Child Injury in Thailand

Child Injury in Thailand:

A report on the Thai National Injury Survey

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Foreword

There have been fundamental changes in global public health over the last two decades. As a result of improving social and economic conditions, many countries are experiencing an epidemiologic transition. This situation exists in Thailand and other countries in the Asian and Pacific region, where traditional child survival efforts have met with great success, so child mortality from infectious diseases has dropped significantly. This results in morbidity and mortality from non-communicable causes, especially injury, becoming increasingly more prominent.

Injury emerges as a leading cause of death and disability in all child age groups in most countries in the world today, but this trend is yet to be recognized as a national health issue due to the reporting systems that are primarily based in facilities. As many injuries are never treated at health facilities where data is collected, they under-report many injury events. Consequently, a number of UNICEF country offices in Asia, in collaboration with The Alliance for Safe Children (TASC), and local government, public health and academic institutions, have undertaken large scale community-based studies on child injury in order to obtain more accurate data on this emerging public health threat.

In response to the need for a deeper understanding of the causes and factors contributing to Thailand's child mortality and morbidity patterns, the Institute of Health Research (IHR) at Chulalongkorn University and TASC in collaboration with UNICEF conducted the Thai National Injury Survey (TNIS). The TNIS involved interviews with more than 100,000 households representing nearly 400,000 residents, making it the largest community based survey on child mortality and morbidity ever conducted in Thailand. The methodology employed in this survey is consistent with other national surveys undertaken by UNICEF/ TASC and local institutional partners in the region. This is a landmark study that provides extraordinary detail on what really kills children in Thailand today.

The survey allows us to characterize the causes of child morbidity and mortality in both urban and rural settings. This provides researchers with valuable insights into the differences between these environments, creating critical knowledge for future prevention activities. The survey also provides detailed findings on all causes of death and morbidity and associated risk factors. In addition to the quantitative data, it considers some of the community knowledge and practices that may have contributed to the injuries.

This study established that injury accounts for almost two thirds of all deaths in children aged 1 to 17 years, and it is the major cause of death in all ages after infancy (older than 1 year) in Thailand. With close to 6000 children dying annually from injury, Thailand has clearly made the epidemiologic transition. This survey provides Thailand's policy-makers and public health practitioners with a roadmap for the development of interventions that are necessary to prevent the loss of so many young lives. It is our hope that this report will be received as a clear call for action.

We would like to thank our many colleagues at UNICEF, the IHR and TASC for their hard work in developing this evidence base for injuries in Thailand. We look forward to using this report to help create the interventions needed to promote safety and injury prevention for all the children of Thailand.

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Abbreviations

ARI	Acute Respiratory Infection
ASMR	Age Specific Mortality Rate
CDC	US Centers for Disease Control & Prevention
CDR	Crude Death Rate
CMR	Child Mortality Rate
EPI	Expanded Program on Immunization
IHR	Institute of Health Research, Chulalongkorn University
IMCI	Integrated Management of Childhood Illness
IMR	Infant Mortality Rate
LBW	Low Birth Weight
MOPH	Ministry of Public Health, Thailand
NCD	Non-Communicable Disease
RTA	Road Traffic Accident
TASC	The Alliance for Safe Children
U5MR	Under 5 Mortality Rate
UNICEF	United Nations Children's Fund
UTD	Unable to determine
WHO	World Health Organization

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Chapter 1

Key Points

- The TNIS is the largest survey on death and disability from injury ever conducted in Thailand
- After infancy, injury kills more children (64%) than infectious and non-communicable diseases combined
- Injury is a leading cause of morbidity and permanent disability
- Drowning is the leading cause of death for children older than one and road traffic accidents are a close second

Key Points

This survey is the largest community based survey on child mortality and morbidity ever conducted in Thailand. It used a nationally representative sample selected by the National Statistics Office. The survey was conducted between September 2003 and April 2004 and examined 100,179 households with 389,531 residents, of whom 98,904 were children younger than 18. Children represent nearly 30 per cent of the population of Thailand, and the epidemiology of both fatal and non-fatal injury is of significant cost and importance to the country.

Detailed interviews were conducted to examine deaths, illnesses and injuries in children and their parents. This report *Child Injury in Thailand: A report on the Thai National Injury Survey* (TNIS) describes the overall causes of child death and illness and then looks in detail at child injury.

Injuries are characterized by age group and described as moderate, major, serious, severe, and fatal in order to help determine the risk factors and some of the related social and economic costs. The survey did not include injury that was considered minor. To be counted, the minimum injury required the patient to seek medical care, or miss three days of work or school.

The report clearly shows that children have different patterns of disease and injury according to their stage of childhood. In fact they have very different patterns of injury itself according to the stage of childhood. These patterns, referred to as the epidemiology of childhood morbidity and mortality, clearly stand out in the survey and provide policy-makers with key pieces of information to tailor child health programs to best target the actual causes of child death and disability in Thailand.

Figure 1 below shows this differing pattern of cause of death by stage of childhood. In infancy, non-communicable disease (NCD) is the leading killer, mainly from birth related causes and congenital defects in the neonatal period, followed by infections in the post-neonatal period.

Infancy is a special period in a child's life. Infants cannot walk and they are protected from hazards by their mothers, so injury rates are low. However, when they begin to walk at about one year of age, they are exposed to external hazards and injury rates increase. As children grow older, the proportion of injury deaths increases while infections and NCD deaths decrease. At all age groups after infancy, injury is the leading cause of death of children. Injury accounts for almost two thirds (64%) of all deaths in children aged 1- 17.

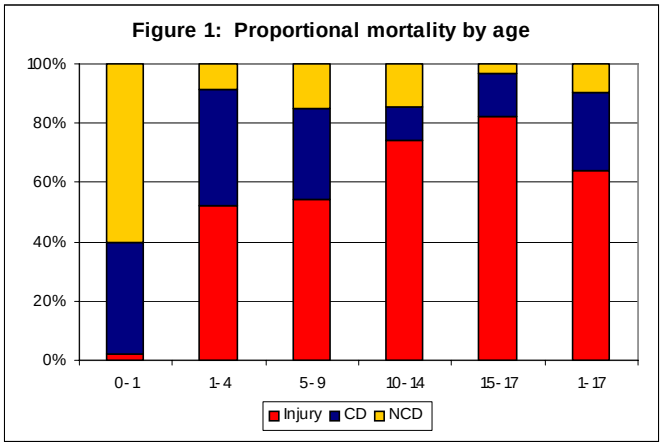
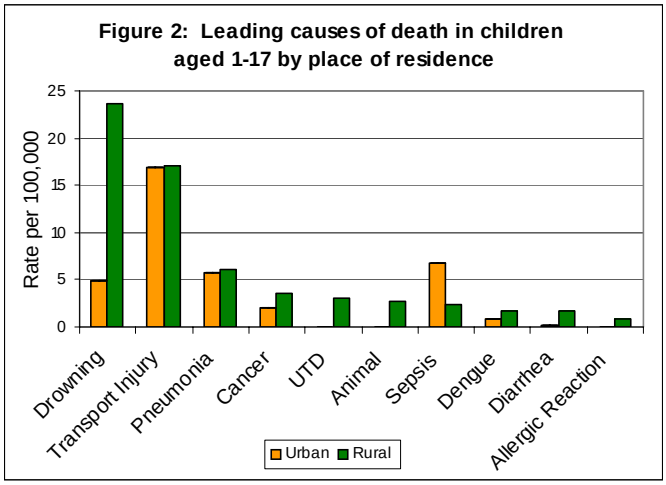


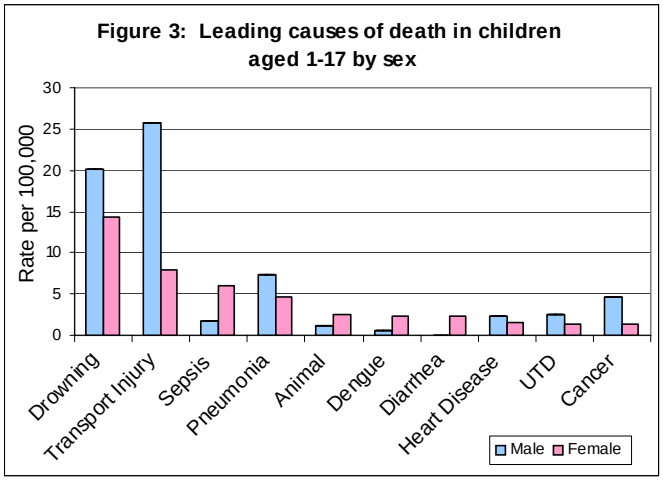
Figure 2 below shows that the cause of death depends on where children live. Most children in Thailand live in rural areas (80%). So the different causes by urban and rural location are quite important to recognize, for example there are

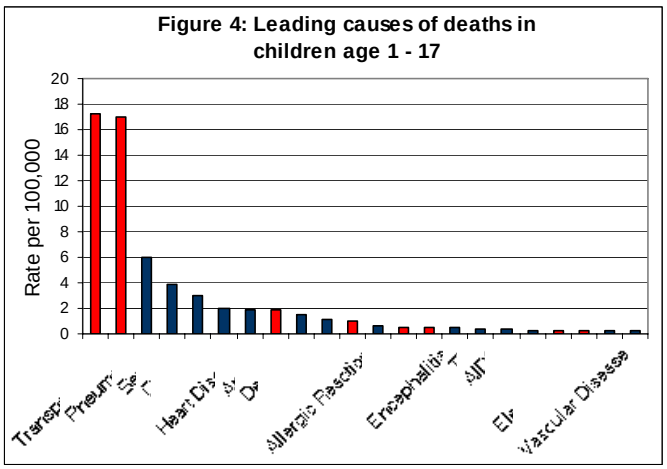


high rates of drowning in rural areas compared to urban areas.

There are also large differences in the pattern of death according to gender. Figure 3 below shows that for some types of death, especially those related to injury, males often have significantly higher rates of death rates than females do. This is very visible in the two leading killers of children after infancy in Thailand: deaths from drowning, and deaths from road traffic accidents

Figure 4 below summarizes the leading causes of death for children aged 1-17. Overall, more children aged 1-17 in Thailand die each year from drowning than from any other cause – 17.2 per 100,000. About 2,640 children are estimated to have died from drowning in the year preceding the survey. Road traffic is close behind in second place, killing 17.0 per 100,000. About 2,600 children are estimated to have died from road traffic injuries in the year prior to the survey. Overall, around 6,000 children are estimated to have died from all causes of injury in the year surveyed.





Injury prevention is literally is a matter of life and death for thousands of children in Thailand each year. Table 1 shows the estimated annual toll in child lives from injury..

Table 1: Estimated numbers of child deaths from injury in Thailand (all children under 18)

Injury Type	Per Year	Time between each death
Drowning	2,644	3.3 Hours
Transport Injury	2,605	3.4 Hours
Suffocation	450	20 Hours
Animal	282	1.3 Days
Homicide	160	2.3 Days
Fall	86	4.2 Days
Suicide	70	5.2 Days
Burn	43	8.5 Days
Electrocution	43	8.5 Days
Total	**6,385**	**82 Minutes**

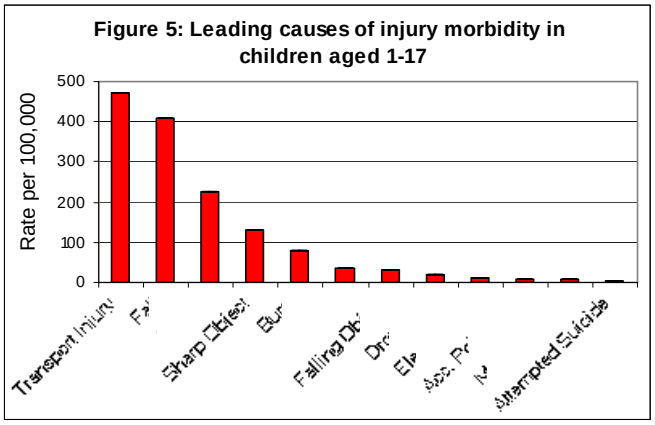
Household surveys such as this provide excellent information on unintentional or accidental causes of death and disability. However, because they rely on self-report, they always seriously underestimate intentional causes of death, disability and other morbidity. Thus, the numbers and rates for homicide and suicide (and their non-fatal equivalents of assault and self-harm) are significantly underestimated, even though they appear as the fourth and sixth leading cause of child death. Assessing true rates of violence and suicide requires specially designed surveys that allow for the personal and sensitive nature of these injuries. When done in the future, they will almost certainly show an increased rank in the leading causes of child injury in Thailand. These figures are included here to allow policymakers to recognize their presence as leading causes of child injury, even as underestimates.

Figure 5 below shows that injury morbidity rates are 1,429 per 100,000 for children aged 1 to 17. Almost 1.5 per cent of all Thai children were injured in the year preceding the survey.

The leading cause of non-fatal injury was road traffic injury, estimated to have injured more than 72,000 Thai children. Falls, the second leading cause, are estimated to have injured more than 62,000 children. Overall, almost 220,000 children are estimated to have suffered an economically and medically significant injury.

More than 1,600 children are estimated to have been permanently disabled from injury. This is more than four children every day. The leading causes of permanent disability from injury in children are from road traffic accidents (RTA), which are estimated to cause about 2 permanent disabilities every day, and falls which are estimated to leave one child disabled every day.

While injury that causes the death of a child is understandably a critical issue for child health in Thailand, fatal injury is only the tip of the iceberg. There are significant costs associated with fatal injury, but in terms of the economic and social costs it is serious injury, especially that which causes permanent disability, that outstrips fatal injuries. There is an urgent need to focus on the issue of non-fatal injury for Thai children.



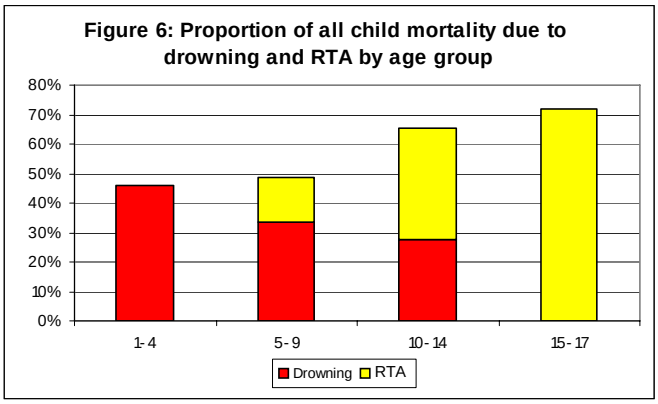
Principal findings and recommendations

Injury should be formally acknowledged as a leading public health problem in children and given greater emphasis in child health policy and programming at all levels— national, provincial and local. The problem is so large that Thailand should develop a National Strategy for Child Safety. This is supported by the following evidence:

- About 1.5 per cent of Thai children were injured significantly enough to require medical care or lose three days of school or work in the year preceding the survey. More than 1,600 children were estimated to have been permanently disabled from injury and more than 6,000 Thai children died from all causes of injury, roughly 16 per day.
- While communicable disease remains a concern for infants, injury is a major cause of death for children in every other age group. It accounts for almost two thirds (64%) of all deaths among children aged 1 to 17. For children older than one, more died from drowning than from any other cause – about 2,650 children in the year preceding the survey. Road traffic accidents (RTA) were a close second, killing 2,600 children.
- There are significant costs associated with fatal injury, but the economic and social costs associated with serious injury, especially permanent disability, are higher. The leading cause of non-fatal injury was RTA, estimated to have injured almost 72,000 children in the survey year. The second leading cause was falls, which injured an estimated 60,000 children. Other causes include burns, animal bites, cuts, poisonings, and assaults. Overall, 220,000 children are estimated to have suffered an economically and medically significant injury during the year preceding the survey.

The problem is complex, but there are many solutions already available which can be initiated in Thailand to reduce these deaths and non-fatal injuries to children.

- Figure 6 shows that after infancy, drowning and RTA surpass all other causes of child death. Drowning alone is responsible for almost half of all deaths in the 1-4 age group; and drowning and RTA account for two out of three deaths in the 5-17 age group. Targeting them together would be an efficient strategy. A focus on parents of preschool children to reduce drowning hazards in and around households and to increase supervision would result in a major reduction of the U5MR.



- For school-aged children, programs that teach water safety and swimming would decrease the leading cause of death in this age-group. Similarly, programs that teach children how to safely walk and ride bicycles along Thailand's busy roads and how to use protective transport equipment (helmets, seat belts) would decrease the second leading cause of child deaths in school aged children.
- Such initiatives could begin by bringing information on prevention practices to the attention of national community services organizations and key enablers within the educational sector. Because of the relatively high level of development, strong social infrastructure, and institutional strengths, Thailand is better positioned than other countries in the region to introduce an integrated intervention strategy into child protection and health promotion programs.

Chapter 2

Methodology

- The survey covered a nationally representative sample of 100,179 households selected by the National Statistics Office
- The head of household and caretaker of any child in the household were interviewed to examine the health of the 389,531 infants, children and adults covered
- Causes of death were determined by medical certificates where available and by verbal autopsy where it was not
- The recall period was three years for mortality and one year for morbidity

Methodology

Background

A cross-sectional national survey was conducted between September 2003 and April 2004 in order to determine all causes of mortality and morbidity in children. It was a joint project between the Institute of Health Research at Chulalongkorn University (IHR), The Alliance for Safe Children (TASC) and UNICEF Thailand.

Sampling and interviewing

The country was stratified into the five regions that are customarily used to describe Thailand: North, Northeast, Central, South and Bangkok. Within each region a number of provinces were randomly selected and are listed below. Bangkok was treated as one province. In total 20 provinces were selected.

North: 4 out of 18 provinces

Northeast: 5 out of 19 provinces

Central: 6 out of 24 provinces

South: 4 out of 14 provinces

Bangkok: 1 out of 1 province

After the initial provinces were selected, 12 additional provinces (three from each region except Bangkok) were selected for inclusion based upon the presence of a reporting point in the MOPH hospital-based injury surveillance system. This was done to allow the comparison of patterns of injury measured at the level of the community and those measured at the level of the hospital.

Each province was then stratified into urban and rural areas. Bangkok, being entirely urban, was stratified by slum and non-slum areas.

Clusters of households were randomly selected from the provinces by the Thai National Statistics Office. Census blocks were used as the cluster unit in urban areas; villages were used as the cluster unit in rural areas

All households within the rural villages were sampled. Within the urban census blocks, a third of each block (60 households on average) was randomly selected for inclusion.

The interviewer for each household met with a primary respondent who was asked about all morbidity and mortality events that occurred to members of the household. The respondent was asked to recall all deaths in the last 1, 2 and 3 years and any morbidity in the last 1, 3, 6 and 12 months.

The total sample size was 100,179 households, including 61,464 from rural areas, 35,706 from non-slum municipal areas and 3,009 from slum areas in Bangkok. The survey covered 389,531 individuals within these households, including 98,904 children younger than 18.

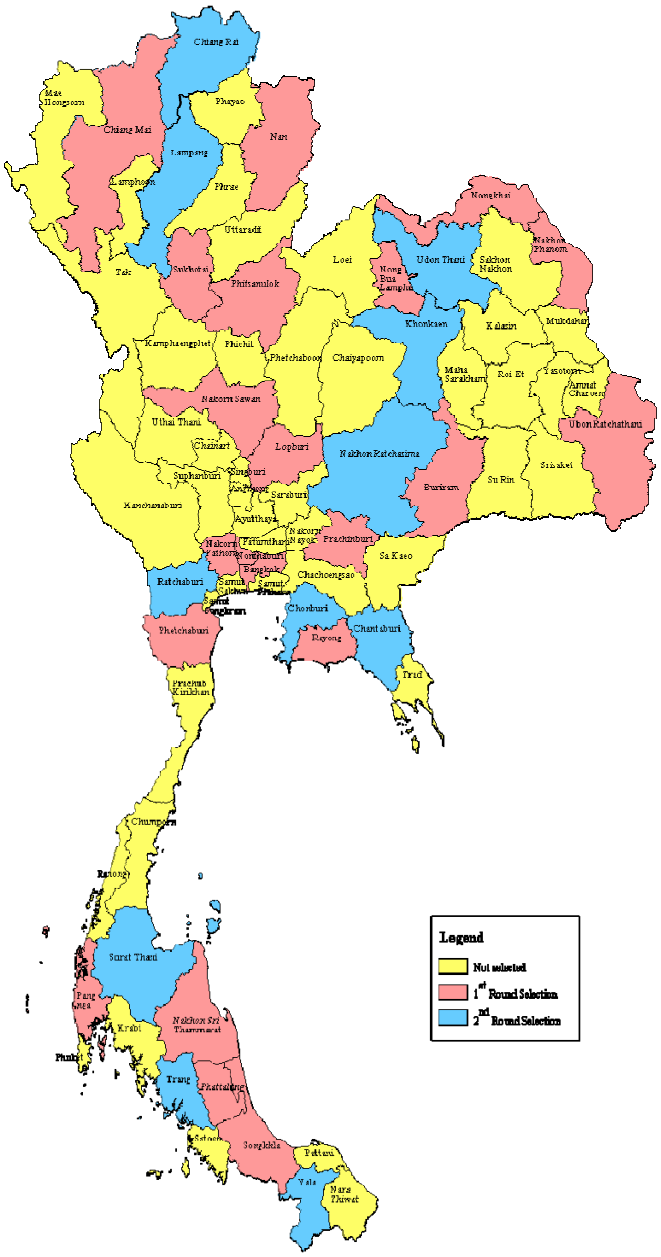
Survey Area

Figure 2.1 on the next page shows the provinces selected for the survey. Red provinces were selected in the first round using simple random sampling within each region. Blue provinces were included later to allow for comparison between this household survey data and hospital surveillance data already being collected.

Calculation of rates and adjustment of data

SPSS version 12 Complex Samples module was used to generate national estimates of morbidity and mortality frequency based upon calculated sample weights. These weights include regional and provincial population proportions. Rates were calculated by dividing the frequency of each

Figure 2.1: Map of provinces selected for survey



event by the national population of the appropriate substrata. The total number of deaths in each specific category over the three year recall period was divided by three to create an annualized rate.

The number of individuals by sex in each five year age interval was compared to the population of the 2000 Thai National Census. The survey appears to have under-represented young children while adults over the age of 40 were over-represented. Infants, in particular, were under-represented. In the 2000 census infants accounted for 7.6 per cent of the national population, yet they were only 5.4 per cent of the survey sample, a 29 per cent undercount. Given this undercount of infants, as well as a similar undercount of children aged 1-4, the infant mortality rate and 1-4 mortality rates from the 2000 census were used to adjust the observed all-cause mortality rates in the two groups.

The adjustments were done on all-cause mortality so the proportions of mortality by cause (communicable, non-communicable and injury) were not affected. The proportions of children in the older age groups (5-17 years) were the same as the 2000 census and no adjustments were made.

Recall Decay

To maximize the number of events recorded in the survey, respondents were asked to report morbidity events that occurred in the past 1, 3, 6 and 12 months and the number of deaths that occurred in the past 1, 2 and 3 years. An analysis of these events by the time they occurred reveals a clear correlation between temporal distance from the event and the frequency of that event – that is, a decay in recall over time (Figures 2.2 and 2.3).

More than half of all morbidities recalled happened in first month of the recall period. The remainder occurred over the next 11 months, but a steady decrease in the ability to recall can be seen.

Figure 2.2: All morbidity by month of recall

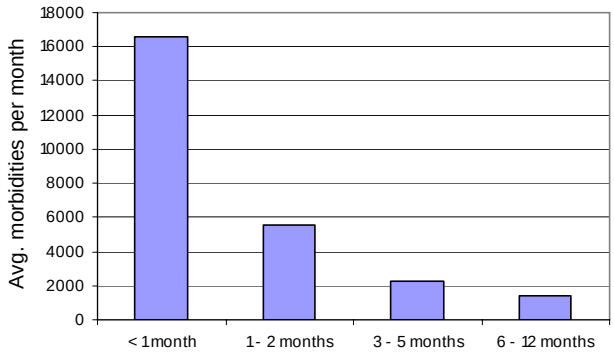
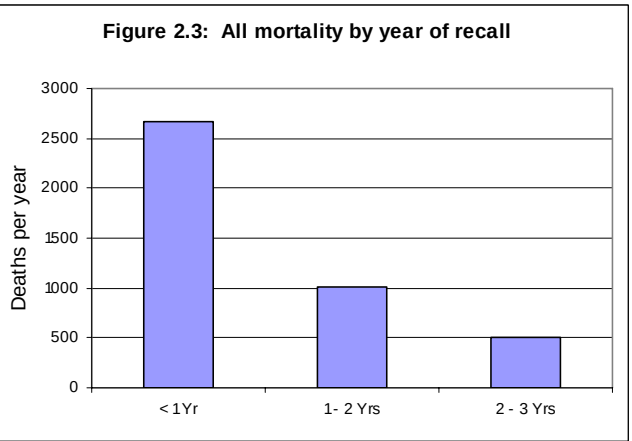
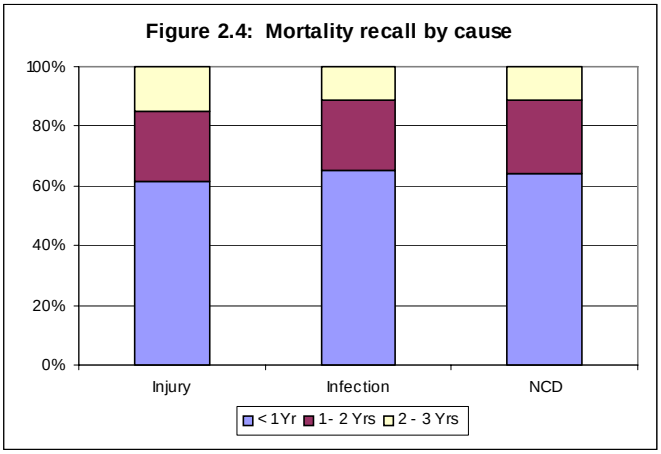


Figure 2.3: All mortality by year of recall



Almost two thirds of all deaths recalled were those that occurred in the first year of the recall period. About one fifth of all deaths were recalled in the second year, and only about a tenth of the deaths recalled were those recalled in the third year of the recall period.

