of fall injuries in the whole country due to sample frame. Identification of preventive intervention was beyond the scope of this study. Despite this drawback this study has probably provided the first comprehensive assessment of fall injury among young children in Bangladesh.

Concept of Preventive Intervention

Falls happen to children in so many different ways, it is difficult to develop a plan to impact all childhood falls. When addressing fall injury prevention strategies a combination of education, enforcement and engineering, which is called three E formulas has proved to be the best effective approach. As community participation in developing intervention model to implementation is important I like to add two more E. The 4th E is engagement of the community in the programme, so that they can think that the programme is their own programme and in that case we hope output would be better. The last E is economy. Without financial solvency or better economy it is difficult to develop and implement appropriate intervention programme to address fall injury, as the risk factors and mechanism are not same for all. At the same time cost effectiveness of any interventions is the key concern in developing countries²⁶.

Identification of priority target groups from the result of this study might be the starting point for health planners to develop appropriate prevention strategies. Recently safe community model⁴² for preventing injuries has drawn the attention of injury epidemiologist and policy makers. We can use the result of the study in different models of injury prevention to develop a fall injury prevention model, appropriate for our socio-economic context.

Future Scope of Research

In Bangladesh like other low-income countries due to lack of recent information regarding falls problem, making the situation worse day by day. The analysis of the study has discovered some potential priorities for future work in Bangladesh, like –

- In depth investigations on fall injuries to design preventive interventions.
- Developing cost effective program for the prevention of falls-related injury.

Conclusion

Though there was some limitation, the study reveals that fall injury among young children is an important public health problem that accounts for an estimated 447.60/100,000 fall injuries nationally. Mortality due to fall injuries is no so high like drowning, burn etc. But morbidity due to fall injuries among young children is an alarming feature. Thousands of

young children are becoming disable following fall injuries. This is a very big burden for the family as well as for the society, because of its high incidence rate. This study provides the most recent estimates on the magnitude of falls-related injuries among young children and pattern of the problem. This information could be useful for priority setting and policy recommendations. It is necessary for Bangladesh and other low-income countries to target fall-related injury research and intervention immediately. It is also important to keep a strategic oversight on what work is being done on fall injuries and whether work in this area is progressing.

References

1. Bulut M, Korkmaz A, Akkose S, et al. Epidemiologic and clinical features of childhood falls. *Ulus Travma Derg*, 2002;8(4):220-3.
2. Meller JL, Shermeta DW, Falls in urban children: A problem revisited. *Am J Dis Child*, 1987;141(12):1271-5.
3. Sharma AK, Sarin YK, Monocha S, et al. Pattern of childhood trauma. Indian perspective. *Indian Pediatr*, 1993;30(1):57-60.
4. Ozanne-Smith, J. and Brumen I. 'Product-related child fall injury', Monograph Series No. 4, Research report, Commonwealth Dept Health and Family Services, Canberra ACT, 1st, 1996:1-132.
5. 2nd Asian Regional Conference on Safe Communities-1st Bangladesh Conference on Injury Prevention, 15-17 February 2004.
6. World Health Organization; INJURIES: In South-East Asia Region-Priorities for Policy and Action.
7. World Health Organization. The Injury Chart book: A graphical overview of the global burden of injuries. 2002:43-50.
8. Murray JA, Chen D, Velmahos, et al. Pediatric falls: is height a predictor of injury and outcome. *Am Surg.*, 2000;66(9):863-5.
9. World Health Organization – Injury: A Leading cause of Global Burden of Disease. (http://www.who.int/violence_injury_prevention/injury/gbi/gbi8/en/print.html)
10. United Nations Children Fund (UNICEF), Vietnam; Childhood injury prevention in Vietnam: Injury Issues Monitor No.27, June 2003, 13-14.
11. Aduesunkanmi AR, Oseni SA, Badru OS. Severity and outcome of falls in children. *Weast African J Med*. 1999;18(4):281-5.
12. Zargar M, Sayyar Roudsari B, Shadman M, Kaviani A, Tarighi P. Pediatric transport related injuries in Tehran: the necessity of implementation of injury prevention protocols. *Injury*, 2003;34(11):820-4.
13. Giersing M. Assessing the burden of injury in Bangladesh: Injury Issues Monitor No.27, June 2003, 5-6.
14. Hoque M. Towards Improving Road Safety in Bangladesh. International Seminar on Road Safety. Dhaka, 1995.
15. Rahman F, Andersson R, Svanström L. Health Impact of Injuries: A Population-Based Epidemiological Investigation in a Local Community of Bangladesh. *Journal of Safety Research*, 1998;29:213-222.
16. Hoque MF, Grangeon C, Reed K. Spinal cord lesions in Bangladesh: an epidemiological study 1994 – 1995. *Spinal Cord*, 1999;37(12):858-61.
17. Byass P, Huong DL, Minh HV. A probabilistic approach to interpreting verbal autopsies: methodology and preliminary validation in Vietnam. *Scand J Public Health*, 2003;Suppl 62:32-7.
18. Huong DL, Minh HV, Byass P. Applying verbal autopsy to determine cause of death in rural Vietnam. *Scand J Public Health*. 2003;Suppl 62:19-25.