Differences in recall rates by cause of mortality would potentially introduce more complexity. Figure 2.4 shows this not to be the case, that the same pattern of recall decay is present in all causes. Some 65 per cent of infectious deaths, 64 per cent of non-communicable deaths and 62 per cent of injury deaths occurred in the first year of the recall period.



In the survey, injury morbidity was divided into four categories of injury severity:

Moderate – required seeking medical care, or missing three days of work or school, but not requiring hospitalization.

Major – requiring hospitalization, but for fewer than 10 days.

Serious – requiring hospitalization of 10 days or more.

Severe – resulted in permanent disability, regardless of length of hospitalization.

Figure 2.5 shows that over the one year period of morbidity recall, there is little difference in recall by level of severity in the first month and next two months. However, recall of moderate events, (the least severe), fell off after that and recall of permanent disability (the most severe level) increased.

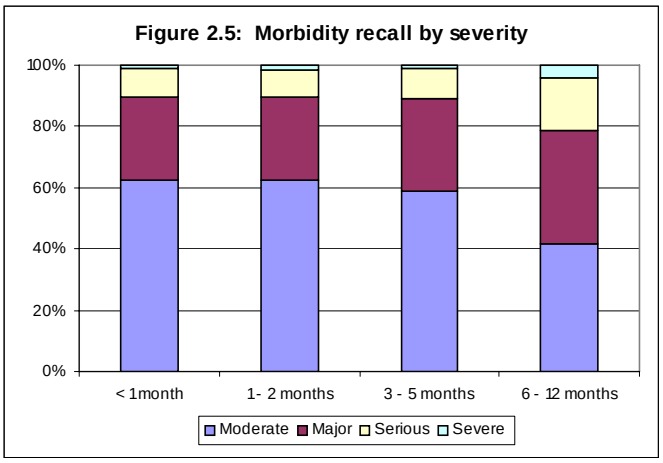
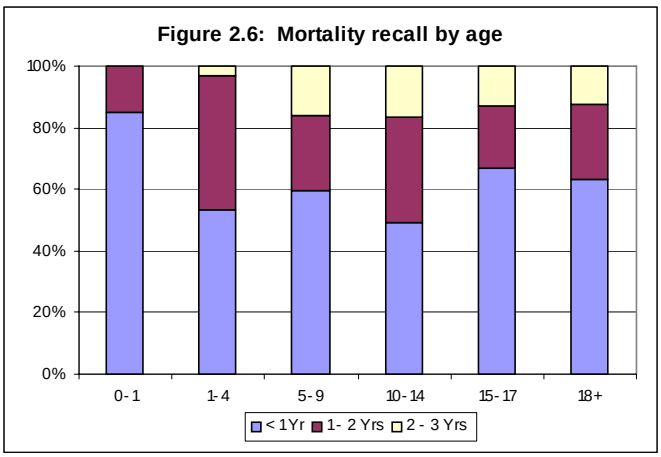


Figure 2.6 shows how recall varies with the age of the dead child. It is unlikely that there were no infant deaths in the third year of the recall period. Thus, it appears that the deaths of infants are recalled less well than the deaths of older children.



To capture deaths in children by the more infrequent causes (such as electrocutions, falls or burns) and give the best estimate of proportional mortality and morbidity, a large number of deaths and morbidities are required. In order to maximize these numbers, this analysis uses the three year mortality figures and annualizes it by dividing by three. This achieves the goal of obtaining rates for the largest number of specific types of injury deaths to show the most complete pattern of injury mortality.

However, a significant drop-off in recall occurs in the second and third years. Because of this, the mortality rate calculated from the most recent year recalled (almost two-thirds of all deaths recalled) is higher than the mortality rate calculated from a three year average of deaths. This survey uses the annualized three year mortality recall for reporting rates. Therefore the true, annual, child mortality rates of disease and injury are higher than the three year averaged rates reported here.

Cause of death and morbidity determinations:

All episodes of mortality and morbidity found in the survey during the appropriate recall period were listed as being caused by non-communicable diseases (NCD), infectious diseases or injury. The determination of cause used two methods: One of these methods was if the event had been registered with the civil authorities and a medically determined cause of death was known, then the specific medical diagnosis was coded according to type (NCD, infection, or injury) as well as the actual medical condition.

This was the case for almost all child deaths in the survey. Only four of the child deaths had not had a medical doctor determine the cause of death. In these cases, a standardized verbal autopsy form, based on the WHO standard format and extended to cover older age groups by IHR and TASC was used to assign cause of death. A panel of Thai pediatricians and internists participated in this determination.

Morbidity cases used a similar process, where the actual medically determined cause of morbidity was used where it was known, as reported to the parents by the medical professional who delivered treatment. For those children with morbidity that were not seen by medical professionals (entirely those morbidities not serious enough to require seeking medical care), the cause was determined by using a verbal diagnostic instrument, based on the WHO verbal autopsy instrument, and extended by IHR and TASC to cover non-fatal conditions. The same panel of Thai pediatricians and internists did the actual assigning of cause.

Table 2.1 which follows shows the numbers in each age group for the sample population, and for deaths and morbidities within the recall period.

Table 2.1: Number of cases in the sample population

		Mortalities			Morbidities		
Age	**Sample**	**Injury**	**CD**	**NCD**	**Injury**	**CD**	**NCD**
0-1	3,309	1	6	9	8	266	50
1-4	17,591	9	11	2	149	1,949	346
5-9	28,047	23	15	7	380	1,950	413
10-14	32,220	23	6	4	606	1,407	477
15-17	17,737	31	3	4	386	509	270
18+	290,627	653	601	2,765	4,433	7,059	21,930

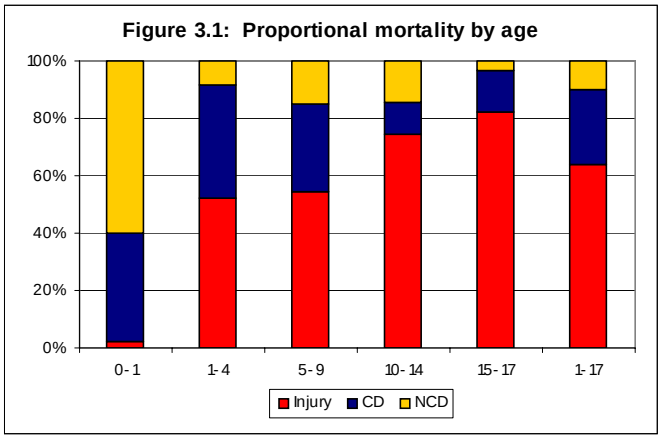
Chapter 3

Mortality Overview

- There are almost 6,000 child deaths per year from injury
- More than 16 children die each day from injury
- After infancy, injury accounts for more deaths in the rest of childhood than all infection and non-communicable disease combined

Mortality Overview

Injury accounts for only 2 per cent of infant mortality because infants are protected from danger by their mothers. However, at age one, when they begin to walk and become independent, injury becomes the leading cause of death and continues as such throughout the rest of their childhood. After infancy, injury accounts for more child deaths than all infections and non-communicable diseases combined (Figure 3.1).



Injury causes almost two thirds (64%) of all deaths in children 1 to 17. In infancy, NCD is the leading killer, mainly from birth related causes and congenital defects in the neonatal period, and followed by infections in the post-neonatal period. As children grow older, the proportion of injury deaths increases as infections and NCD deaths decrease.

Leading causes of child deaths

Most deaths in infants were because of non-injury causes (Figure 3.2). Congenital heart disease, pneumonia, and birth defects were the three leading killers. Asphyxiation (suffocation) was the only injury cause of death.

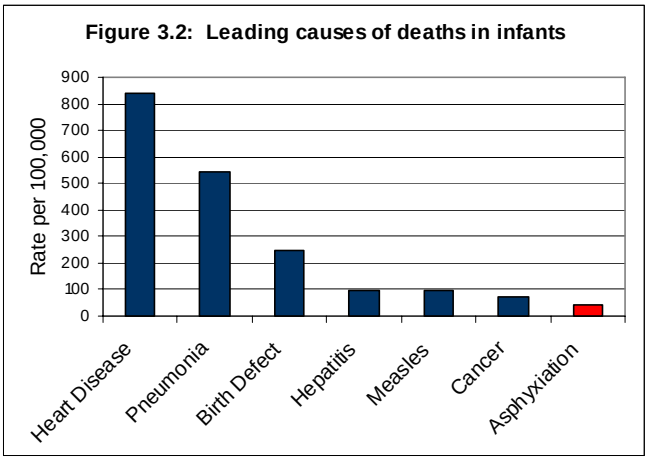


Figure 3.3 shows that drowning is by far the leading cause of deaths in toddlers (aged 1 to 4).

About 40 per 100,000 children in this age group die from drowning annually. Animal injury (bites) is the other injury cause of death for children in this age group (5/100,000 children). Infection caused 42 deaths per 100,000 and NCD caused 15 deaths per 100,000. UTD represents "Unable To Determine", as the symptoms did not allow a specific diagnosis to be assigned.

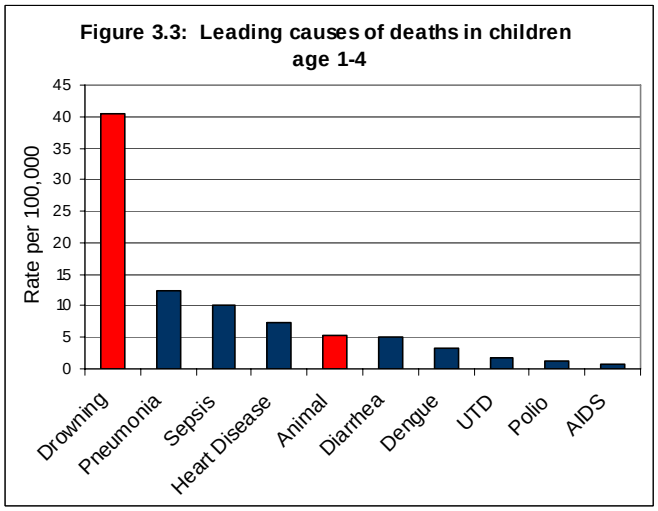
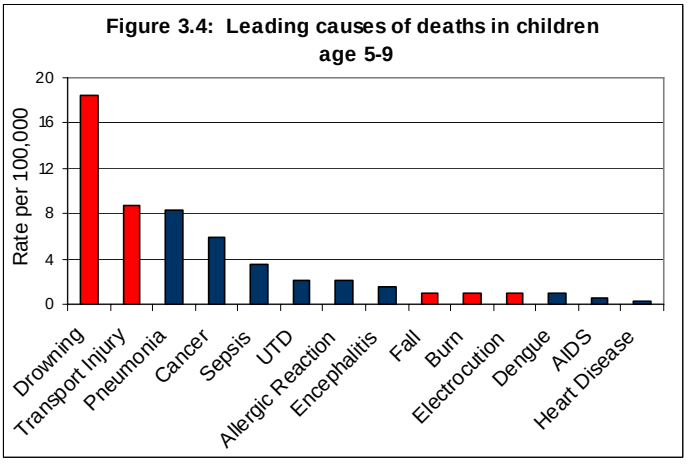


Figure 3.4 below shows that drowning remains the leading cause of death in children aged 5 to 9, killing 18.5 per 100,000 children in this age group. Drowning kills over twice as many children in this age group as the next leading cause.

Road traffic accidents (RTA), or transport injuries, emerge as the second leading cause (8.7/100,000). Infections and NCD follow. Injuries from falls, burns, and electrocution each account for about 1 death per 100,000.



Injuries are three of the four leading causes of death in children in the 10-14 age group. Figure 3.5 shows that transport injury (12/100,000) overtakes drowning (9/100,000) as the leading cause of death. Cancers take third place (3.2/100,000) and pneumonia deaths come in fifth (1.4/100,000), while animals and falling from heights are also leading causes of death.

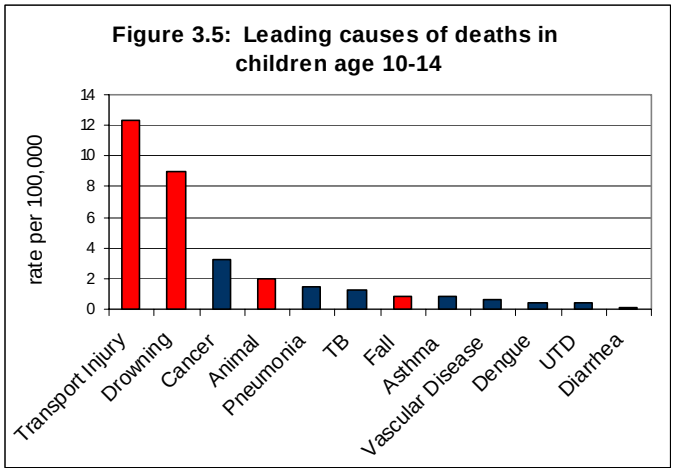


Figure 3.6 below shows that death in the 15 to 17 year old age group is predominantly transport injury. RTA causes more deaths (61/100,000) than all other causes combined (24/100,000). Intentional injury is the other cause of injury deaths for this age group. Homicide kills about 6 per 100,000 while suicide kills about 3 per 100,000.

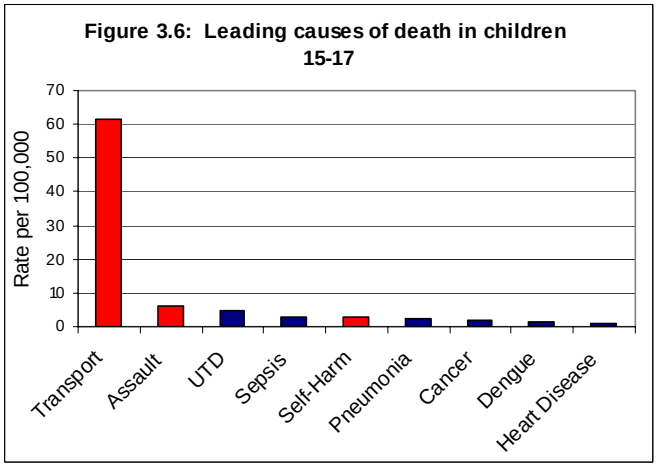
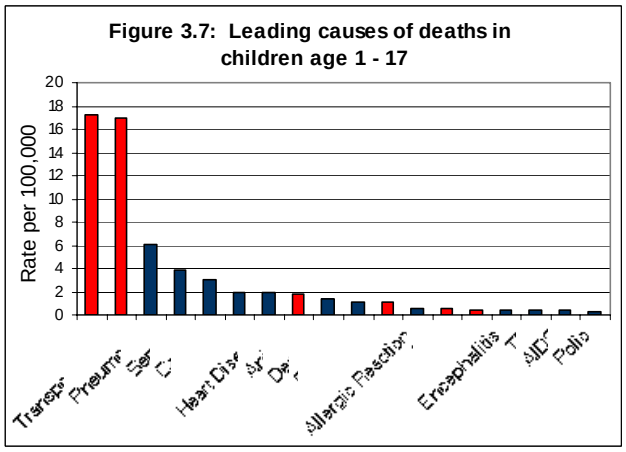
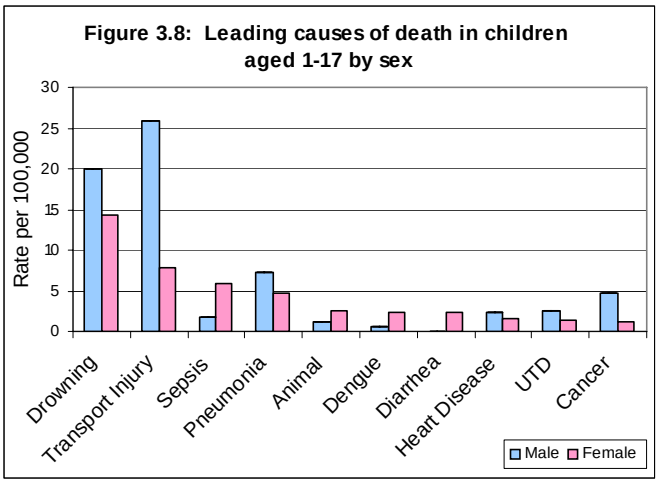


Figure 3.7 which follows shows that overall, more children aged 1 to 17 in Thailand die each year from drowning than from any other cause – 17.2 per 100,000. Road traffic accidents come a close second, killing 17.0 per 100,000. The third and fourth leading cause of injury death was animal bites and homicide, at levels well below that of drowning and RTA.



There are gender differences in child death rates. Figure 3.8 shows the ten leading causes of all child deaths. In addition to the male predominance in drowning and road transport, males were killed more frequently from homicide, falls, and electrocution. Females lead in deaths from burns and suicide (not shown).



Death rates are largely similar based upon place of residence (Figure 3.9, see over), with a few notable exceptions:

Drowning deaths are much more common in rural areas than in urban areas. While five urban children per 100,000 die each year from drowning, making it the fourth leader killer of urban children, about 24 per 100,000 rural children die from drowning, a five-fold difference.

Falling deaths, burns and electrocutions were only seen in urban areas, while deaths from animal bites were only seen in rural areas. This does not mean they occur exclusively in these areas only; but in the other areas it happens at rates lower than the survey's ability to measure.

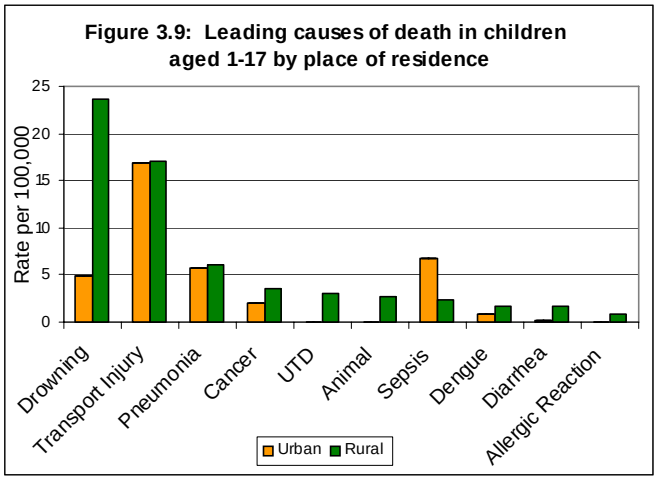


Table 3.2 shows the estimated frequency of child deaths from injury in Thailand. Every 3 hours and 19 minutes a child dies from drowning; every 3 hours and 22 minutes a child dies in a transport accident, and every 1 hour 22 minutes a child dies from some cause of injury.

Table 3.2: Estimated numbers of child deaths from injury in Thailand

Fatal injury	Per year	Time between each death
Drowning	2,645	3.3 Hours
RTA	2,605	3.4 Hours
Suffocation	450	1.2 Days
Animal	280	1.3 Days
Homicide	160	2.3 Days
Fall	85	4.2 Days
Suicide	70	5.2 Days
Burn	45	8.5 Days
Electrocution	45	8.5 Days
All injury deaths	**6,385**	**82 Minutes**

The numbers in the table were obtained using the SPSS Complex Sample module to project the measured injury rates to the national population.

Chapter 4

Morbidity Overview

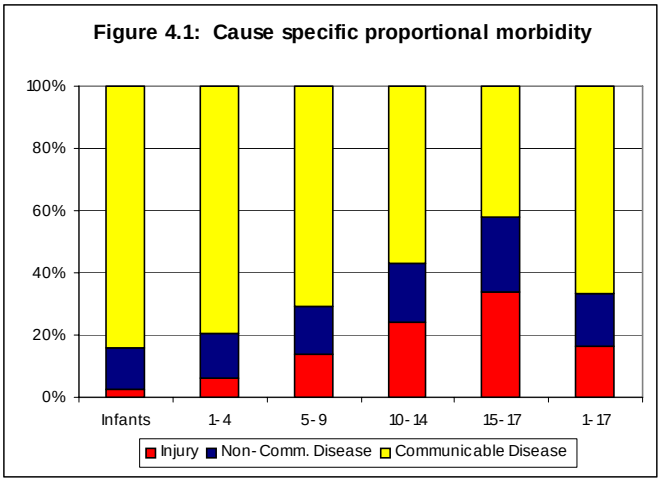
- To be counted, injury had to result in a measurable cost. Minor ones like bumps and bruises did not count. The lowest level counted was “moderate”, which required seeking care, or missing three or more days of school or work
- The most severe injury level short of death resulted in permanent disability
- Between these endpoints, there was a great range: for every permanently disabled child, 10 spent at least ten days hospitalized, 37 spent between one and nine days hospitalized, and 88 missed at least three days of school or work

Morbidity Overview

How minor is moderate injury?

The survey only counted morbidities that were significant. "Moderate" level injuries were the minimum level included, which required the child visit a medical provider, miss three days of school or work or restrict daily activities for three days or more. This excluded the vast majority of morbidities that were so minor they involved no financial or other cost (such as a minor cold or a scraped knee). Over 1.29 million incidences of morbidity, at all levels of severity in children aged 0 to 17, were available for analysis from the survey sample. Of these, 96 per cent occurred post infancy.

Figure 4.1 below shows the breakdown of all causes of morbidity by age group. Only 2 per cent of morbidity in infancy is caused by injury. This proportion steadily increases with the age of the child. Injury accounts for 6%, 14%, 24%, and 34% of all morbidity in children among the older ages of 1-4, 5-9, 10-14 and 15-17, respectively. Infants have particularly low morbidity rates from injury, similar to the situation with mortality, and for the same reasons. Infants are protected from injury by their mothers.



External causes of childhood injury morbidity

Figure 4.2 which follows, shows that falls are the leading cause of injury morbidity among infants, followed closely by burns. Animal bites cause about 17 injuries per 100,000 infants.

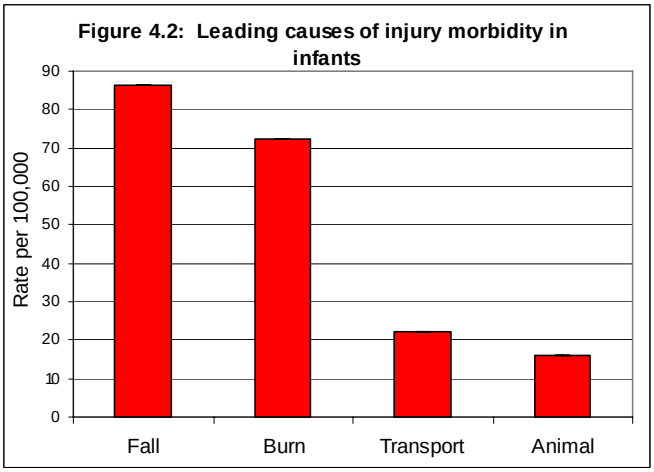
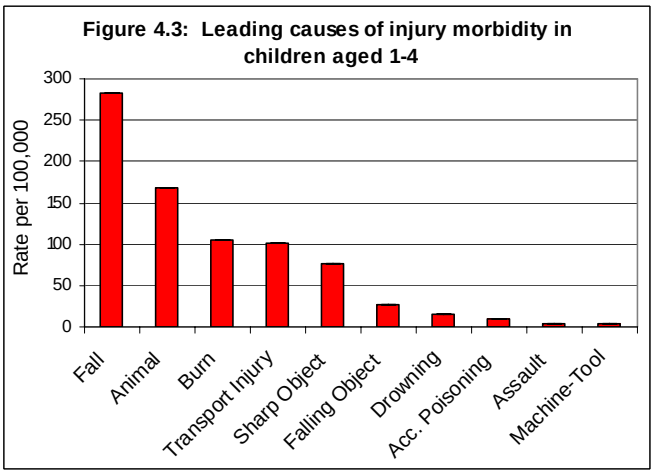


Figure 4.3 shows that falls remain the leading cause of injury morbidity in the 1 to 4 age group, but many additional causes appear. Animal bites supplant burns as the second leading cause of injury. Burns takes third place, followed by transport injury (road traffic accidents) and sharp objects.



Falls remain the leading cause of injury morbidity in the 5 to 9 age group (Figure 4.4, see over). Road traffic accidents, or transport injuries, are in second place. Most toddlers (children 1-4) spend much of their time at home, as they are too young for school. However as children reach school age, they become more exposed to vehicles, whether as pedestrians or passengers, and the road traffic component of morbidity increases. The third and fourth leading causes of injury, still at large levels, are animal bites and cuts from knives and other sharp objects.

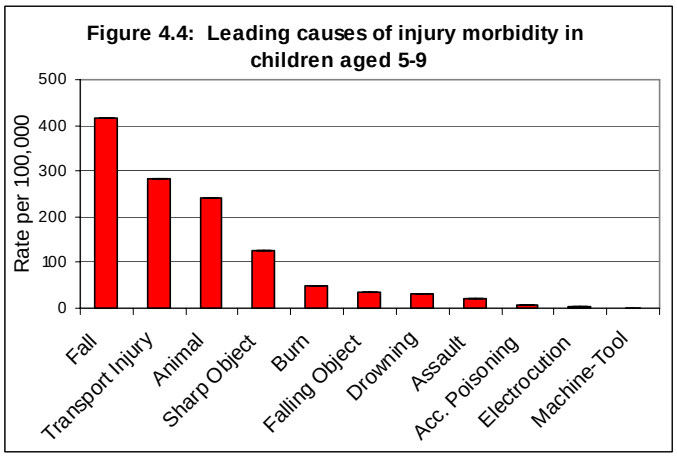
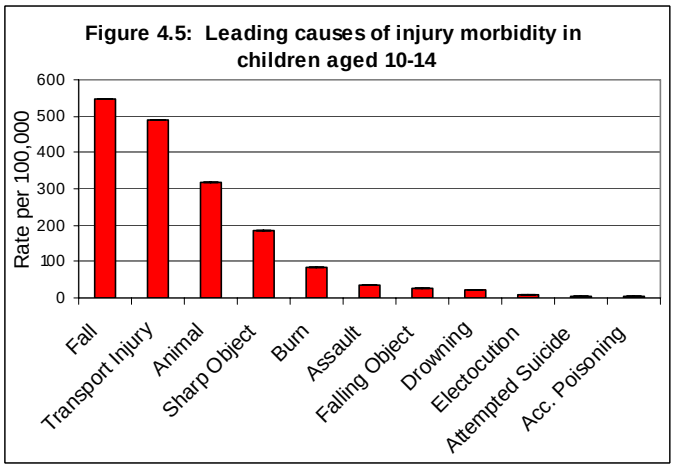
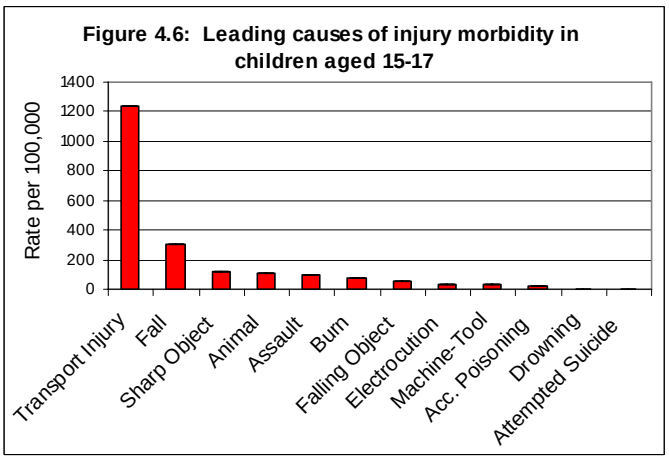


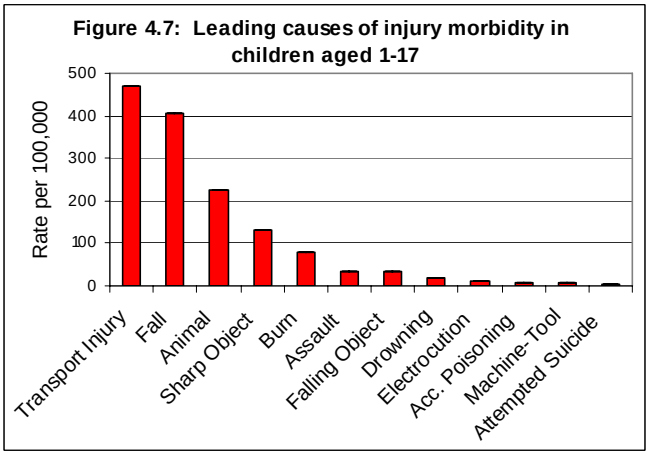
Figure 4.5 shows that in the 10 to 14 year old age group, transport injury is nearly as large as falls as a cause of injury morbidity. Attempted suicide appears for the first time as a cause of morbidity.



In the 15 to 17 year old age group, transportation injuries become by far the leading cause of injury morbidity (Figure 4.6).

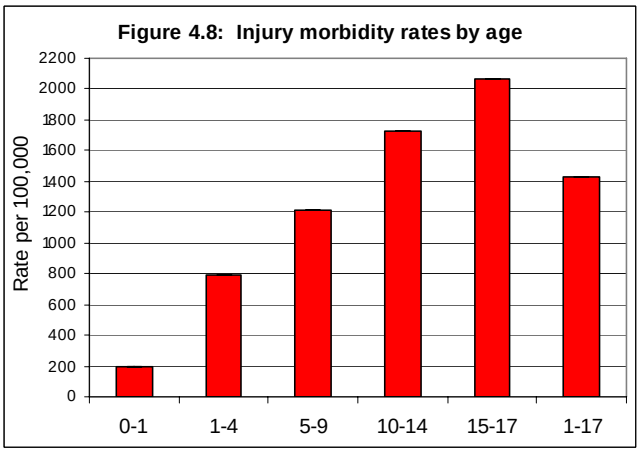


The extraordinarily high transport injury morbidity rate in the 15 to 17 year olds skews the distribution of morbidity for all children aged 1 to 17, (as can be seen in Figure 4.7, following), such that road transport accidents become the leading cause of injury for all children. Falls, which are prevalent in every age group, are also a major cause of morbidity. The third, fourth, and fifth causes of injury morbidity in all children aged 1 to 17 are animal bites, cuts from sharp objects and burns.

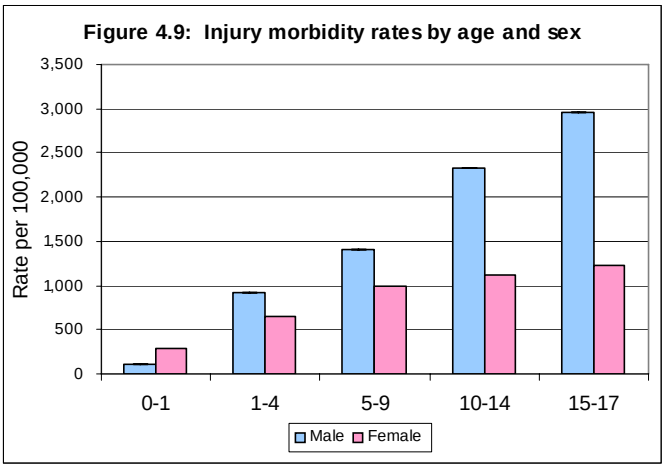


Age specific causes of injury morbidity

Injury rates were 1,429 per 100,000 for children aged 1 to 17. A steady increase in injury morbidity rates as age increases is clear in Figure 4.8. Infants had the lowest rate, which increases as the child grows older.



Similar to mortality, there is strong gender predominance for non-fatal injury between males and females. Figure 4.9 shows this male predominance in all age groups except infancy.



Injury Severity

Non-fatal injuries were categorized into four severity levels: moderate, major, serious and severe.

Moderate injuries were those that either generated a visit to a care provider or caused the individual to miss 3 or more days of school or work. **Major injuries** required hospitalization for one to nine days. **Serious injuries** required hospitalization for 10 or more days. **Severe injuries** resulted in a permanent disability, such as the loss of a limb or a sense (sight, hearing, etc). The largest proportion of injuries by severity for every age group is moderate, followed by major, and then serious and severe (Figure 4.10).

Figure 4.10: Injury severity rates by age

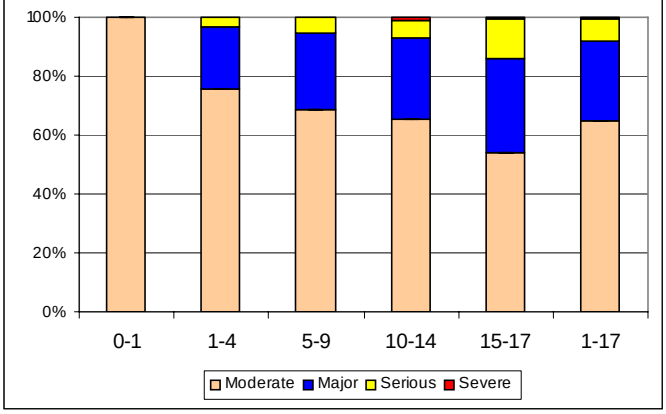


Figure 4.11 below shows a similar pattern is evident by gender. Males experience higher morbidity rates at every severity level except for severe injuries. Females had higher severe injury rates, but a likely cause for this is the lack of survey power for these very rare events. Morbidity had a one-year recall period, which minimized the numbers compared to mortality, which had a three year recall period.

Figure 4.11: Injury severity rates in children aged 1-17 by sex

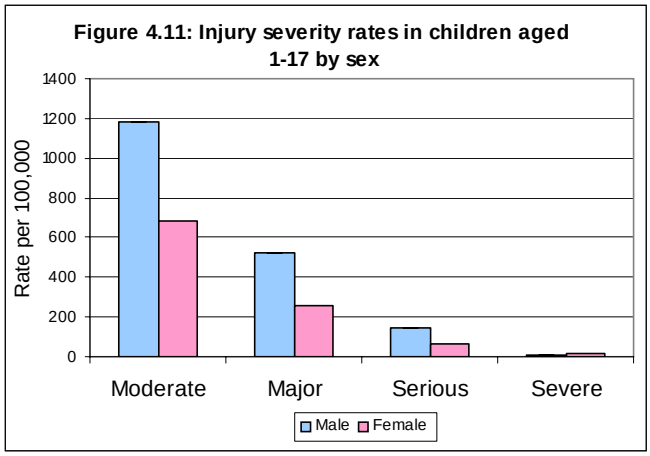
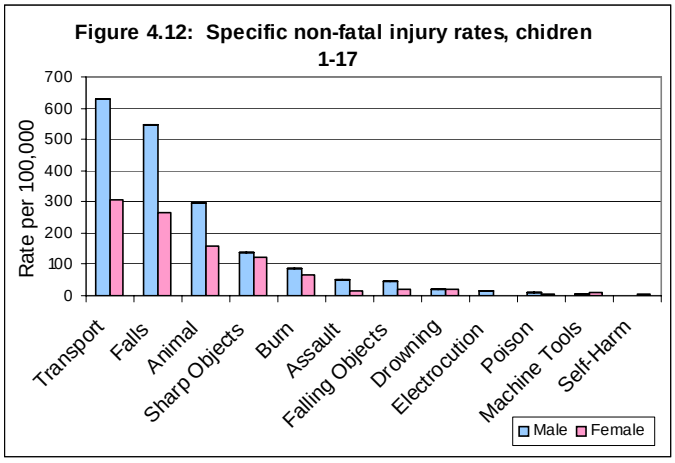


Figure 4.12 shows that males experienced greater morbidity rates than females in every injury type except for near-drowning, machine tool injuries, and attempted suicide.

Females experienced the same near-drowning rates as males and greater rates of morbidity from machine tool and attempted suicide injuries.

Figure 4.12: Specific non-fatal injury rates, chidren 1-17



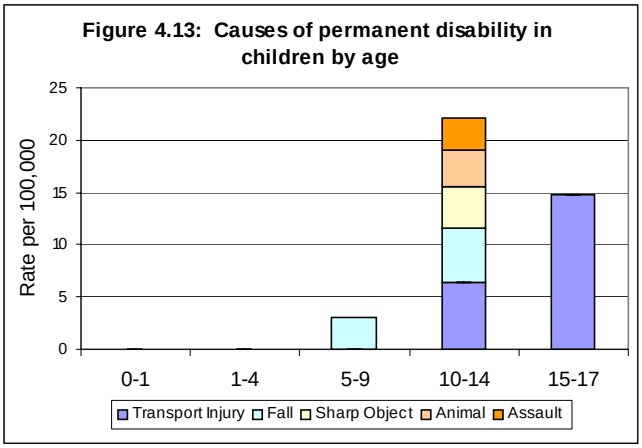
Permanent disability from injury

Permanent disability is the most severe outcome from non-fatal injury and is considered separately. Permanent disability usually has higher costs and a larger social burden than fatal injury. Since these events were non-fatal, however, the recall period was only one year – unlike mortality which had a recall period of three years.

The small sample size of the youngest age cohorts together with the relative rarity of permanent disabilities resulted in no permanent disabilities for children younger than five. This does not mean that these disabilities do not occur — they certainly do. But, they occur at a frequency below the power of the survey to detect.

Figure 4.13 shows that the primary cause of permanent disability in the 5 to 9 age group is falling from a height. The 10 to 14 age group also experienced permanent disability from falls, but transport injury is the leading cause. Also causing permanent disability in the 10 to 14 age group are sharp objects, animal bites, and assault. The sole measured cause of permanent disability in the 15 to 17 age group is transport injury.

Figure 4.13: Causes of permanent disability in children by age



Overall, transport injury is the leading cause of permanent disability in children aged 1 to 17 as seen in Figure 4.14.

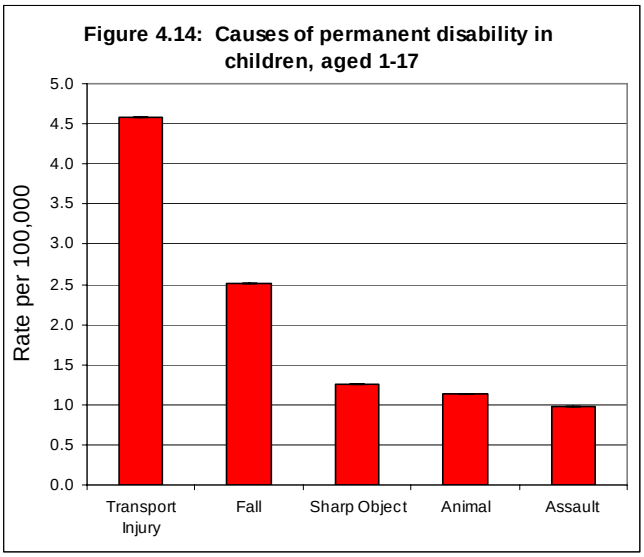
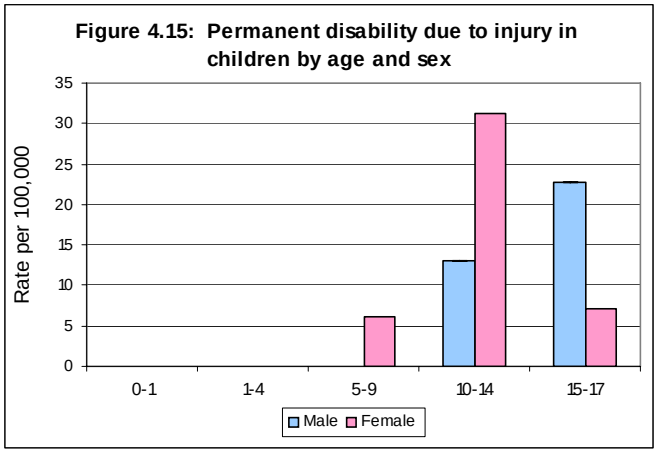
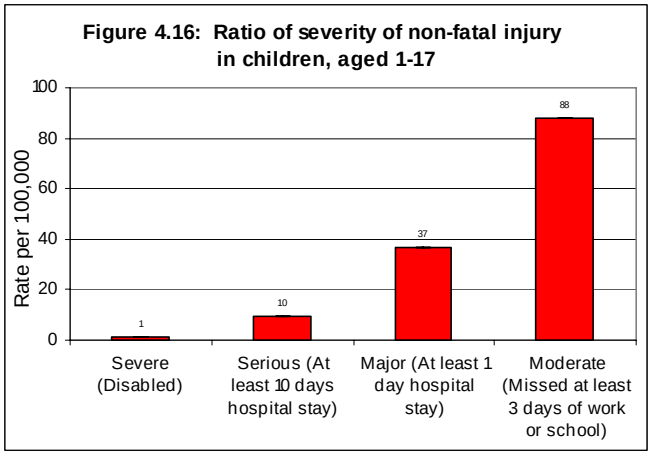


Figure 4.15 shows no clear pattern of permanent disability due to sex. Care must be taken in interpreting any potential gender differences due to the survey's relatively low power for these rare events.



The impact of injury morbidity

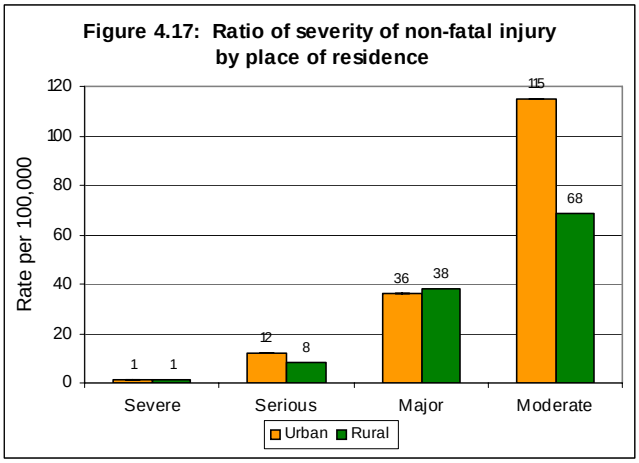
Figure 4.16 shows the full extent of morbidity caused by non-fatal injury. As devastating as permanent disability is, it occurs infrequently when compared to other levels of severity.



Each morbidity classified as "moderate" equals at least three days of school or work time lost, or a visit to a medical provider. Each morbidity classified as "major" implies a financial cost to the individual's family of at least one day in a hospital, and each morbidity classified as "serious" includes a cost of at least 10 days in a hospital.

Thus for every child that suffers a permanent disability, 10 spend at least ten days hospitalized, 37 spend between one and nine days hospitalized, and 88 miss at least three days of school or work.

Figures 4.17 show a similar pattern of severity but compared by place of residence, in urban versus in rural areas.



Evaluation of the evidence

While it appears that there may be higher rates of moderate injury in urban areas, the definition of moderate injury required parents to take a child to a medical provider, or to have lost 3 days from school or work. Urban parents are more likely have more financial resources as well as better access to medical providers than rural parents, which may account for this observed difference. There does not appear to be a difference in injury hospitalization rates between urban and rural areas, which may be due to any injury severe enough to require hospitalization resulted in parents taking children to hospitals regardless of whether they lived in urban or rural areas.

Tables 4.2 and 4.3 estimate the total number of children permanently disabled or injured in 2003, the year the survey was conducted. These estimates are made using SPSS's Complex Samples module to project the age specific non-fatal injury rates from the sample to the national population.

Table 4.2: Estimated number of children permanently disabled due to injury (aged under 18)

Injury type	Per year	Time between each disability
Transport injury	705	12.4 Hours
Fall	386	22.7 Hours
Sharp Object	194	1.9 Days
Animal	175	2.1 Days
Assault	150	2.4 Days
Total	**1,610**	**5.4 Hours**

Table 4.3: Estimated number of injured children (aged under 18)

Injury type	Per year	Time between each injury
Transport injury	72,680	7.2 Minutes
Fall	63,400	8.3 Minutes
Animal	34,910	15 Minutes
Sharp object	20,310	26 Minutes
Burn	12,680	42 Minutes
Assault	5,210	1.7 Hours
Falling object	5,180	1.7 Hours
Drowning	3,000	2.9 Hours
Electrocution	1,530	5.7 Hours
Acc. poisoning	1,270	6.9 Hours
Machine-tool	945	9.3 Hours
Suicide attempt	370	1.0 Days
All injuries	**221,485**	**2.4 Minutes**

Chapter 5

Drowning and Suffocation

- Drowning is the leading cause of injury death for children, but it is not recognized as such in Thailand
- About 2,650 children die from drowning each year, or about 7 per day
- More children over one year old die from drowning than from any other single cause of death, and drowning causes almost half (46%) of child deaths in the 1- 4 age group

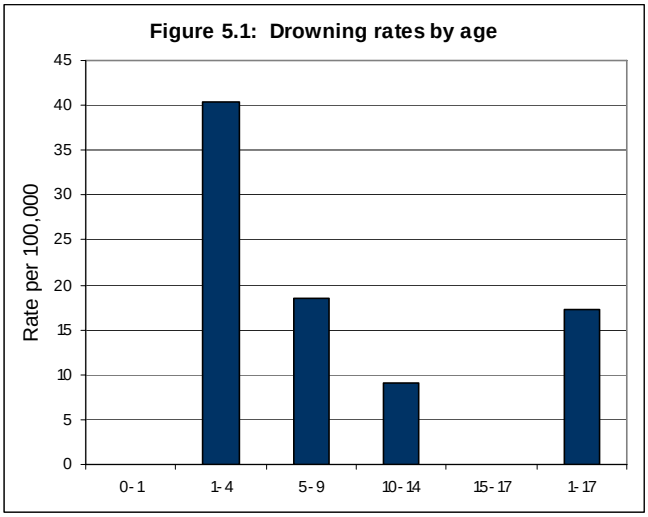
Drowning

Definitions

Drowning is defined as death resulting from suffocation within 24 hours of submersion in water; victims of near drowning survive for at least 24 hours. Drowning is always a fatal event and near drowning may or may not be. If a drowning had occurred as a result of a water transport mishap, such as a ship sinking, boat capsizing or falling from a boat, then it would have been considered a water transport death (although there were none found in the survey).

Drowning

Most drowning deaths occur in toddlers who die at a rate of 40 deaths per 100,000 children annually (Figure 5.1). Children in this age group are more mobile and independent of their mothers, thus increasing their exposure to water hazards such as open wells, rivers, and ponds. These children are also unlikely to be able to swim. The peak drowning rate is 106.8 per 100,000 and is in two year old males; for females, the peak rate also occurs in two year olds and is 50.6 per 100,000.



As children age, they become both more aware of the dangers of drowning, more physically developed and are also more likely to be able to swim. This can be seen in the older age groups as a steady decline in drowning deaths – there were no drowning deaths in the 15 to 17 year old age group.

Figure 5.2 below shows that for toddlers 1 to 4 years old, males are more than twice as likely as females to drown. However, females aged 10 to 14 have higher rates of drowning than males their age. Across all age groups and in both sexes, drowning deaths occur at substantial rates, thus drowning is a serious danger for all children.

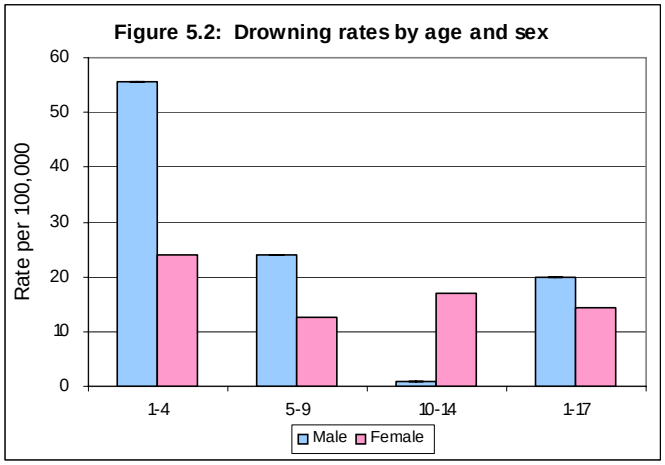
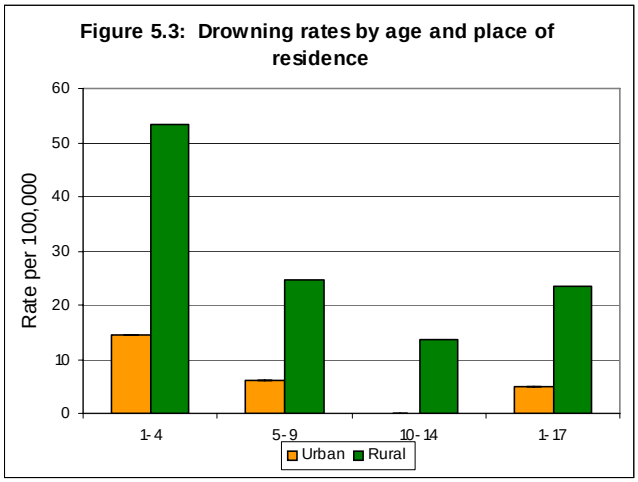


Figure 5.3 following, shows that drownings occur in both urban and rural settings, but the magnitude of the problem in rural areas is far greater. Rural toddlers in Thailand drown at a rate of 72.4 per 100,000 children. No urban drownings were measured in the 10 to 14 age group. Overall, rural children aged 1 to 17 are almost 5 times more likely to drown than their urban counterparts. The highest drowning rates are seen in rural males aged 1 to 4: 93.4 deaths per 100,000.



Near Drowning

Most near-drowning events occurred in the 5 to 9 year old age group, but a substantial number of events occur at every age, except for infants (Figure 5.4).

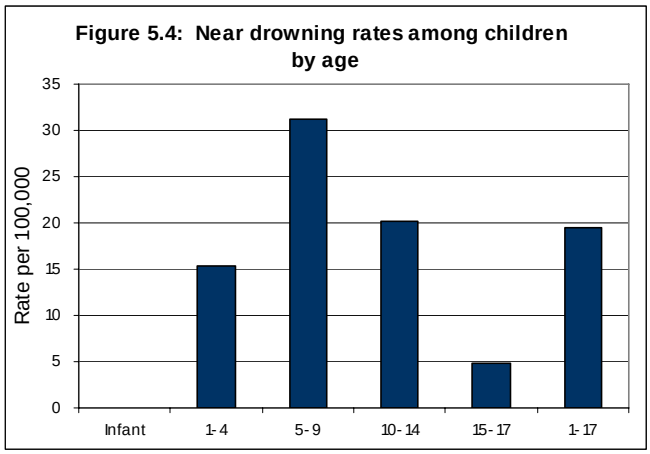
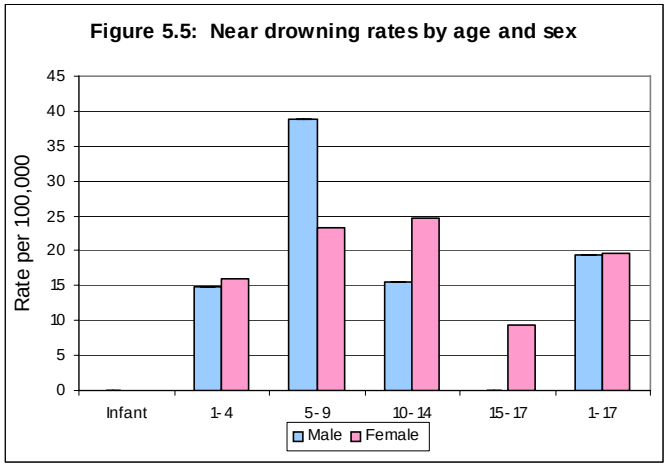


Figure 5.5 shows nearly identical near drowning rates in 1-17 year olds by sex. However, there are rate differences by age categories. Five to 9 year old males are almost twice as likely to experience a near drowning event as females their age. In 10 to 14 year olds, females are more likely to experience a near drowning event. In the 15 to 17 age group, near drowning was only seen in females.