19. Marsh DR, Sadruddin S, Fikree FF, Krishnan C, Darmstadt GL. Validation of verbal autopsy to determine the cause of 137 neonatal deaths in Karachi, Pakistan. *Paediatr Perinat Epidemiol.*, 2003;17(2):132-42.
20. Chandramohan D, Setel P, Quigley M; Effect of misclassification of causes of death in verbal autopsy: can it be adjusted?: *Int J Epidemiol.*, 2001;30(3):509-14.
21. Mirza NM, Macharia WM, Wafula EM, Agwanda RO, Onyango FE. Verbal autopsy: a tool for determining cause of death in a community. *East Afr Med J*,1990;67(10):693-8.
22. Bang AT, Bang RA. Diagnosis of causes of childhood deaths in developing countries by verbal autopsy: suggested criteria. *Bull World Health Organ.* 1992;70(4):499-507.
23. World Health Organization – Injuries and violence prevention. http://www.who.int/violence_injury_prevention/unintentional_injuries/falls/falls1/en/
24. Cumming P, Koepsell TD, Mueller BA. Methodological challenges in injury epidemiology and injury prevention research. *Annu Rev Public Health*, 1995;16:381-400.
25. 2001 peel community Health Survey; State of the Region's Health-2002:20-21.
26. SI Bangdiwala, E Anzola-Perez, CC Romer, B Schmidt, F Valdez-Lazo, J Toro and C D'Suze. The incidence of injuries in young people: I. Methodology and results of a collaborative study in Brazil, Chile, Cuba and Venezuela. *International Journal of Epidemiology*,1990;19(1):115-124.
27. Harel Y, Overpeck MD, Jones DH, Scheidt PC, Bijur PE, et.al. The effects of recall on estimating annual nonfatal injury rates for children and adolescents. *American Journal of Public Health*, 1994;84(4):599-605.
28. Mock C, Acheampong F, Adjei S, Koepsell T. The effect of recall on estimation of incidence rates for injury in Ghana. *Int J Epidemiol.*, 1999;28(4):750-5.
29. Rahman F, Andersson R, Svanström L; Health Impact of Injuries: A population-Based Epidemiological Investigation in a Local Community of Bangladesh. *Journal of Safety Research.* 1998;29(4),213-222.
30. Wang MY, Kim KA, Griffith PM, Summers S, McComb JG, Levy ML, Mahour GH. Injuries from falls in the pediatric population: an analysis of 729 cases, *J Pediatr Surg.*,2001;36(10):1528-34.
31. Lallier M, Bouchard S, St-Vil D, Dupont J, Tucci M. Falls from heights among children: a retrospective review. *J Pediatr Surg.*, 1999;34(7):1060-3.
32. Lehman D, Schonfeld N. Falls from heights: a problem not just in the northeast. *Pediatrics*, 1993;92(1):121-4.
33. Mosenthal AC, Livingston DH, Elcavage J, Merritt S, Stucker S. Falls: epidemiology and strategies for prevention. *J Trauma.*, 1995;38(5):753-6.
34. Solheim K. When children fall: *Tidsskr Nor Laegeforen*, 1998;118(16):2481-2.
35. Sharma AK, Sarin YK, Manocha S, Agarwal LD, Shukla AK, Zaffar M, Singh J. Pattern of childhood trauma: Indian perspective. *Indian Pediatr.*, 1993;30(1):57-60.
36. Ittai S, Gad BJ, Naim S, David F, Vardit J, Moshe R. Hospitalizations due to falls in Jewish and Arab children in northern Israel. *Eur J Epidemiol.*, 2000;16(1):47-52.
37. Adesunkanmi AR, Oseni SA, Badru OS. Severity and outcome of falls in children. *West Afr J Med.*, 1999;18(4):281-5.
38. Laffoy M. Childhood accidents at home. *Ir Med J.*, 1997;90(1):26-7.
39. Del Ciampo LA, Ricco RG, De Almeida CA, Mucillo G. Incidence of childhood accidents determined in a study based on home surveys. *Ann Trop Paediatr.*, 2001;21(3):239-43.
40. Miron D, Shinnawi F, Meenes R, Avishai I, Sarid Y, Rotem M. Childhood injuries in northern Israel – prevalence and risk factors. *Harefuah*, 2003;142(8-9):579-82, 648.
41. Brown GW, Malone P. Child head injuries: review of pattern from abusive and unintentional causes resulting in hospitalization. *Alaska Med.* 2003;45(1):9-13.
42. Laflamme L, Svanström L, Schelp L. Safety Promotion Research. 1st ed. Stockholm: Karolinska Institutet, 1999:112.