When considered by place of residence, urban children experience more near drowning events than their rural counterparts (Figure 5.6). This holds true for all age groups over five years of age. However, near drowning appears exclusively a rural phenomenon in children aged 1 to 4.

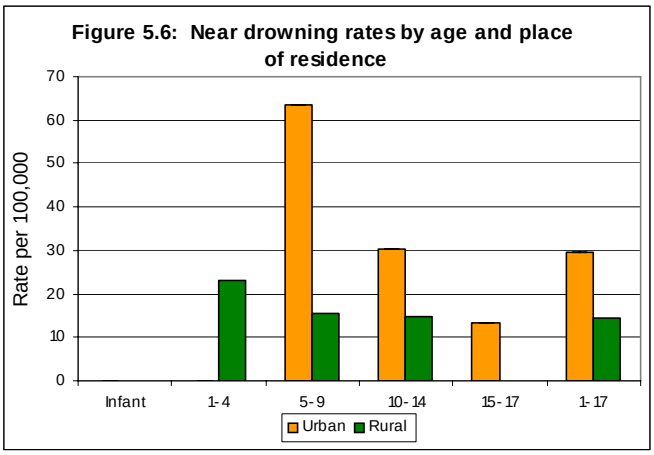
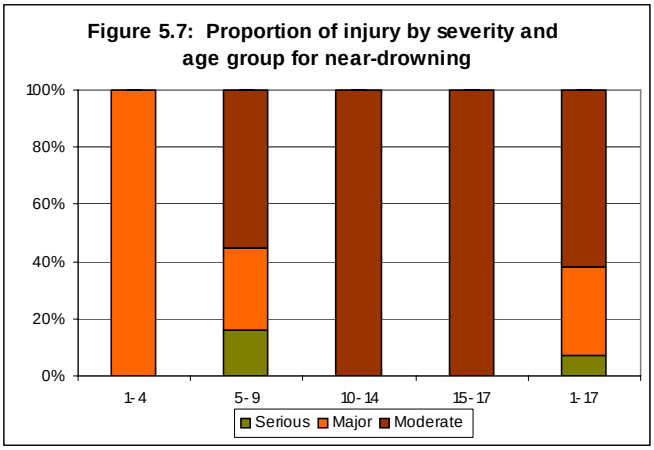


Figure 5.7 shows that almost two thirds (62%) of near drowning events are moderate in severity and do not require a hospital stay; 31 per cent are major in severity and require between 1 to 9 days of hospitalization, and 7 per cent are serious enough to require an extended hospital stay of at least 10 days. The less severe incidents occur in the older age groups.

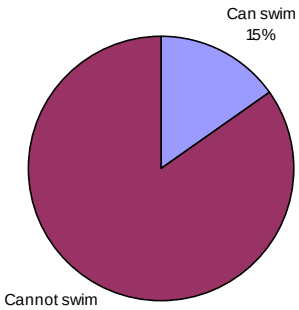


Factors associated with drowning

The graphs that follow illustrate various environmental factors connected to drowning deaths. Unless otherwise noted in the text, all statistics presented are for children between the ages of 1 and 17.

Figure 5.8 shows that 85 per cent of children over the age of four who die from drowning do not know how to swim. Children over four are old enough to have potentially learned how to swim and whose deaths might have been prevented had they possessed this skill and knew water safety.

Figure 5.8: Swimming skills of drowned children over 4 years



As can be seen in Figure 5.9 below, most fatal drownings occur in natural water bodies. Ponds, ditches, lakes, rivers or the sea account for 76 per cent of drownings. Rivers are the leading cause in the 5-9 age group (72%) and in children generally (1 to 17, 35%). No children drowned indoors.

More than a quarter (28%) of toddlers, 1 to 4, and 15 per cent of all children aged 1 to 17 drown in wells. Wells are the leading cause of drowning deaths in toddlers, It should be noted that wells are easily covered or fenced, and thus can be easily removed as drowning hazards for toddlers.

Figure 5.9: Place of drowning of children

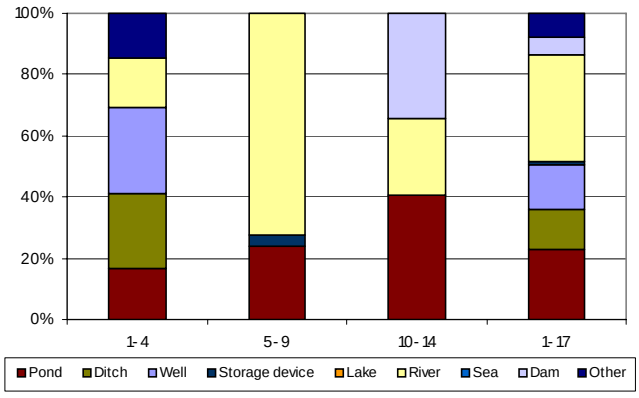
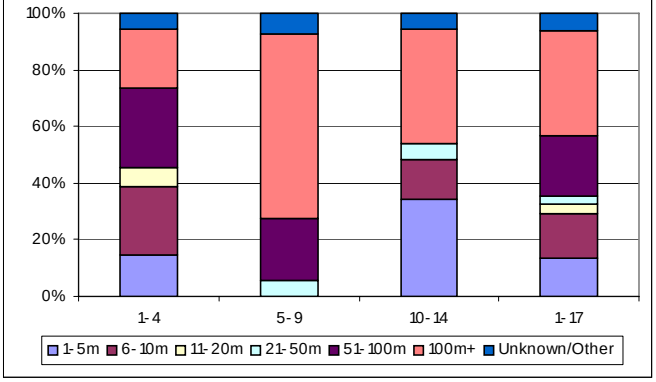


Figure 5.10 below shows that more than half (56%) of all drowning deaths occur within 100 meters of the child's home.

Figure 5.10: Distance to water body where drowning took place



Drownings that took place in close proximity to the home were even more striking for toddlers. Almost three quarters (74%) occur within 100 meters of the home and almost 40 per cent occur within 10 meters of the home. Clearly, close supervision is required to stop these drownings.

Figure 5.11 below shows the ways in which water sources where drownings took place were used. Most Thai drownings occur in bodies of water not connected with the household. Water bodies used for "bathing/washing", "storage" and "cooking/drinking" combined make up just 16 per cent of the drowning locations.

The single largest category is "raising fish", which accounts for 31 per cent of the bodies of water. "No regular household use", "agriculture" and "other" are the next highest categories.

Figure 5.11: Use of water source where drowning occured

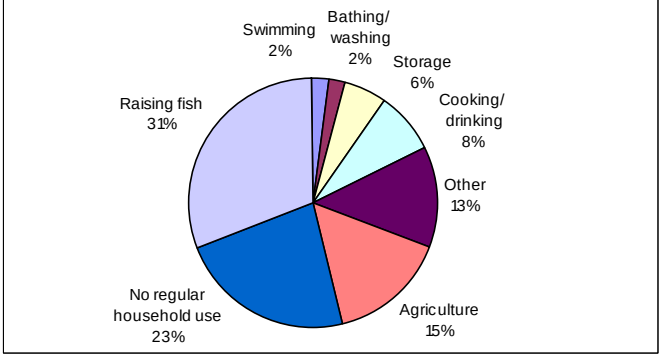
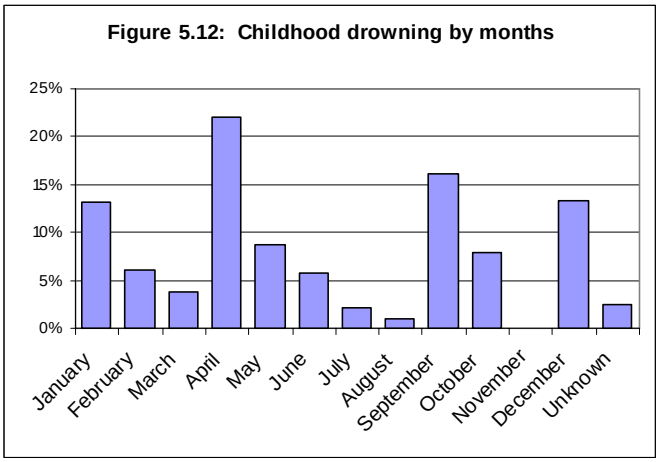


Figure 5.12 shows that there is no temporal pattern to drowning. Drowning deaths fluctuate throughout the year without relationship to the monsoons. January, April, September, and December are the four months with the most deaths.

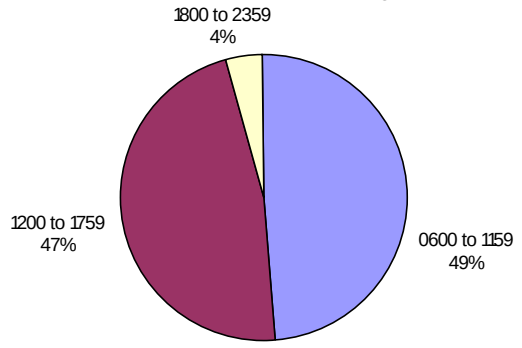
Figure 5.12: Childhood drowning by months



For those cases where the time of day was noted (90% of all drownings), Figure 5.13 that follows shows the hour the drowning victim is first noticed missing.

Drowning is essentially a daylight phenomenon. The vast majority of children (96%) are first noticed missing during daylight hours (between 6am and 6pm). No children are noted to be missing before 6am, and only 4 per cent are noticed miss-

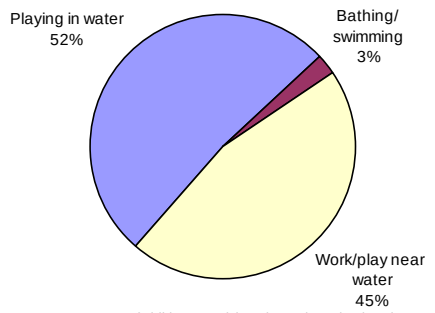
Figure 5.13: Known* time of day drowned child is determined to be missing



*10% of all cases have an unknown time of day

Figure 5.14 shows the activity that children were doing prior to the drowning event, for the cases where the activity is known (92%). More than half (52%) were playing *in* the water, while just under half (45%) were working or playing *near* the water.

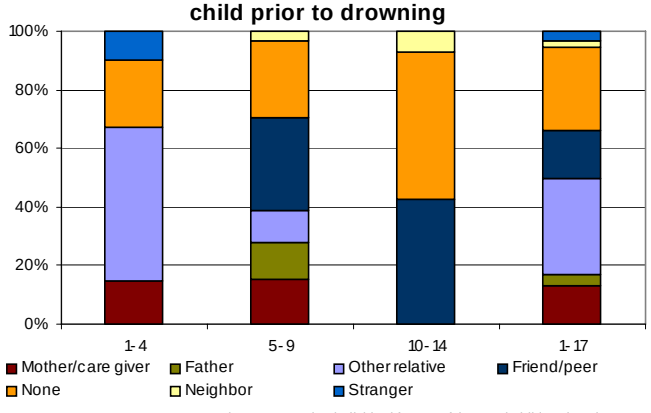
Figure 5.14: Known* activity of children prior to drowning



8% of children's activity prior to drowning is unknown

Figure 5.15 shows the relationship to the person

Figure 5.15: Known* person accompanying child prior to drowning



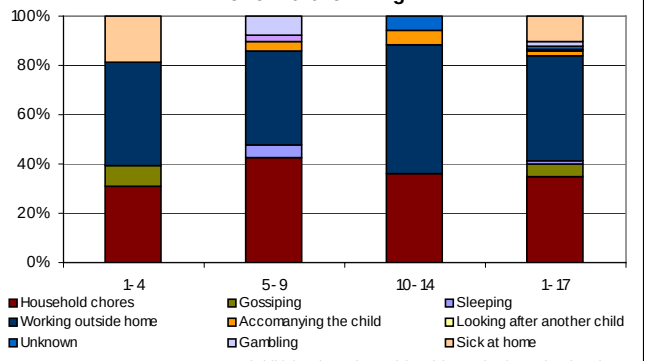
The accomanying individual for 3% of drowned children is unknown

Across all age groups, only 17 per cent of drowned children were accompanied by their mother, father, or other primary caretaker at the time they drowned. While it may be normal for children older than 10 to venture out without their parents, for children aged 1 to 4, and 5-9, only 15 per cent and 28 per cent respectively were accompanied by parents. This may be partly because almost all drownings occurred with incidental exposure to water. Therefore, parents were unaware of and unprepared for the risks, unlike, for example, when a child goes swimming and parents can plan in advance and accompany their child.

Almost one third (29%) of all drownings occur when the child is alone. In 1 to 4 year olds, half the time (52%) when a toddler drowns a family member other than their parents is accompanying the child, most often an older sibling acting as the supervisor for the child in absence of the mother.

Figure 5.16 shows the activity the mother of the drowned child was engaged in at the time of the drowning, for those cases where the mother's activity is known (99%). The two most common activities are working outside of the house (42%) and doing household chores (35%).

Figure 5.16: Activity of mother/caregiver at time of child drowning

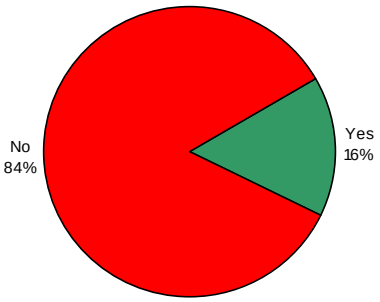


For 1% of child drowings, the activity of the mother/caregiver is unknown

Factors associated with near-drowning

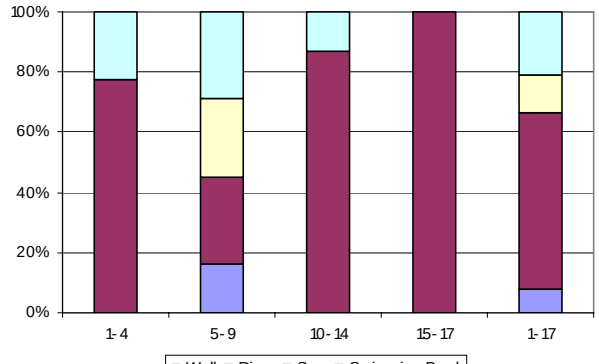
As with drowning victims, near-drowning victims are unlikely to know how to swim. Some 84 per cent of all children aged 5 to 17 who nearly drowned did not know how to swim (Figure 5.17).

Figure 5.17: Swimming skills of near-drowned children over 4 years of age



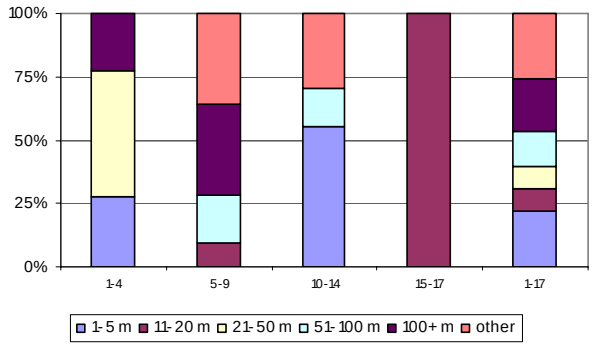
There was no near drownings indoors, with most near drownings occurring in rivers (60%). All the near drownings among 15 to 17 year olds were in rivers. The second most common location for all children was swimming pools (21%). Five to 9 year olds experienced near drowning with nearly equal proportions occurring in rivers, the sea, wells and swimming pools.

Figure 5.18: Place of near drowning of children



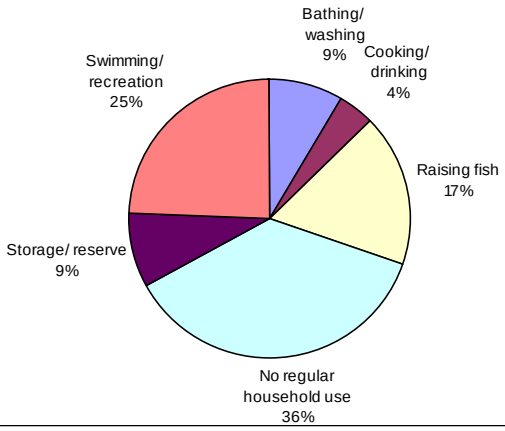
Near-drownings occur close to the child's home (Figure 5.19). About half occur within 100 meters and a fifth within 5 meters. For toddlers, almost three quarters occur within 50 meters of the home.

Figure 5.19: Distance to water body where near drowning occurs, by age



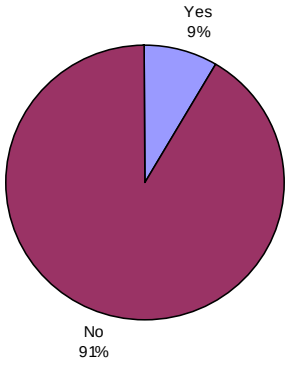
Most near drownings occur in water sources that do not have a regular household use (36%) or are used for swimming and recreation (25%). Fish ponds were third with 17 per cent (Figure 5.20).

Figure 5.20: Use of water sources



The vast majority (91%) of water bodies involved in the near drownings were not fenced to guard against access (Figure 5.21). The majority of near drownings occur in rivers, with nearly three quarters occurring in rivers and the sea (71.5%).

Figure 5.21: Presence of fence



Near drowning occurs regularly throughout the year as seen in Figure 5.22. September, November, and January have the highest frequencies. No near drowning was measured in December.

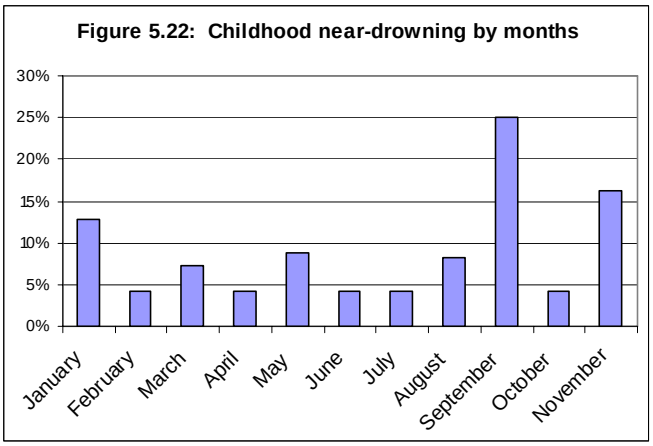


Figure 5.23 shows the activity of the child prior to the near drowning. A large majority of children (77%) are playing *in* the water, while 14 per cent are working or playing *near* the water. Children bathing or swimming make up the final 9 per cent.

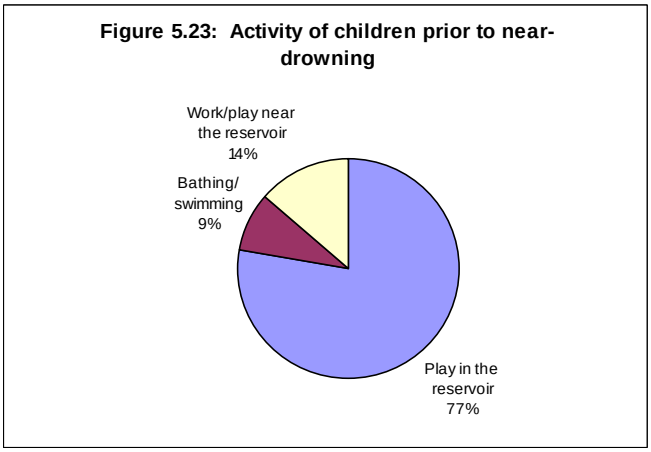


Figure 5.24 shows younger children who experience near drowning events are often accompanied by their mother or father (mother: 28% in 1 to 4 year olds; 27% in 5 to 9 year olds; father: 50% in 1 to 4 year olds; 29% in 5 to 9 year olds). In older children, neither parent was accompanying their children at the time of a near drowning event.

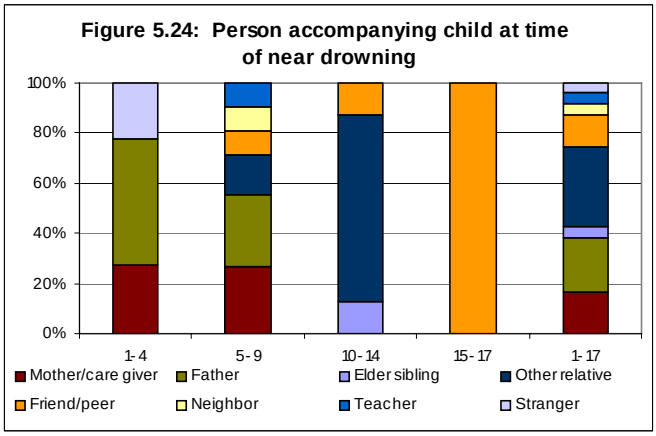


Figure 5.25 shows the age of the individuals accompanying the near drowning victim at the time of the incident, if known. (In 3% of cases the companion's age is unknown). Across all age groups, when the age of the companion is known, 79 per cent of near drowning victims are accompanied by an adult, 20 years of age or older. Toddlers that nearly drown are always accompanied by an adult. It is also always the case that near drowning victims aged 15 to 17 years old are accompanied by a peer of the same age.

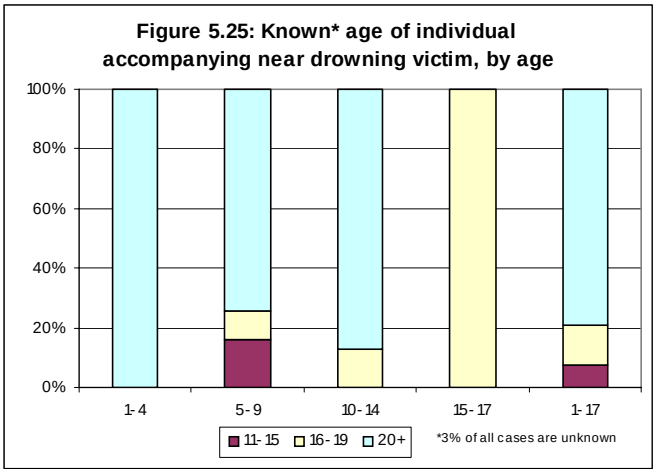
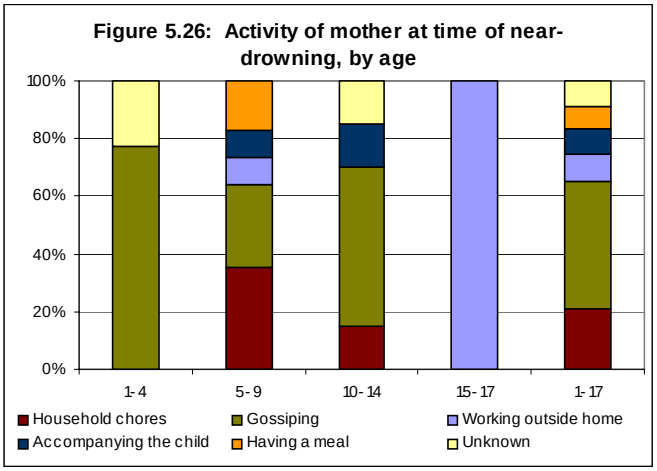
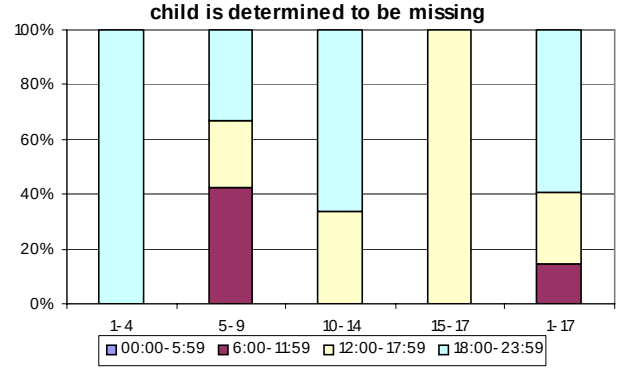


Figure 5.26 shows the activity the mother or caretaker of the near drowning victim was engaged in at the time. The most predominant activity across all age groups is gossiping with others (44%).



For those cases where the time of day was noted (79% of all near drownings), Figure 5.27 that follows shows the hour the near drowning victim was first noticed missing. All 1 to 4 year old near-drowning victims were first noticed missing in the evening, between 6 pm and midnight. All 15-17 year old near-drowning victims were first noticed missing in the afternoon between noon and 6 pm. The 5 to 9 year olds are likely to be noticed missing throughout the day and evening while their 10 to 14 year old counterparts were more likely to be missing in the evening hours.

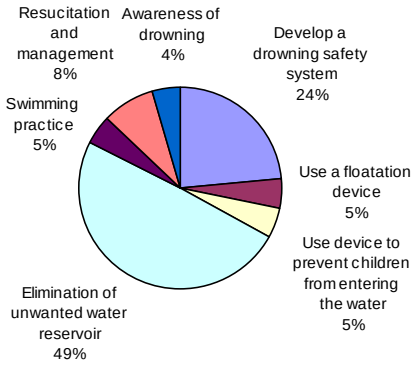
Figure 5.27: Known* time of day near-drowned child is determined to be missing



* 21% of cases reported an unknown time of day

When caretakers with a child who was a victim of a near-drowning incident were asked their opinion on methods to prevent these events, 49 per cent felt the best prevention method was the elimination of unwanted water reservoirs (Figure 5.28). Another 24 per cent felt a drowning safety plan was the most effective way to prevent near drowning events. Only 5 per cent of respondents felt improving swimming skills was the preferred prevention method.

Figure 5.28: Opinion of prefered prevention method



Drowning Life Stories

- A mother was busy cooking in her Bangkok home as her daughter, 2, wandered around in the house. Intent on the meal, it was some time before she noticed she had not recently had to chase her daughter away from the kitchen. She suddenly realized the girl had disappeared and began hunting around her house and neighborhood. It was another three and a half hours before the little girl's drowned body was found in a canal 20m from their house.
- A mother in Southern Thailand was busy with her housework but knew her two-year-old daughter was playing within a 10m radius. She forgot to factor in the small canal nearby until her daughter fell into it. Someone else saw the little girl fall and tried to rescue her. However the would-be rescuer could not swim. The girl was dragged from the canal and rushed to hospital where she later died.
- A Northern Thai mother was so absorbed in her housework she did not realize her 13-month-old son had left the house. He had only just started walking and, busy with chores, she had forgotten that he was now able to go off on his own. By the time she discovered he had gone, her son had drowned in a pond 5m from the house.

An Unrecognized Epidemic of Childhood Drowning

Unlike drowning, policy-makers in Thailand are well aware of the toll of road traffic accidents (RTA) on children in Thailand. There is a great deal of information available in technical reports and research findings to document RTA, and there are stories on a daily basis in the local media. The survey finding of very high rates of child death from RTA will come as no surprise to policy-makers, public health advocates, parents and even children in Thailand, given their constant exposure to media coverage on this.

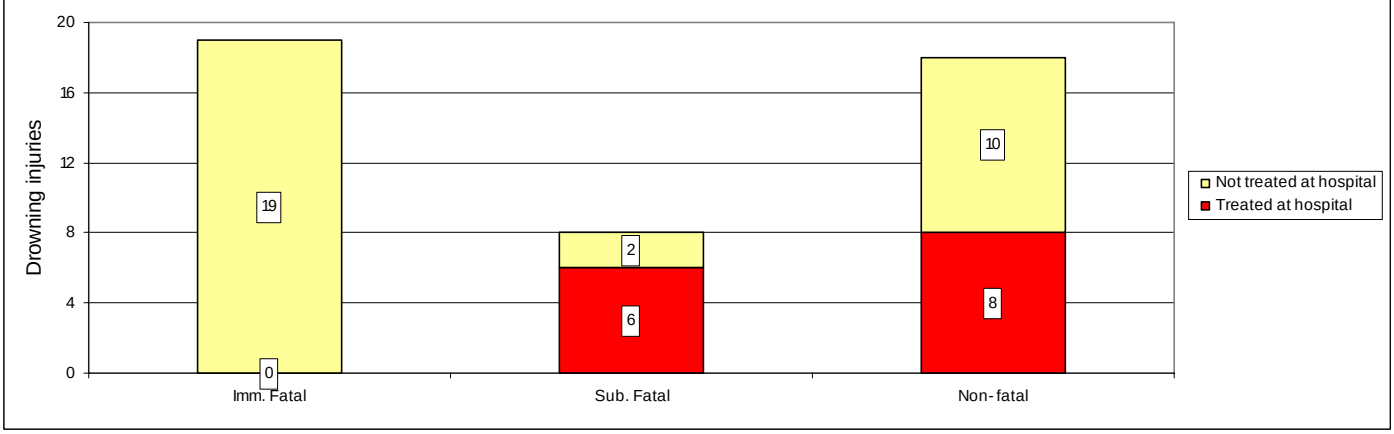
However, the finding that drowning is the leading cause of child death after infancy in Thailand will likely surprise many people as the health information system does not rank drowning as a leading cause of child death, and there is also much less coverage of this in the local media. The survey included information on whether the death was reported to a hospital, health facility or other government institution. This information sheds light on why child drownings are relatively unseen in official reporting systems, which rely on facility-based reports, such as those from hospitals. Most of the drowning deaths were not seen or reported to one of these facilities. Thus, lacking a community-reporting system, and relying on facility reports introduces a significant reporting bias that decreases reporting for drowning.

Additionally, the survey shows that immediately fatal drowning was reported much less frequently than drowning that was not immediately fatal, as that the parents or caretaker took the child for emergency care in the hope of saving the child's life. In cases of immediately fatal drownings, where for example, a caretaker finds the child submerged in the pond and obviously no longer alive, taking the child to a hospital or health care facility serves no medical purpose and the caretaker sees no reason to take their dead child to a hospital. In these cases, the child is buried or cremated and the health facilities are unaware of the death. Drowning is somewhat unique among causes of injury for having a very high and rapid fatality rate; since the difference in death from submersion and no injury at all can be as short as a minute or two.

Figure 5.29 shows this clearly: There were a total of 27 fatal child drownings recalled over three years in the Thai survey. Less than one quarter of these (6 subsequently fatal, 22.2%) were treated at a hospital. None of the immediately fatal drownings were reported to a hospital, which accounted for almost three quarters (70.3%) of all drownings. One quarter (25%) of fatal drownings that were not immediately fatal were not reported to a hospital. Some 44.4 per cent of non-fatal drownings were reported to a hospital.

Injury surveillance systems that rely on hospital reporting greatly underestimate drownings. This single cause of injury death accounts for almost nine-tenths (88.3%) of all injury deaths in the 1-4 age group, and about half (46%) of all child deaths of any cause in this age group. Since this is the age group with the highest death rates after infancy, this is why drowning causes almost half (44.6%) of all child injury deaths after infancy and almost one third (28.4%) of all child deaths from any cause after infancy. Without an effective community-based surveillance system for injury, child drownings will continue to be greatly under-reported and policy-makers will continue to miss this leading cause of child death.

Figure 5.29: Drownings in the Thailand National Injury Survey; whether immediately fatal, subsequently fatal and whether they were reported to a hospital

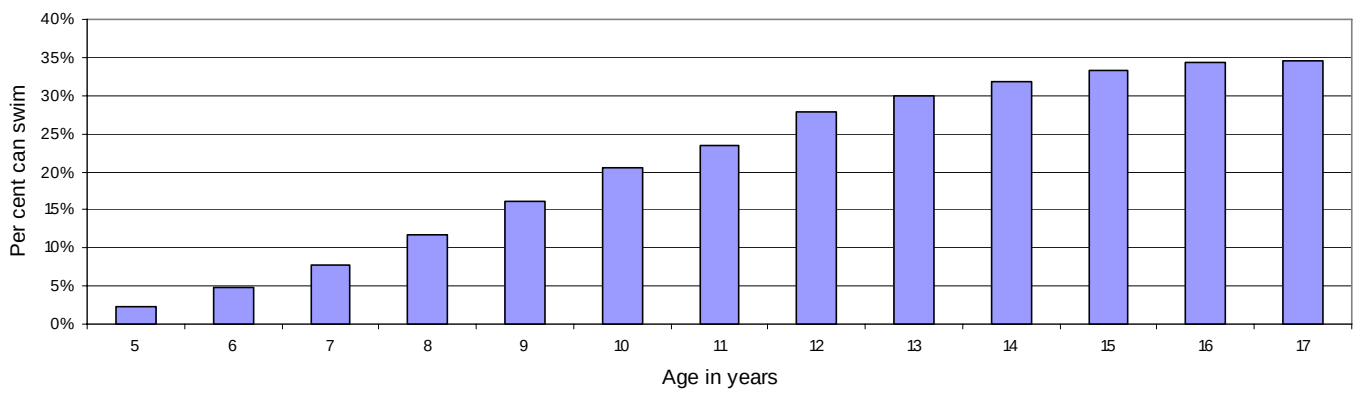


Risk factors for drowning and prevention options

Drowning in Thailand, like drownings elsewhere in the developing world, result from incidental exposure to water hazards. The water exposure is usually not planned, unlike a recreational activity in rich countries at a pool, or the beach or boating, where parents and caretakers can be aware of the risk in advance and prepare for it by increasing supervision or using flotation devices, etc. The exposure to the water occurs as part of the child's daily routine – as seen in the picture above on the left where toddlers are playing nearby the home, or in the picture on the right, where the children are going to and from school or are out with peers in the community. The water entry is often unexpected, due to a fall or a slip. Even when a child or a group of children decide to play or swim in a pond or other body of water, it is done on the spur of the moment and there are no adults present to supervise the children. Children usually play in similar age groups and since swimming ability is rare in early and middle childhood where most drownings occur, when a child is in trouble, no one has the skills or ability to rescue the drowning child.

Given the risk factors for child drownings presented from the survey, prevention efforts will need to be designed to counter these factors. Since most child drownings (53%) occur in children under five, and these children are too young to learn to swim, prevention will require increased supervision, especially as infants develop into toddlers and outstrip a busy mother's ability to closely supervise them. Fences and other barriers will need to be placed between the home and nearby water hazards. For children five years and older, swimming is a protective skill to prevent drowning. As shown in Figure 5.30, swimming ability is quite low overall. Only about one third (34.5%) of Thai children ever learn how to swim. Swimming ability is particularly low in children aged 5-9, so these younger children at highest risk of drowning cannot swim.

Figure 5.30 Swimming ability by age in years, Thailand



An in-virtuo case control study on risk factors for drowning

The survey shows that many child drownings occur in water sources close to a child's home and among children who cannot swim. An in-virtuo case control study was done to examine these factors. Cases were all children aged 5-17 who were identified in the survey as having drowned. Controls were four randomly selected children, matched for age and sex for each drowning victim. Preliminary analysis of these risk factors for all children aged 5-17 years is shown in Table 5.1.

Among 5 to 17 year olds, those children who live within 25 meters of a pond have a higher risk of drowning. The risk associated with other water hazards was not significant at the .05 level, but the data is suggestive of elevated drowning risks for children exposed to at least one water hazard. The very low swimming rates overall contributed to a lack of power to detect significance related to swimming factors.

The data also suggest that an inability to swim may be associated with an elevated drowning risk for children. Given the low prevalence of swimming ability in Thailand, it would be difficult to detect a statistically significant effect unless the effect size was extremely large. In the survey, the odds of drowning were almost four times (3.98) higher for children who cannot swim.

Table 5.1: Risk of Drowning for 5-17 year olds in Thailand

Risk Factor	OR	95%CI	p-value
Inability to swim	3.98	0.77 – 21.32	0.11
Within 25 meters of house			
Well	1.17	0.12 – 11.44	0.89
Pond	3.36	1.06 – 10.64	0.04
Water storage cistern	1.14	0.24 – 5.50	0.86

*Analysis used SPSS Complex Samples Conditional Logistic Regression and odds ratios used to approximate rate ratios since the outcome (drowning) is rare. Risk factors have been considered independently, without adjustment for potential confounders. Further examination of these is in progress.

Key prevention issues

Prevention begins with acknowledging the problem and monitoring it. For child drownings, this will require a surveillance system that operates at the community level. Since the survey shows that parents do not bring drowned children who immediately died to a health center or hospital, the facility-based method of drowning surveillance needs to be supplemented by information from existing institutions in the community that are aware of mortality in children. One possibility is the school system, which maintains attendance records on children and a child death (from any cause, not only drowning) would immediately show up as a permanent absence. A school-linked system would cover the high-mortality years of most children's lives (the school years for ages 6-12, when most children are in school).

The survey shows that drowning is the leading single cause of death in the toddler (1-4) age group, with a peak rate in two year olds. This is an age where the child is actively exploring their environments and this requires increased supervision on the part of mothers. However given the average of three children per family, and an inter-birth interval of 18 months, many mothers are either in the late stages of pregnancy or looking after a new infant and are unable to meet the supervisory needs of the toddler. Prevention will require putting barriers between the exploring toddler and the outside water hazards and this requires both that parents recognize the need to do this and are also encouraged to act. This is an opportunity for existing maternal and child health programs to incorporate these issues. Current immunization schedules call for a measles dose at 9 months of age for the infant. As currently implemented, this represents a missed opportunity since the mother is not reminded at this visit that her infant will soon walk and is not given simple prevention messages, for example to place a door gate in the house or to use an improvised playpen. The last immunization visit is at the age just before the peak age of drowning— and parents could be encouraged to keep the house door closed at all times and put fences around nearby ponds.

Drowning prevention for school aged children is more complex, as they are outside the home, usually with peers and are not supervised by an adult. Fencing or barriers are less effective as older children often defeat any that are in place in order to play in the water-body. Conceptually, since the children cannot be isolated from the hazards, it is necessary to take a risk-mediation approach and reduce the risk of death to the child from the water hazard. That means ensuring that the child learns to swim at the earliest possible age, since the highest drowning rates occur in the earlier age groups. Teaching swimming is only one component of a broader water safety program. The child learns how to safely rescue others and how to deal with water hazards safely. Since the data indicates that most often the person accompanying the drowning victim was a peer, these skills allow the peer to potentially save the endangered child– a "herd immunity effect".

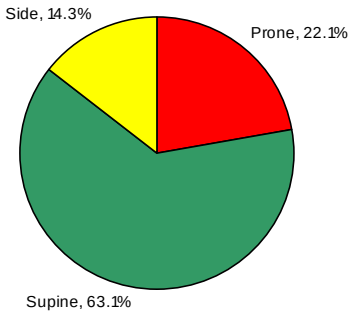
Accidental Infant Suffocation

Accidental infant suffocation was the leading injury cause of death for infants. At a rate of 44.6 per 100,000 it is a significant problem, which accounted for more than 450 infant deaths — more than one every night. However, this is an easily preventable cause of infant death.

Risk factors for accidental infant suffocation are sleeping in a non-supine position (other than on the back), parental smoking and multiple bed-sharers. In Thailand, more than one third of infants are put to sleep in risky positions (22.1% prone and 14.3% sideways, Figure 5.31).

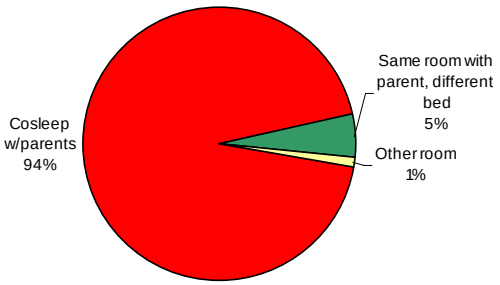
Figure 5.32 shows that 94 per cent of infants sleep in the same bed with their parents. More than a third of parents smoke and the average family size is five, with two parents and three children.

Figure 5.31 Position infant put to sleep in



The average household has one bed for the family, which means that many infants share a bed with both parents and two older siblings, leading to a very crowded sleeping environment for an unprotected infant.

Figure 5.32 Place of sleep of infant, Thailand



There are many benefits to infants sharing a bed with their mother — it increases breast feeding, and leads to increased bonding to name only two. However, in order to fully reap the positive health benefits, parents need to be aware of how to do it most safely for the infant. Given the known risks of suffocation in these circumstances, it is a major missed opportunity for antenatal care programs to not conduct educational programs with the expectant mothers about proper sleep positions, the hazards to the infant from smoking parents and working with the mothers to plan a safe way to share the adult bed with her vulnerable infant.

Chapter 6

Transport Injury

- Road traffic accidents kill more than 2,600 children a year — about 7 a day
- Motorcycles were involved in 92 per cent of all child deaths from RTA
- Fatal crash rates were so high in male motorcyclists 14-17 years, that 90 per cent of all child RTA deaths occurred in this group
- Almost three quarters of all RTA deaths before the age of 10 were as pedestrians. No preschoolers died from RTA

Transport Injury

While there are many different types of transport (water, air, train and other forms) in Thailand, all mortality and morbidity from transport was from road traffic accidents (RTA). This does not mean that other types of transport are safe, just that these methods of transport are much less commonly used by the average person in Thailand. While accidents occur with other modes of transport, these are rarer than road traffic accidents and are less likely to be found in a cross-sectional survey.

Fatal transport injury

Road transport accidents (RTA) kill more children aged 1 to 17 in Thailand every year than any other cause, except for drowning. RTA is mainly a problem of school-aged children and older children. Infants and toddlers have much less exposure to roads and vehicles since they spend most of their time inside and with their mother or caretaker.

Figure 6.1 shows the RTA death rate increases with the age of the child, after age five. No fatalities were measured in infants or toddlers, but almost 9/100,000 children aged 5 to 9; 12/100,000 aged 10 to 14 and 61/100,000 aged 15 to 17 are killed by RTA annually. Overall about 18/100,000 children aged 1 to 17 are killed by RTA every year, ranking it the second leading cause of death.

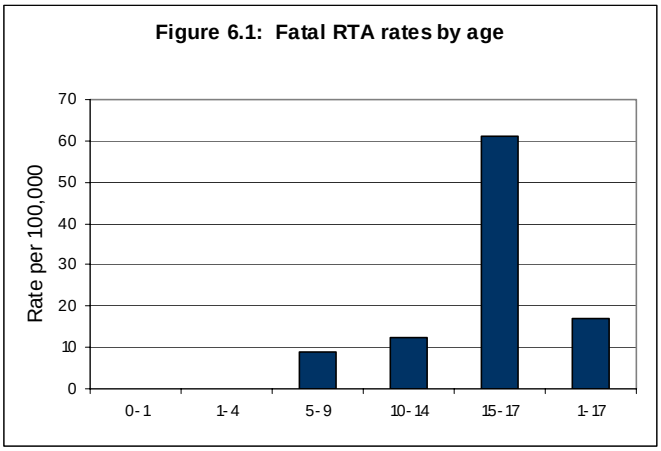
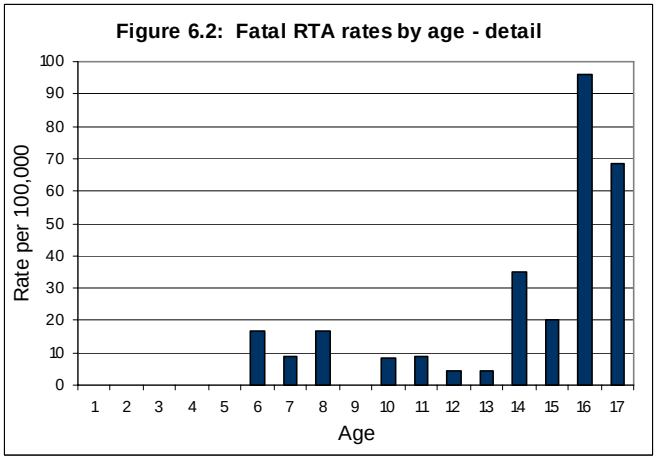
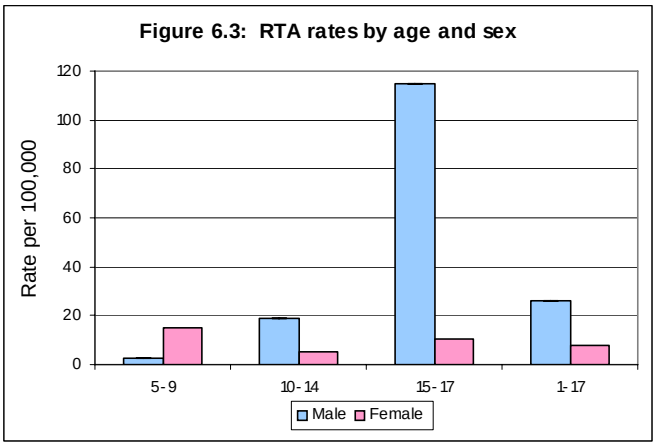


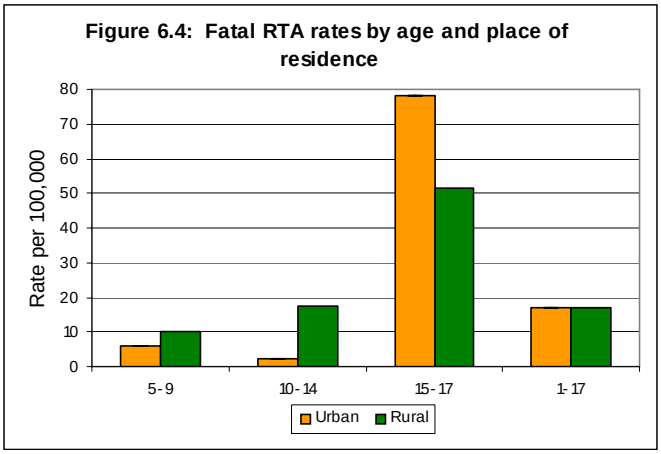
Figure 6.2 that follows shows fatal transport rates by one-year age intervals. It is clear that RTA fatality rates dramatically increase at age 14. This illustrates that the age classification of 10-14 masks an important issue-- fatal RTA is predominantly an issue in post-pubertal adolescents.



There is a strong male predominance in RTA deaths (Figure 6.3). Though more females died in the 5-9 age group, 15-17 year old males are over 10 times more likely to die from RTA than females (10.7:1). Overall, males aged 1-17 die from RTA at 27.1/100,000 and females at 8.2/100,000.



In children 1-17 there appears to be no predominance of deaths in rural or urban areas (Figure 6.4).



Non-fatal transport injury

Non-fatal road traffic injury rates also show a direct relationship with age. Figure 6.5 shows that rates are lower at younger ages, while the highest rate of road traffic accident (RTA) morbidity occurs in the 15 to 17 year old age group.

Figure 6.5: Non-fatal RTA rates by age group

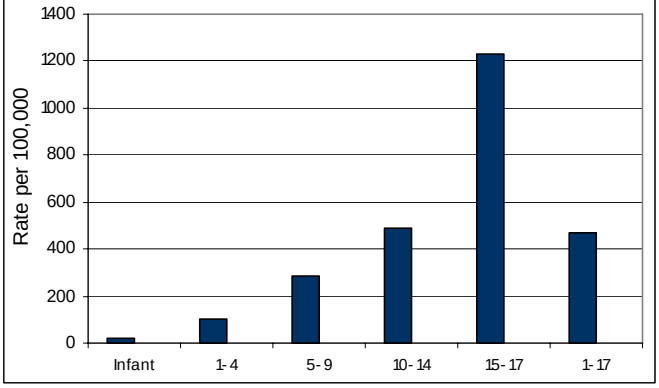


Figure 6.6 shows the RTA morbidity rate by yearly age intervals. It gives further evidence for a correlation between age and RTA, showing the same thing as was seen with fatal RTA, that non-fatal RTA rates also take a sharp upturn as soon as children enter puberty.

Figure 6.6: Non-fatal RTA rates among children by age - detail

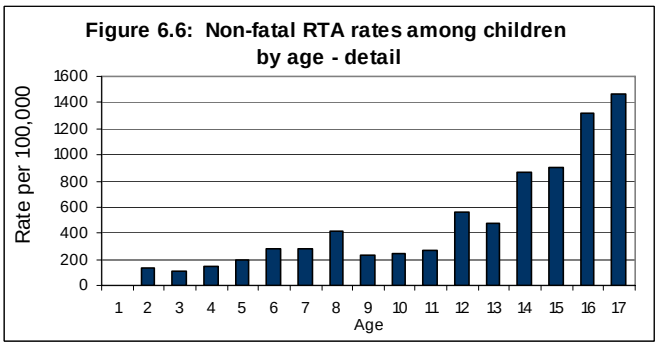


Figure 6.7 shows that morbidity is higher for males in all age groups except 1-4. In the older age groups this disparity is quite striking; the 15 – 17 males have a rate (1,912/100,000) that is more than three times the female rate (588/100,000).

Figure 6.7: Non-fatal RTA by sex and age group

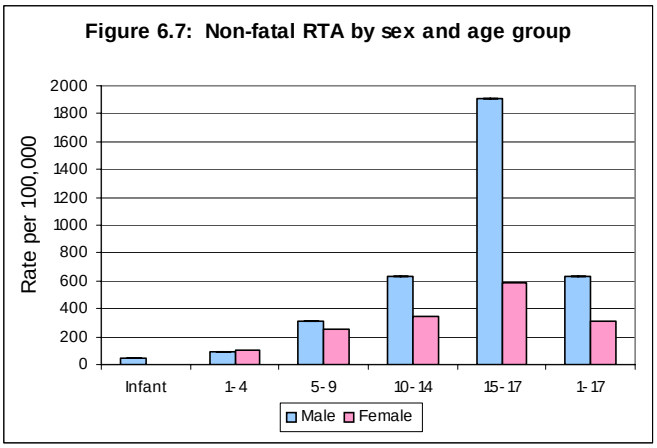
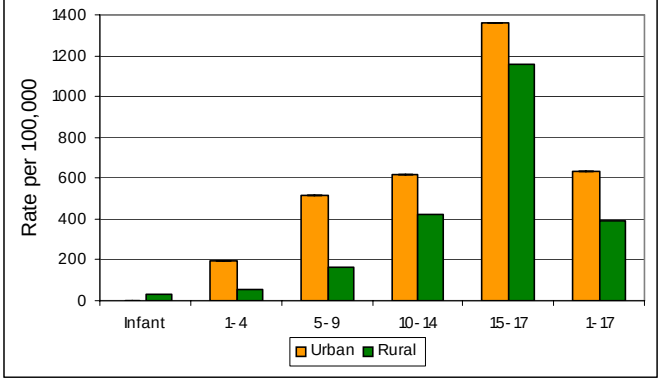


Figure 6.8 below shows that urban rates of RTA morbidity are higher than rural rates in every age group except infants.

Figure 6.8: Non-fatal RTA by place of residence and age group

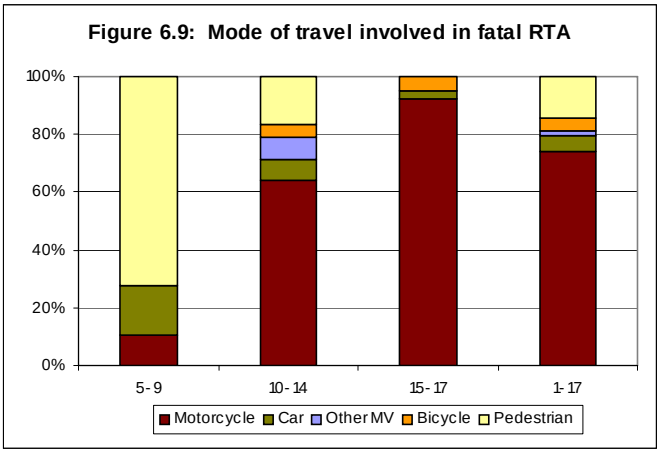


Particulars of the RTA injuries

Almost three-quarters (74%) of all RTA deaths in children age 1 to 17 occur when the child is on a motorcycle (Figure 6.9 below). The next largest proportion is in pedestrians (14%). Cars, other motor vehicles and bicycles combine for the remaining 12 per cent.

Motorcycles are also responsible for nearly two out of three (63%) of all non-fatal RTA injuries as is seen in Figure 6.10 on the following page.

Figure 6.9: Mode of travel involved in fatal RTA



There is a salient age pattern that becomes apparent when the individual age groups of fatal RTA injuries are examined (Figure 6.9). Almost three-quarters (72%) of children aged 5-9 killed by RTA are struck as pedestrians. As the children grow older, they begin riding bicycles or are passengers in motor vehicles, then pedestrian deaths become a smaller proportion of total RTA mortality. In late adolescence children are killed almost exclusively on or by motorcycles; 92 per cent of RTA deaths are associated with motorcycles.

A similar pattern appears in non-fatal transport injuries (Figure 6.10). Motorcycle crashes are a larger proportion of morbidity in the young age groups than fatal RTA, but pedestrian and bicycle accidents are the predominant cause of non-fatal transport injury in 1-4 (56%) and 5-9 year olds (69%). Motorcycles are the leading cause of morbidity in 10-14 (52%) and 15-17 year olds(88%).

Figure 6.10: Mode of travel involved in non-fatal RTA

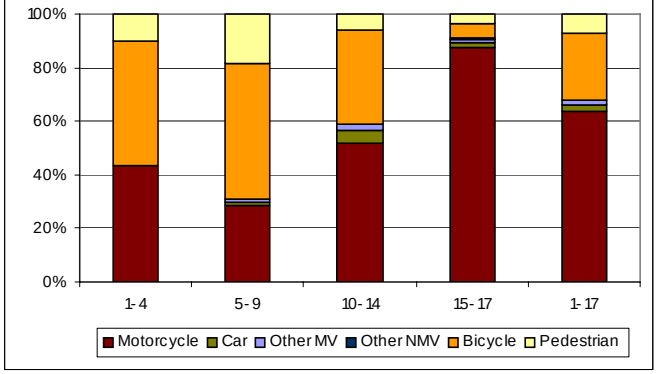


Figure 6.11 shows almost two thirds (65%) of the child RTA fatalities were as drivers or operators of the vehicle, while 21 per cent were passengers and the remaining 14 per cent were pedestrians. However, the aggregate age group 1-17 masks an important age group pattern. The youngest groups are primarily pedestrian while the older groups are primarily drivers or occupants. The proportion of fatalities in passengers remains consistent across all age groups.

Figure 6.11: Type of road user in fatal RTA

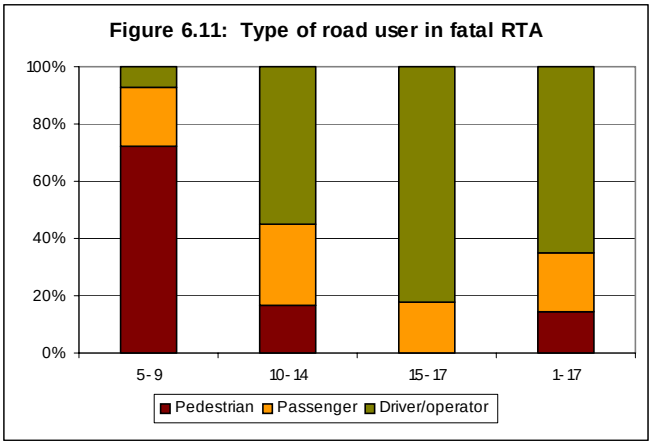
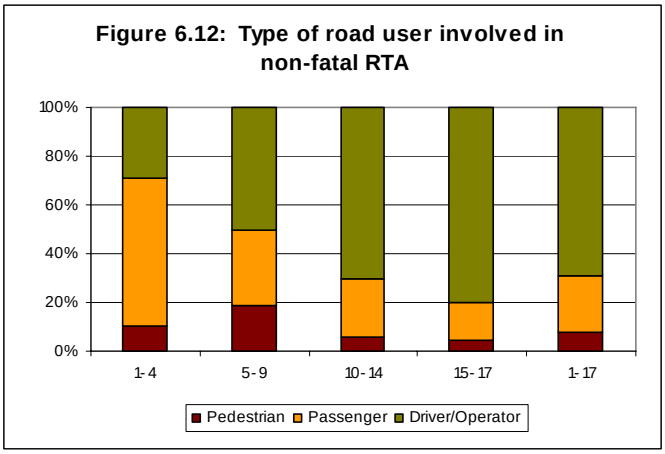


Figure 6.12 shows that the distribution of types of road users in non-fatal road accidents is similar to that of fatal accidents.

Figure 6.12: Type of road user involved in non-fatal RTA



As can be seen in figure 6.13 below, most fatal RTA injuries for all children (age 1 to 17) occur in the afternoon (46%) while the second most common time is in the morning (32%). This pattern is duplicated for 10 to 14 year olds and 15 to 17 year olds. For the youngest age group, however, the majority of fatalities occur in the morning (60%). The times of involvement correlate with the fact that most young children are going to and from primary school in the morning and afternoon. Older children are more likely than young children to be out and about on the road after 6pm. Late adolescents (15-17) are more likely to be on the road after midnight.

Figure 6.13: Known* time of accident in fatal RTA by age

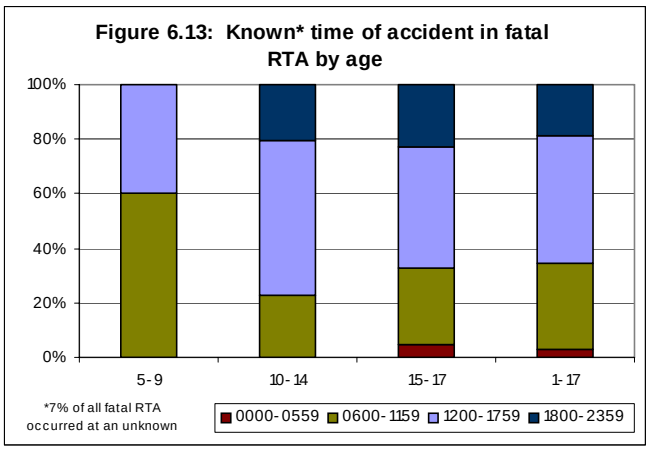
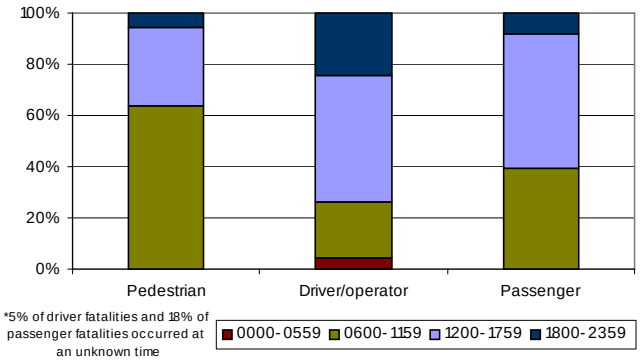


Figure 6.14 on the following page shows the relationship between time of the accident and the role of victim. Pedestrians are killed during daylight hours; only 5 per cent of pedestrian fatalities occur between 6pm and 6am. Likewise only 7 per cent of passenger fatalities occur during these daylight hours. But 27 per cent of driver/operator fatalities occur during the night.

Figure 6.14: Known* time of accident in fatal RTA by role



For non-fatal RTA injuries (Figure 6.15), the afternoon continues to be the time when most accidents occur, but the evening replaces morning as the second most likely time for an accident (60%, 25% and 14% respectively).

Figure 6.15: Known* time of accident in non-fatal RTA

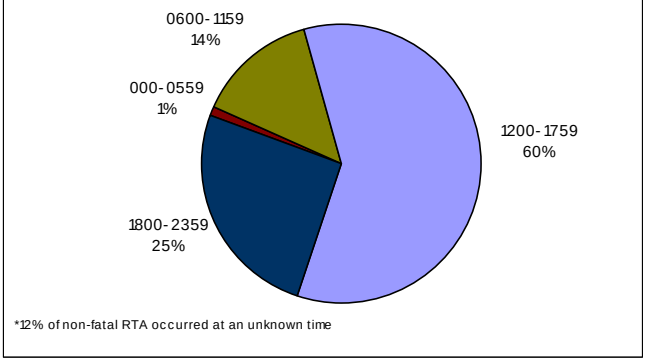
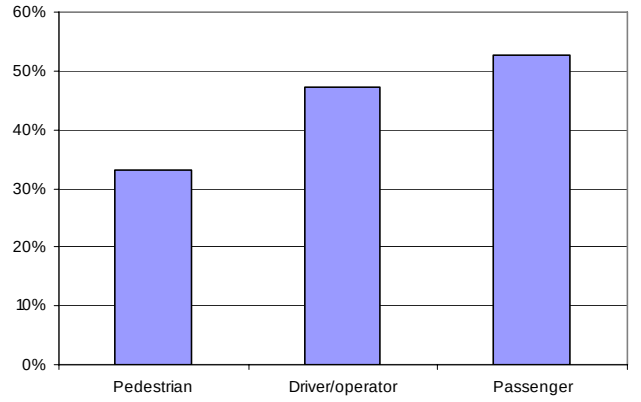


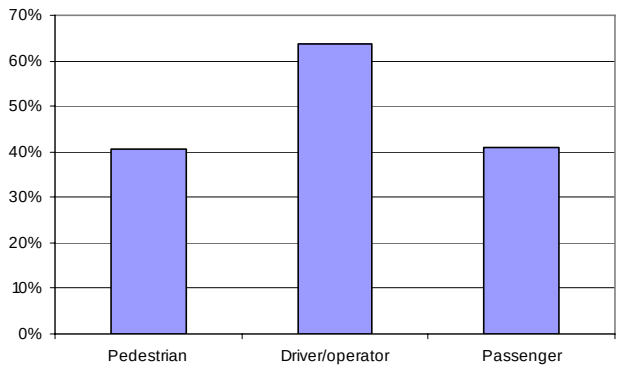
Figure 6.16 shows the degree to which poor driving conditions (either road or weather) was cited as contributing to a fatal accident. Between one third and half of the time there were poor conditions at the time of the accident.

Figure 6.16: Per cent of fatal transport injuries in which weather or road conditions was a factor



Driving conditions are also a major factor in non-fatal crashes (Figure 6.17).

Figure 6.17: Percent of non-fatal transport injuries in which weather or road conditions was a factor

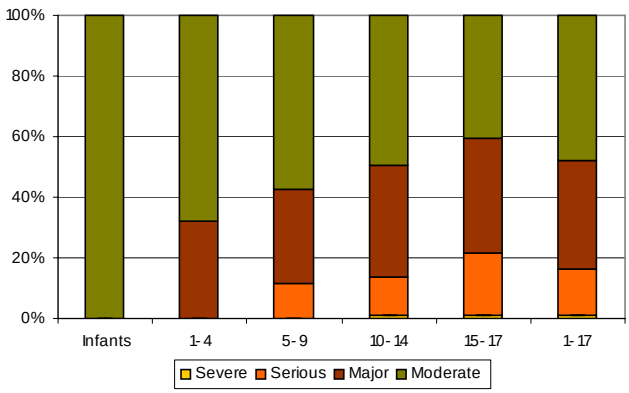


Hospitalization and severity

More than half (52%) of all transport morbidity was of a severity level "major", "serious", or "severe", requiring a hospital stay of at least one day (Figure 6.18). This large proportion is driven by the large number of events that occur in the 15 to 17 year old age group, 59 per cent of which are of a "major" level or greater. The relatively large proportion of major and serious injuries is expected since road traffic accidents are more likely to lead to traumatic injuries that require surgery.

There also is a relationship between a child's age and severity; infant RTA injuries are moderate and at each subsequent age grouping the proportion of higher severity increases.

Figure 6.18: Proportion of injury by severity and age group in non-fatal RTA

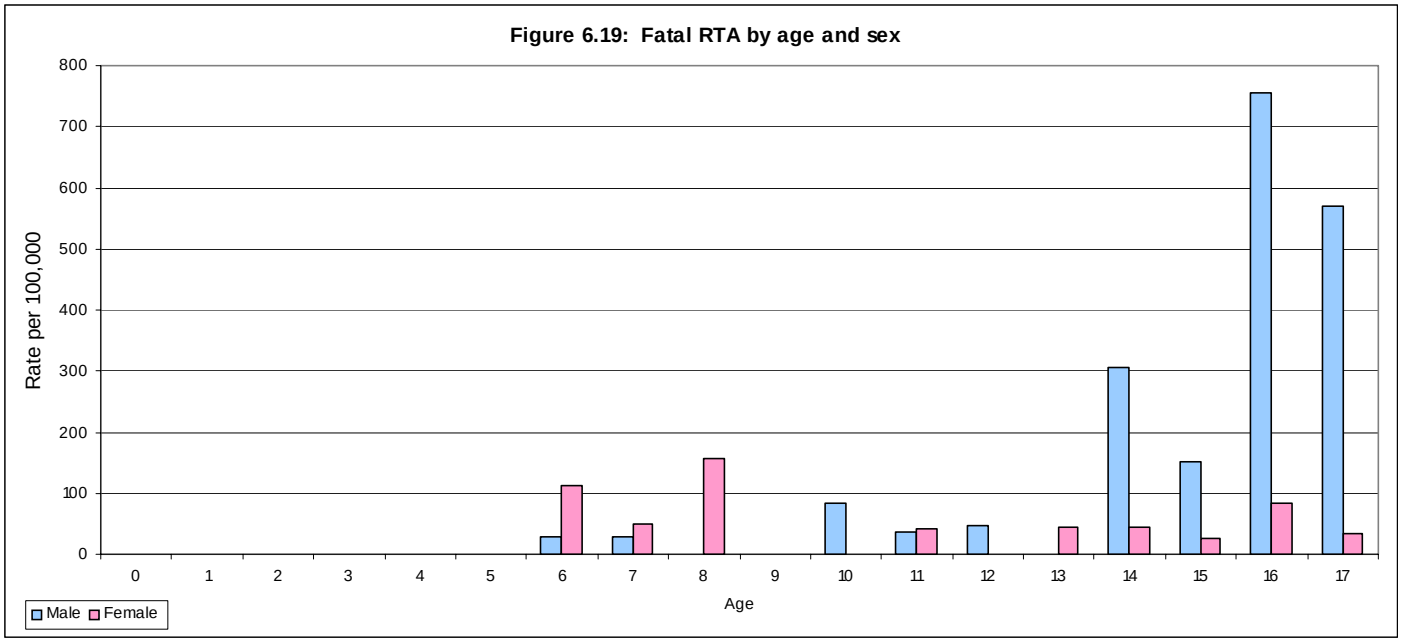


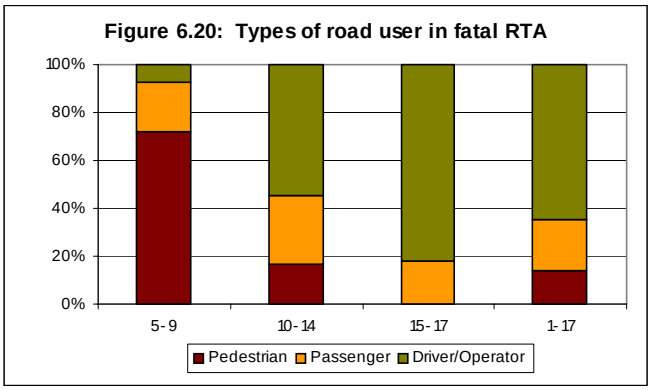
Fatalities were infrequent in the younger age groups of toddlers and early school ages, largely because young children on motorcycles were being carried by a parent or caretaker. They are aware of some of the risks involved and do not engage in high-risk behaviors while the child is on board. This can be seen in the pictures — starting from the top left, it is clear that parents recognize the potential for young children to fall off the motorbike, and they attempt to secure them or place them in the place where they feel is safest — often between adults or with the youngest child riding between the parents arms where they can watch them. While the child is aboard, parents don't engage in behaviors that produce the high fatality rates in late adolescence: racing, showing off and drinking alcohol However, while parents are the key, they can not be relied upon for "common sense" to prevail.. They don't fully realize the dangers and they don't think there will be a crash so they don't prepare for one. It requires both education of parents, as well as effective law enforcement to change these behaviors, and to use a helmet to prepare the child for a potential crash. Finally, it is not only Thai parents. Thailand is a major tourist destination, and children of tourists need the same protections as Thai children do.

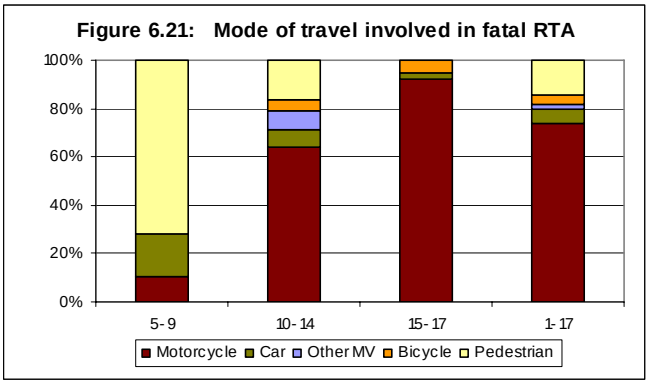
Key prevention issues for RTA and children

The figures below highlight three key points that greatly influence intervention programs:

1. Fatal RTA injury is a rare event in preschool children — it occurs, but so rarely that it is below the power of the survey to detect.
2. Where RTA fatalities do occur is in middle and later childhood — but in two very different situations:
   - For children in primary school, between 6 and 9 years of age, it is children of both sexes, but mainly as pedestrians, that make up 72 per cent of all fatalities in this age group
   - In children 10 and older, 85 per cent of all RTA deaths are as riders and drivers, entirely of motorcycles, which are involved in 100 per cent of these deaths
   - Male motorcyclists in late adolescence are at particular risk — almost 1 out of 200 males in this age group die on a motorcycle — and comprise 90 per cent of all RTA deaths







The non-fatal RTA data mirrors the fatal RTA epidemiology, so the prevention implications are clear: There are essentially two groups that need to be targeted in RTA interventions: one is parents and adults caring for pre-school and school-aged children and the other is adolescent children (mainly males) on motorcycles. It is also clear that there is a need for a special focus on motorcycles.

- Nine out of 10 (92%) of child RTA deaths are from riding, driving or being struck by motorcycles
- All of the permanent disability in children over 10 years old from RTA was caused by motorcycle use
- The survey was self-report, so alcohol use was not determined. However, special surveys regarding alcohol use have found that it is a major factor in adolescent (and adult) Traffic accidents. Thus it needs to be a major enforcement focus as well.

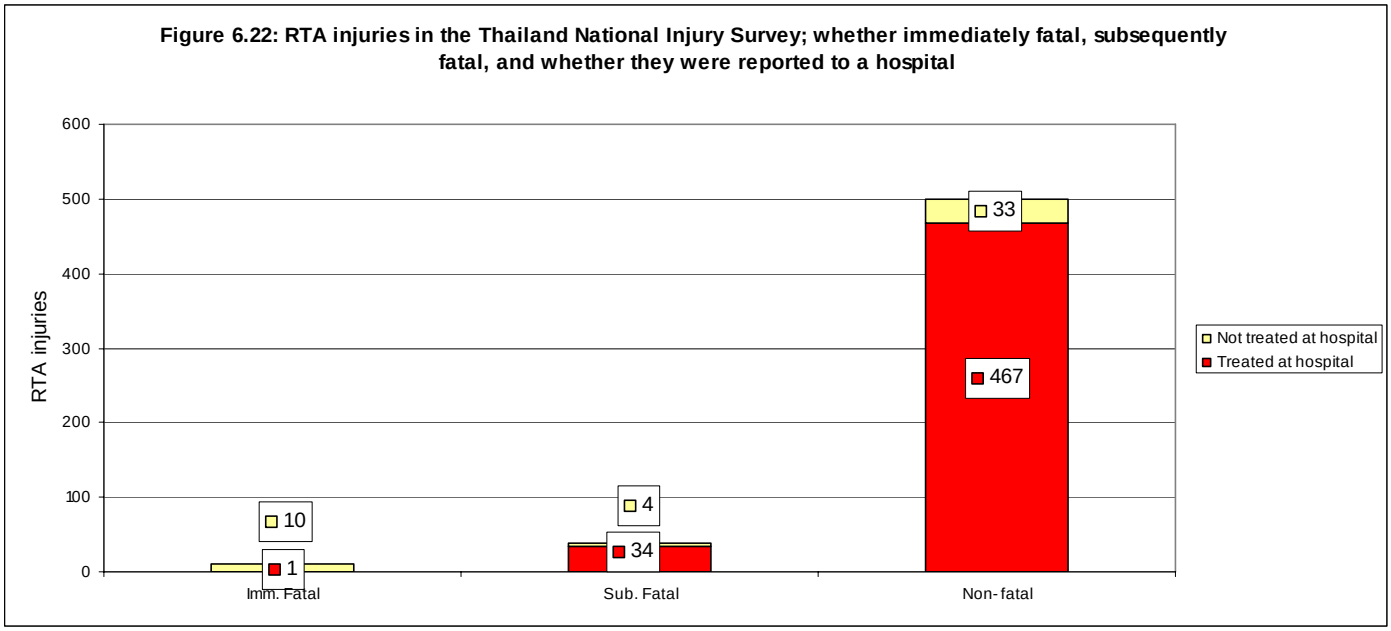
Surveillance and health information systems aspects of RTA

Surveillance and information about traffic accidents, unlike drowning cases, are well reported. Figure 6.22 shows that of the 49 crashes that resulted in child fatalities in the survey, about 71 per cent were examined at a hospital. Among the non-fatal RTA injuries, almost all (93%) were treated at a hospital. Like drowning, those who died immediately typically do not make it into the hospital system. Unlike drowning, however, most traffic fatalities are not immediate. Traumatic injuries, such as traffic injuries, are more easily treatable and thus more likely to be reported in hospital records. Even when considering non-fatal events, RTA incidents are twice as likely to be treated at a hospital than near-drownings (93% to 44%).

Thus incidence of RTA deaths and morbidity are highly visible and receive a great deal of attention. Unlike drowning deaths, the RTA deaths are not lost to the public health system. In addition to the hospital records there are another two institutional sectors that have an overlapping responsibility for collecting information on fatal and non-fatal RTA. One is the police, especially the traffic division who are responsible for maintaining RTA surveillance. They track and report the most significant "missed reports" from the hospital based system which are the immediately fatal (dead on site) as well as many of the subsequently fatal, who are often dead on arrival (DOA) and are thus not admitted to the hospital, which is usually a necessary precursor for entry into the medical reporting system. The other institution with overlapping responsibility to track RTA is the insurance industry, which is often involved in financial payments subsequent to crashes.

Having multiple sectors report helps overcome the problem of lost deaths, but it also adds the issue of accurate reporting for RTA. Multiple institutions count RTA, but none of them use the same definitions. Because of this, it means double or triple counting of some events is a potential occurrence.

Figure 6.22: RTA injuries in the Thailand National Injury Survey; whether immediately fatal, subsequently fatal, and whether they were reported to a hospital



Traffic Injury Life Stories

- A six-year-old boy was on his way home in Northern Thailand, riding as the passenger on the back of a motorbike. The road was wet and undergoing road-works. The motorbike slipped on the wet surface, skidded out of control and hit a pile of stones, throwing the boy off the motor-bike. He suffered head and neck injuries and died on the way to hospital.
- Like many of her family and friends, a seven-year-old girl was riding in the back of a truck in Northern Thailand, a common form of transport in the region. The truck driver tried to overtake on a sharp curve and the truck rolled. The girl was thrown from the truck and broke her neck. She was rushed to hospital but died three hours later.

Chapter 7

Burns

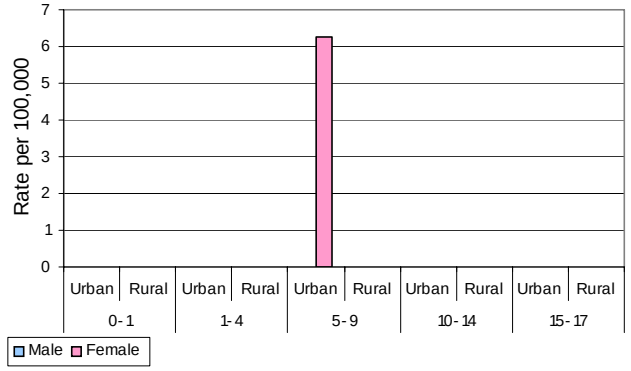
- Burns are a leading cause of non-fatal injury, with almost 12,000 children injured by burns each year, or nearly 33 every day
- Burns in children have a social impact directly related to the degree of disfiguration and scarring as they require intensive medical and surgical rehabilitation
- Fatal burns are rare in Thailand

Burns

Fatal burns

Only one death from burns was recorded in the survey. The child was an 8 year old urban female (Figure 7.1). This is too low of a frequency to draw any meaningful conclusions about the nature of fatal burns in Thai children.

Figure 7.1: Fatal burn rates by age, sex, and place of residence



Non-fatal burns

While burns are not a major cause of child mortality from injury, Figure 7.2 shows that burn morbidity is a serious issue for all age groups in children. The rates are high in all age groups, including infants. Serious burns over large areas of a child's body cause significant disability — not only from the physical effects but there is also a major social burden if the child is disfigured.

Figure 7.2: Non-fatal burn injury by age group

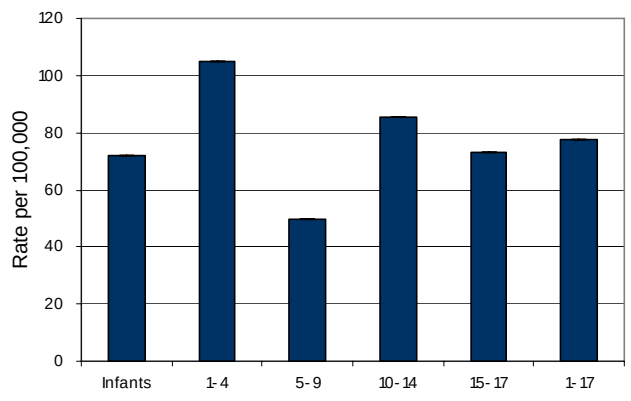
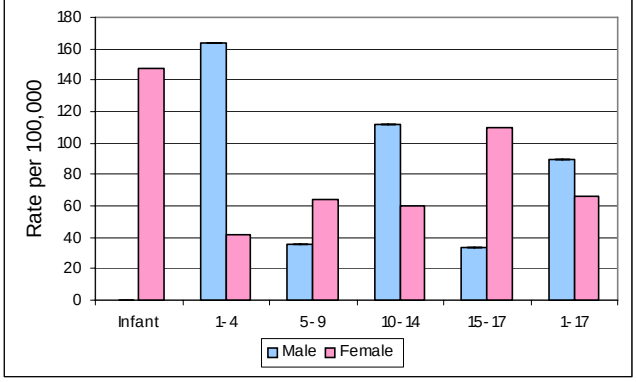


Figure 7.3 that follows compares non-fatal burn rates by sex and age and shows that rates vary considerably by age group.

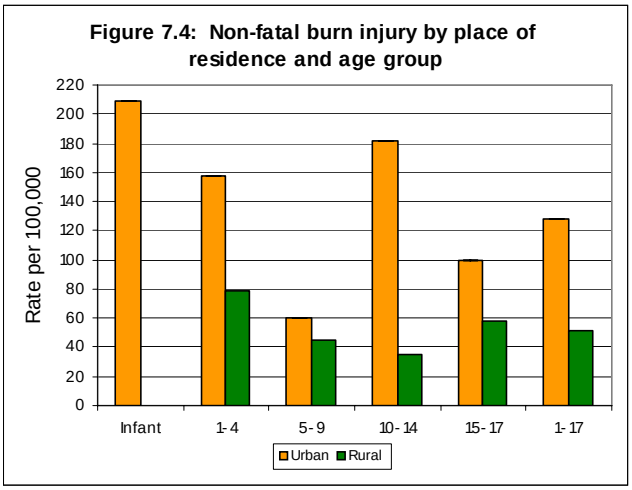
Figure 7.3: Non-fatal burn injury by sex and age group



Overall, males have a slightly higher morbidity rate (85/100,000 for males, 67/100,000 for females), but there are two age groups after infancy where the sex differences are particularly striking. Males have much higher rates in toddlers and females have much higher rates in late adolescence. The male preference in toddlers may reflect the tendency of males in this age group to be more active in exploring their surroundings; while the strong female preference in the 15 to 17 year olds may be attributable to females becoming more active in the traditional role of kitchen work and meal preparation.

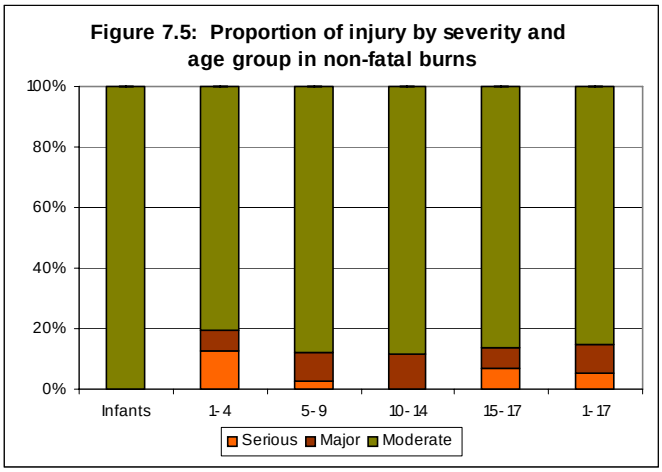
Burn morbidity was higher in urban settings in all age groups (Figure 7.4). Overall, for children 1 to 17, urban rates were more than double those of rural areas (127/100,000 and 50/100,000 respectively).

Figure 7.4: Non-fatal burn injury by place of residence and age group



Consequences of burn injury

Burn severity can be seen in Figure 7.5. The large majority (86%) of burn injuries were moderate while 14 per cent required hospitalization. One out of 20 burn injuries (5%) required hospitalization of at least 10 days. The greatest proportion of burns that required hospitalization (major and serious burns) occurred in the toddler age group, where 19.4 per cent required hospitalization. Burns in toddlers often occur when they reach up to a boiling pot and pull the scalding water down onto their upturned face.



Factors of non-fatal burn injury

The leading cause of non-fatal burns by far is hot liquids, accounting for 71.4 per cent of burn injuries (Figure 7.6).

Hot liquids are the exclusive cause of burns in infants and the cause of the vast majority of burns in toddlers. Flame and explosive burns enter into the picture as children begin to cook and play with fireworks. Fireworks account for 100 per cent of explosive burn injuries.

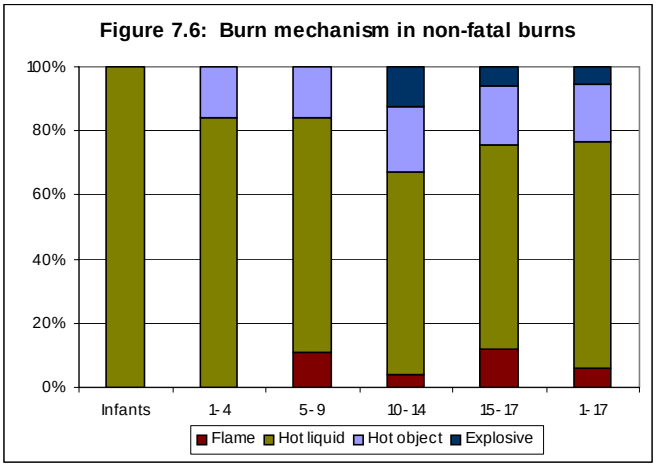
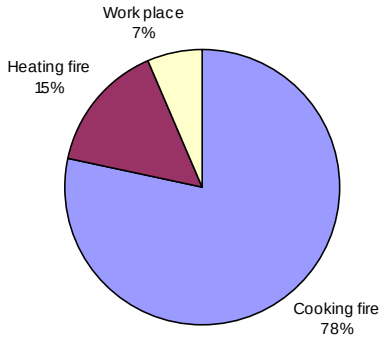
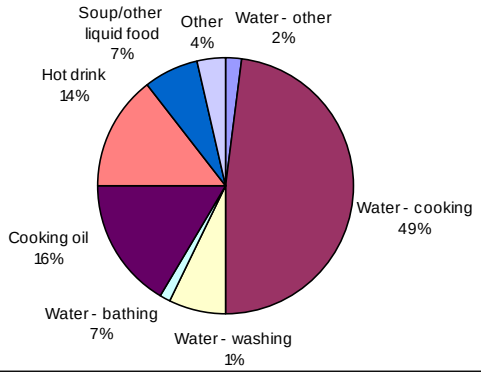


Figure 7.7: Source of flame in non-fatal burns



Cooking is not only the leading cause of flame burns (Figure 7.7 above); it is also the leading cause of liquid burns. Figure 7.8 shows that cooking water and cooking oil are the two most common sources of liquid burns, accounting for 65 per cent of these injuries.

Figure 7.8: Type of liquid in non-fatal burns



Non-fatal burns by hot objects, however, are predominately caused by mechanical equipment, often the hot muffler of a motorcycle burning the bare leg of the child riding on the back. (44%, Figure 7.9). Cooking related hazards (cooking utensils) comes in second, accounting for 31 per cent.

Figure 7.9: Type of hot-object in non-fatal burns

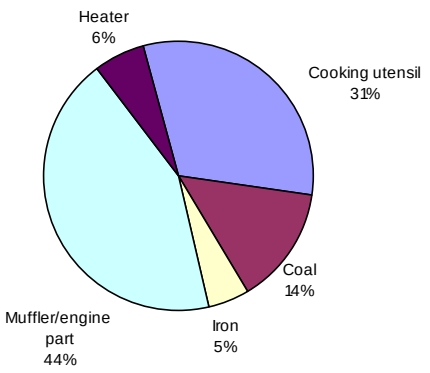
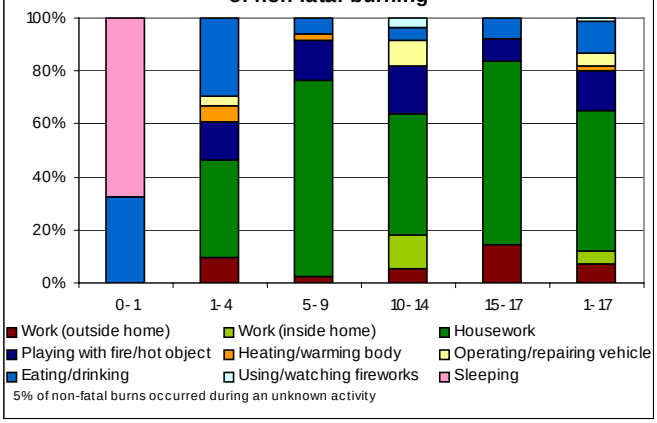


Figure 7.10 that follows shows why cooking or stoves and hot liquids are the leading sources of non-fatal burns.

This figure shows the activity of the child, by age group, at the time they were burned. Once one leaves infancy, the majority of burns at each age group are received when the child is involved in housework, which includes cooking. Half of all non-fatal burns in children aged 1-17 are received while engaged in such housework.

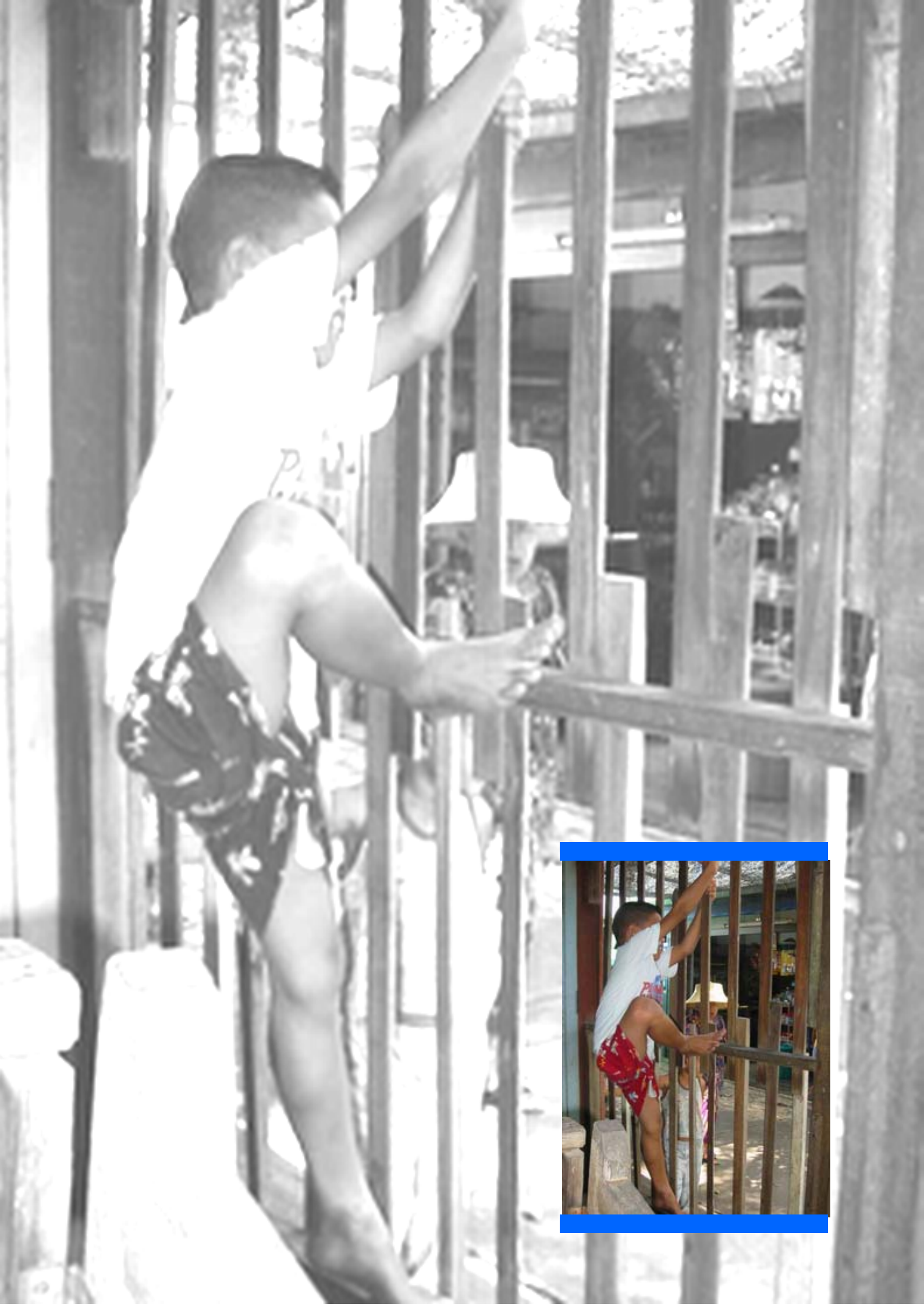
Figure 7.10: Known* activity of the person at time of non-fatal burning



Most of these burns are preventable with increased supervision of the child, or by ensuring the stove is placed on an elevated surface beyond the reach of young children and that pot handles are kept turned towards the wall so they cannot be reached by very young children.

Burns Life Story

- A mother was boiling a pot of water in her Bangkok home while her son, 2, was playing and running around her. Suddenly the boy ran in to the kitchen and accidentally hit the pot, causing it to spill and scald his arms and legs. He was admitted to a government hospital for treatment but he could not walk or use his hands for a month.



Chapter 8

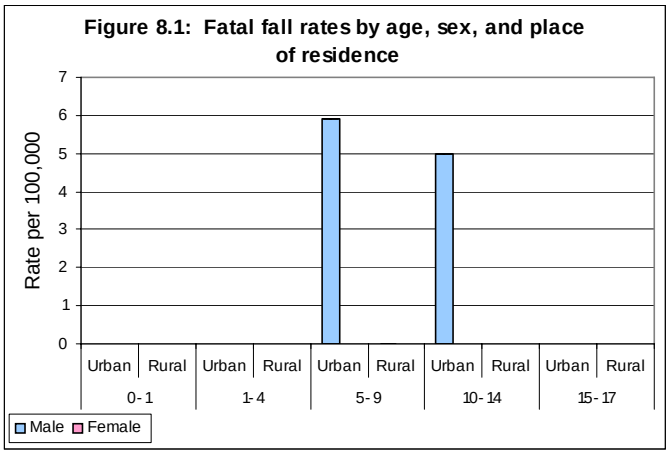
Falls

- Fatal falls are rare but falls are the second leading cause of morbidity in children and also the second leading cause of permanent disability
- Falls cause more than 62,500 child injuries a year — about 170 children a day
- More than 380 children each year, over one every day, are left permanently disabled from falls

Falls

Fatal falls

There were two fatalities recorded from falls from a height, making it difficult to draw conclusions (Figure 8.1). Both were urban males, aged 7 and 14. One fell from a height of 1 to 5 meters, and the other from 5 to 10 meters.



Non-fatal falls

Fall rates are highest in the 10 to 14 year olds with a rate of 546 per 100,000. Rates are high in every age category, however, and steadily increase with the age of the child (Figure 8.2). Infants have the lowest rate at 86 per 100,000.

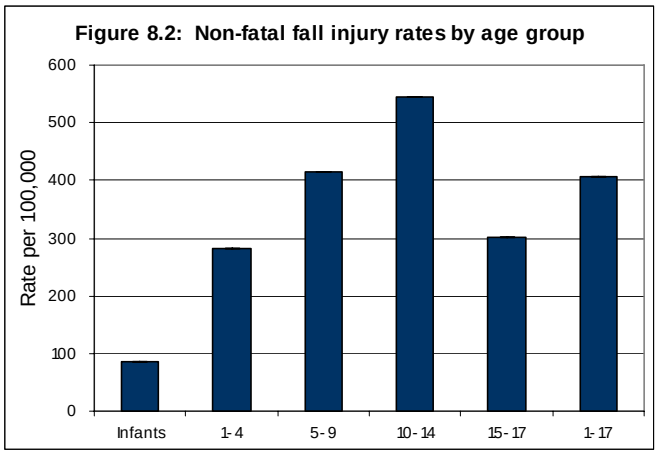


Figure 8.3 shows the distribution of falls by age and sex. Male fall rates are greater than females in every category except infancy. Overall males 1-17 are injured by falls more than twice as often as females (546/100,000 compared to 264/100,000 for females).

The highest rate is in males aged 10 to 14, who are injured by falls at a rate of 828 per 100,000. This is almost 1 per cent of males in this age group.

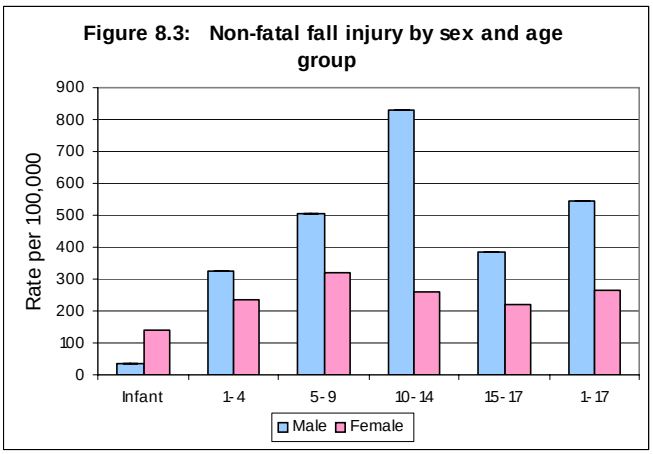


Figure 8.4 shows the distribution in urban and rural areas. Urban dwellers are injured at a greater rate than rural dwellers in every age group.

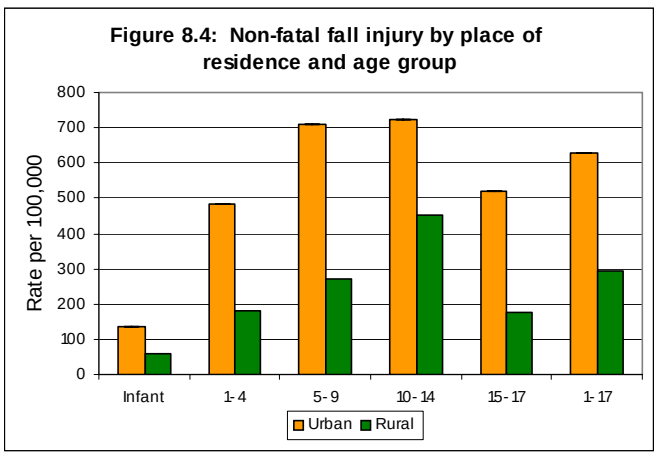
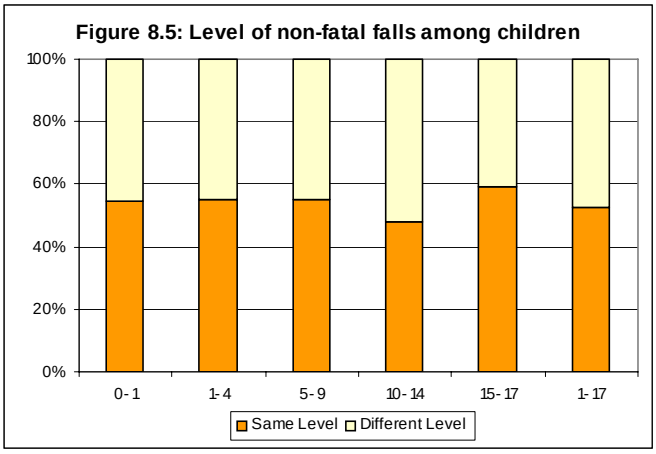
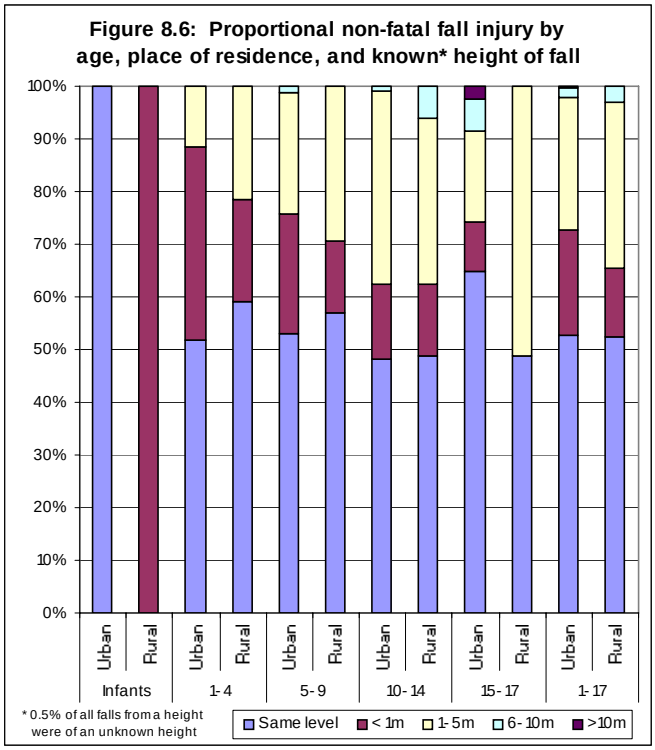


Figure 8.5 shows falls by age group and whether the fall was from the same height, or different height. Across all age groups falls were about equally split between same level and different level falls.



Same level falls are when the surface from which a child falls is at the same height as the surface on which s/he lands. For example, this could be when a child is trips over, or during sport. Different level falls are when a child falls from a height. Figure 8.6 below shows the difference in heights from which children fell more specifically and compares



Most non-fatal falls for children occur inside the home as seen in Figure 8.7, which follows. Almost all (90%) of non-fatal falls in toddlers age 1 to 4 are inside the home. The proportion of falls outside the home increases with increasing age, as children spend more of their daily lives outdoors.

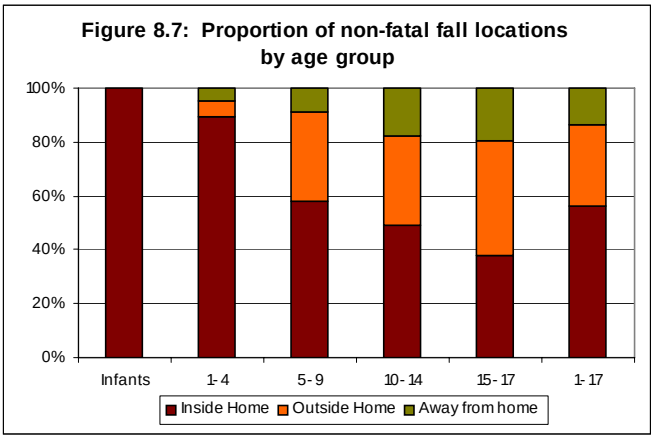


Figure 8.8 shows that the level of severity was similar regardless of where the fall took place.

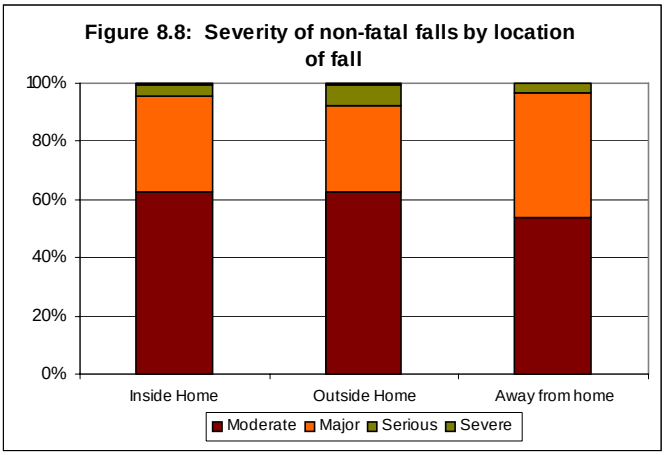


Figure 8.9 which follows, looks at the severity of child injury resulting from falls of different levels. Falls from 1-5 meters in height are the most common. Severe injury (permanent disability) occurs equally from falls at heights of 1-5 meters and for falls less than 1 meter. For serious fall injuries (hospitalization of 10 days or more), 14 per cent are from falls of 6-10 m and 83 per cent are from falls 1-5 meters in height. Less than 1 per cent of these are falls from a height of over 10 meters.

Fall Injury Life Story

- A four-year-old boy was playing in a garden near his home when he slipped. He severely injured his face and arms in the fall and had to spend the next month in a private hospital in Bangkok.

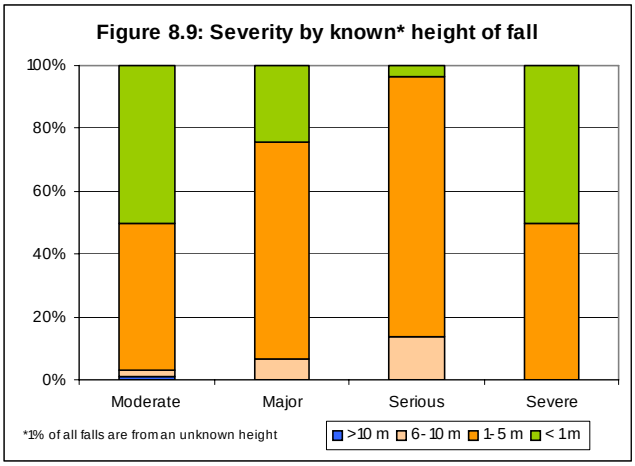
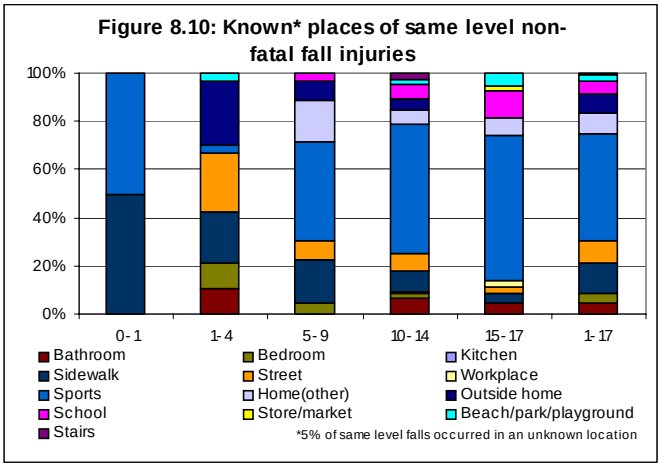
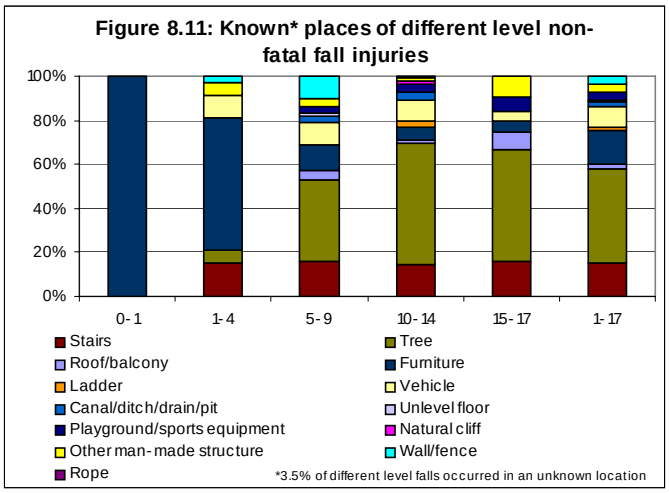
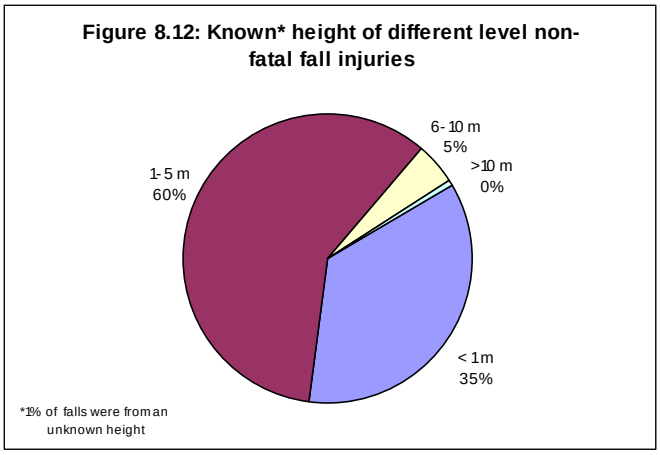


Figure 8.10 shows the locations where falls from the same level occurred. For school aged children, much of fall injury is associated with sporting activities. In children 5-9 years old, 41 per cent of the same level non-fatal falls occur during sports. These figures increase to 54 per cent for 10-14 year olds and 60 per cent in 15-17 year olds. For toddler aged children 1-4 years, about half were inside the home and half were outside. For these toddlers, one quarter of falls from the same level occurred on the street and another 27 per cent were in either the garden or yard of the house.







Consequences of fall injuries

The majority (63%) of injuries from falls were of moderate severity (Figure 8.13). But more than one third (37%) of all children 1-17 that had falls required hospitalization and almost 5 per cent required hospitalization of 10 days or more. Almost 1 per cent (0.6%) of falls were severe and resulted in permanent disability to the child, often from spinal cord injury. The largest proportion of the more severe fall injuries occurred in the same age group that also has the greatest frequency of falls – the 10 to 14 year olds, in which 44 per cent of falls resulted in a hospital stay.

With the increasing height of the falls, the frequency of more severe injuries also increases, as seen in Figure 8.14. Falls from the same level result in an injury that requires hospitalization or causes permanent disability in almost a quarter (24%) of the time, while falls from 6 to 10 meters in height result in hospitalization or permanent disability 78 per cent of the time. The exception to this generalization is in the falls from a height 10 meters or greater, of which there was only one occurrence and it resulted in a moderate injury.

Figure 8.13 Proportion of severity by age group in non-fatal fall injury

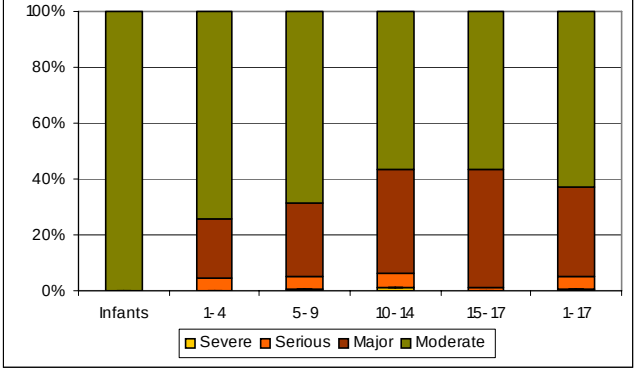
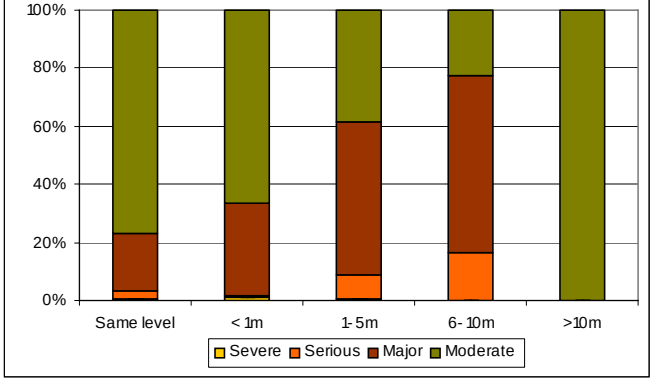


Figure 8.14: Proportion of non-fatal fall injury by height of fall and severity in children age 1 to 17



Prevention issues for falls

In Thailand, like in all middle income and low income countries, homes are hazardous places for children, and this is especially true for falls. Even infants had relatively high rates of falls. Infants are especially vulnerable to brain trauma, given their soft, incomplete skulls. Many serious fall injuries occurred when infants fell from the bed while the parent was sleeping, or while they were 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, stairs usually have non-standard heights and depths of treads, electrical extensions cords often snake across the floor and so on. The floors in urban areas are often bare tiles or concrete and in rural areas they are often hard packed earth, both of which are uncompromising landing surfaces.

The immediate area outside the home 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".

In developed countries, children engaged in play usually have playground equipment that has been tested for child safety and has been installed over impact absorbing ground covers. Children engaged in sports almost always have specially trained adult coaches and wear specially designed and certified protective equipment (helmets, padding, special gloves and shoes). Wherever they play - on a competitive field, in a school yard or at a designated playground in the community - they have coaches or peers who possess basic first aid and access to emergency medical services. Even when engaged in informal play on a daily basis, children in the developed world have been trained in basic first aid in primary school and understand the measures to prevent further injury or disability where the falls have resulted in broken bones or potential spinal cord injury. The fall injury incidence rates and severity levels are much lower as a result.

This is not the case in Thailand. Children who suffered serious injury from falls, whether at home or outside the house are almost always unsupervised by the caretaker, they are either alone or accompanied by a peer. The child and the peer almost never have knowledge of how to respond to a fall injury when it occurred; they do not know about splinting a broken bone or immobilizing a cervical neck injury.

Given these facts, it is clear there is a need for a Safe Home, Safe Schools and Safe Community program to help decrease fall injuries, which are a leading cause of lost school days, seeking medical care, and hospitalizations. (For more information on Safe Home, Safe Schools and Safe Community programs see page 105.)

Chapter 9

Cut Injury

- Injuries from sharp objects or cuts, are the fourth leading cause of child injury
- Fatal injuries from sharp objects are rare but such injuries frequently cause children to seek medical care for punctures or cuts and often result in hospitalization
- There are almost 200 children permanently disabled every year due to injuries sustained from sharp objects.

Cut Injury

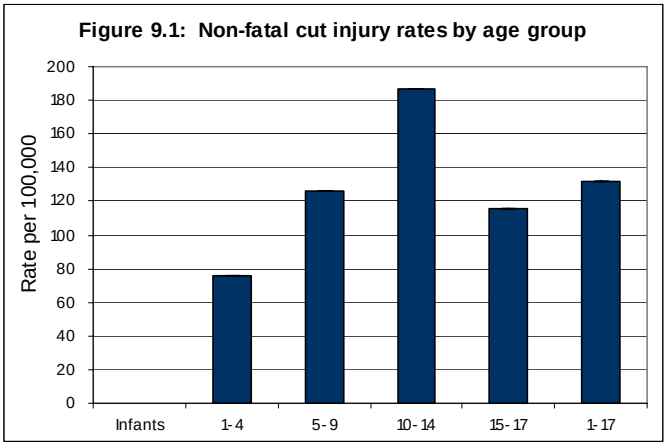
Fatal injury from sharp objects

No deaths from sharp objects were reported, so this section focuses exclusively on morbidity caused by sharp objects.

Non-fatal sharp object injury

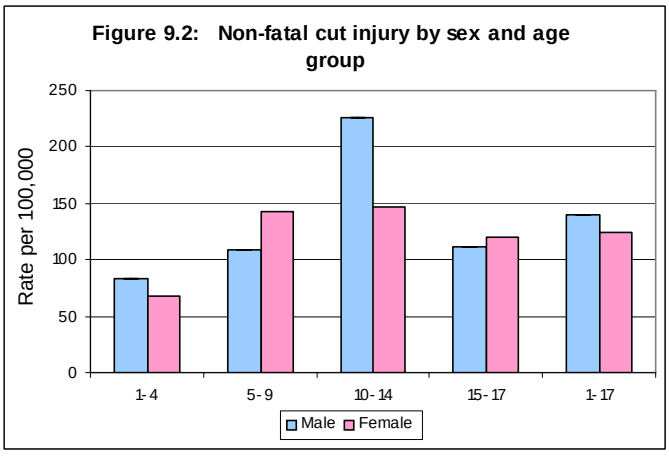
Injuries by cuts from sharp objects occurred at every age except infancy (Figure 9.1). The highest morbidity rate occurs in 10 to 14 year olds, (187/100,000). The rate among all children 1 to 17 years old was 132 per 100,000.

Figure 9.1: Non-fatal cut injury rates by age group



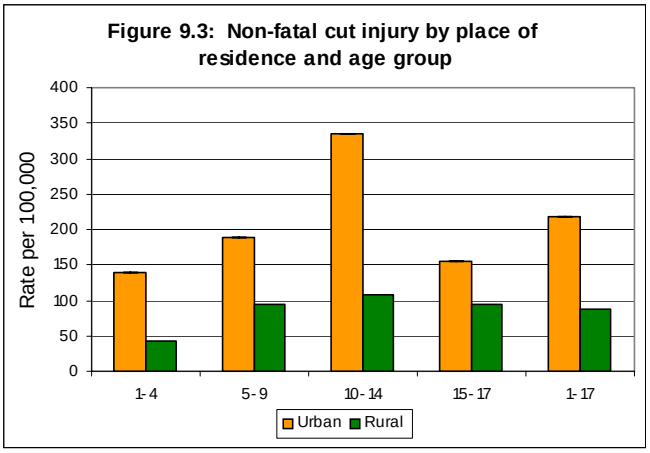
Overall, males are more likely to be injured by a sharp object than females (Figure 9.2). The 10 to 14 age group shows a much higher rate of cut injury in males than females.

Figure 9.2: Non-fatal cut injury by sex and age group



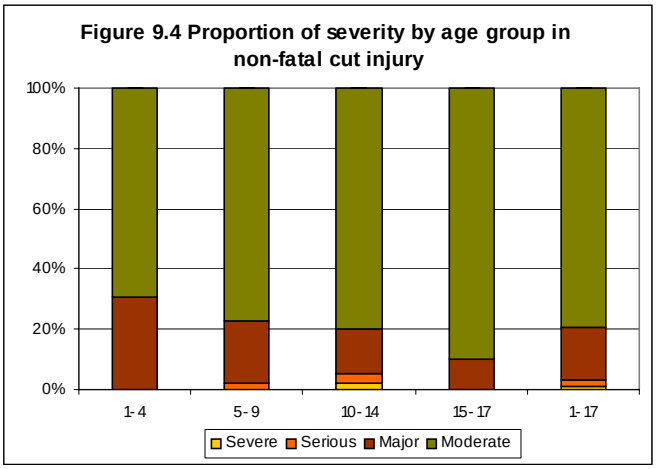
Urban dwellers are far more likely to be injured by sharp objects than rural dwellers (Figure 9.3). The urban rate for all children aged 1-17 is more than double that of the rural rate (218/100,000 in urban areas and 88/100,000 in rural areas).

Figure 9.3: Non-fatal cut injury by place of residence and age group



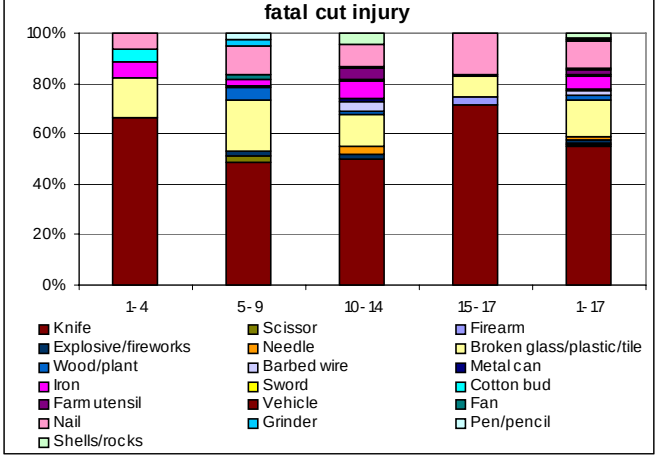
Most cut injuries were of moderate severity (Figure 9.4), but one out of five (21%) resulted in hospitalization. Cut injuries in toddlers were most likely to result in a trip to a care provider, while the 15 to 17 year olds were least likely. About 1 per cent (0.95%) of all sharp object injuries resulted in permanent disability, and these were entirely in the 10 to 14 year old age group.

Figure 9.4 Proportion of severity by age group in non-fatal cut injury



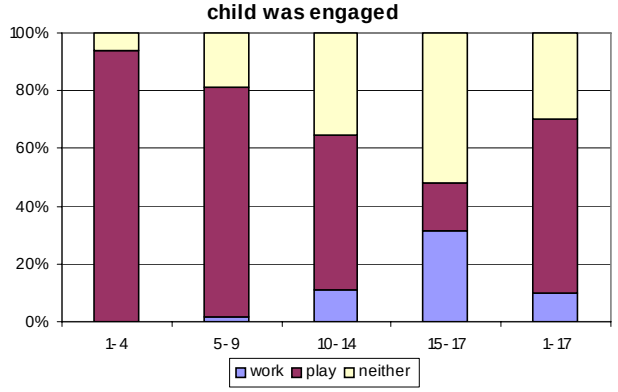
The most common instrument causing non-fatal cut injuries was a knife; which accounted for more than half (55%) of cut injuries among all age groups (Figure 9.5). In the 1 to 4 year olds, knives caused two-thirds of cut injury. The second leading source of cut injuries was broken glass, plastic or tile, accounting for 14 per cent of injuries, and the third most common cause of injury from sharp objects was nails, which accounted for about one out of 10 (10.4%) of these injuries.

Figure 9.5: Categories of instruments causing non-fatal cut injury



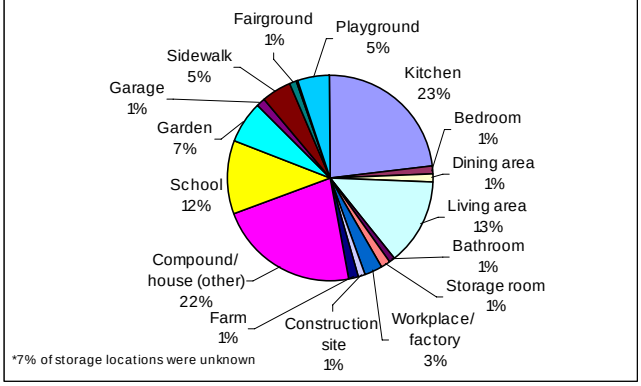
Nearly 60 per cent of cut injuries resulted from children playing with the sharp object. This proportion was very high for toddlers, and decreased as children got older. For children 10 years and over, cuts were increasingly associated with work (Figure 9.6).

Figure 9.6: Activity with object in which injured child was engaged



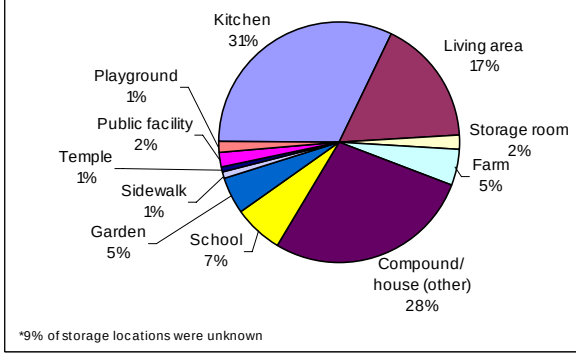
Figures 9.7 and 9.8 describes the storage location for where the sharp objects are kept for urban and rural children. There are more storage locations for sharp objects for urban children than there are for rural children. In both urban and rural environments the primary storage location is the kitchen. The second most common storage location is a catch-all "house – other" category.

Figure 9.7: Known* storage location of sharp object, urban children 1-17



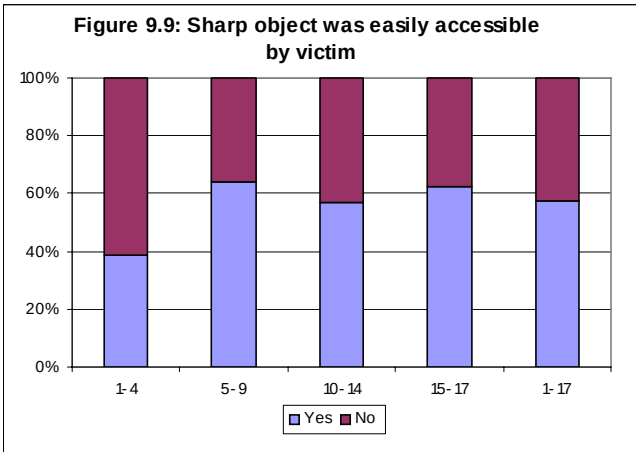
Also worth noting is that the third leading storage location in urban areas is reported to be somewhere on school grounds, indicating that the child was injured by the sharp object while at school.

Figure 9.8: Known* storage location of sharp object, rural children 1-17



As shown in Figure 9.9, in all of the older age groups more than half the time the sharp object causing injury was stored in a location easily accessible to the child, as reported by the caretaker of the child. The only exception to this rule was in toddlers, where the object was easily accessible 38 per cent of the time.

Figure 9.9: Sharp object was easily accessible by victim



Cut Injury Life Story

- A 4–year-old girl was playing in a shelter while her father worked nearby in a rice field in Central Thailand. The unsupervised girl found a knife in the shelter and began playing with it. She was chopping a stick when she badly cut her hand. She was treated at hospital but could not use her hand for more than a month.

Chapter 10

Falling Objects

- Children injured by falling objects are frequently playing in construction areas that do not have access barriers or are injured while playing sports
- Falling objects rarely cause death but it is the seventh cause of non-fatal injury
- About 15 children are injured by falling objects each day

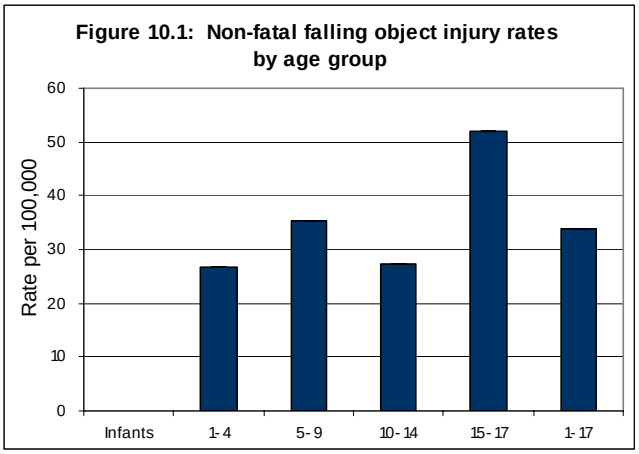
Falling Objects

Fatal falling object injuries

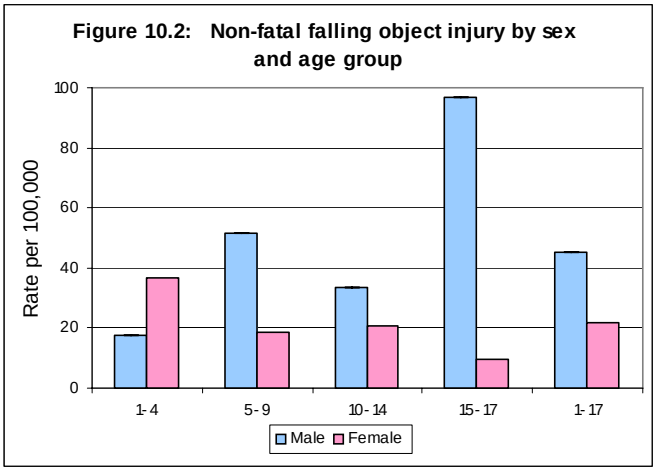
No deaths from falling objects were reported, so this section describes morbidity only.

Non-fatal falling object injuries

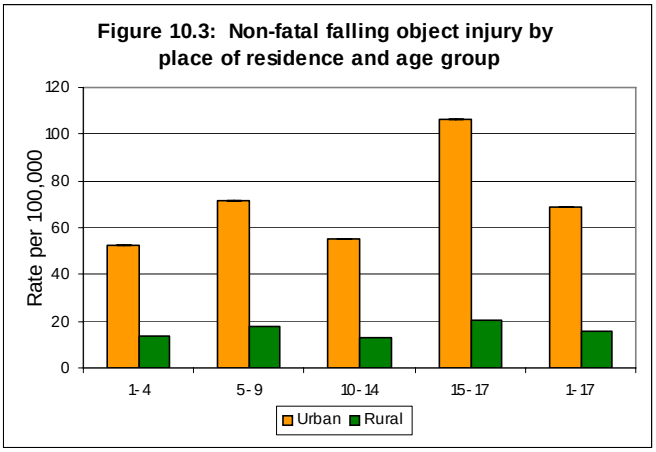
The rate of non-fatal injury by falling objects for all children was 34 per 100,000 (Figure 10.1). The 15 to 17 year olds had the highest rate, at 52 per 100,000. Injury from falling objects was very common, and every age group except infants experienced significant injury from them.



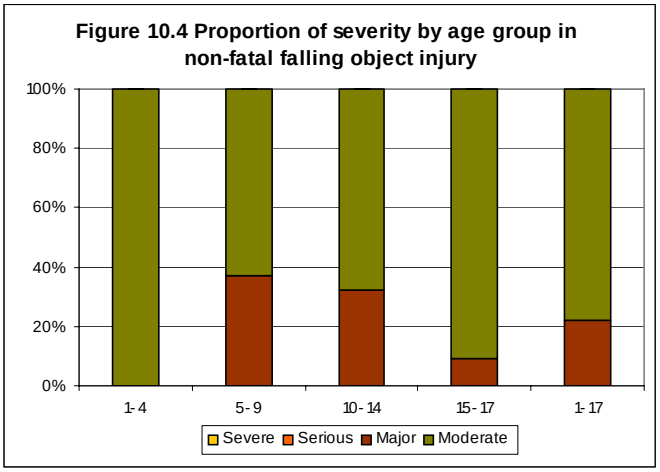
Males experienced greater rates of injury from falling objects than females across every age group except for the 1 to 4 ages (Figure 10.2). The difference between the sexes was especially pronounced in the 15 to 17 year old group, presumably as this is when males begin to find work in construction areas. Males aged between 15 to 17 are 10 times as likely to be injured by falling objects as females of the same age.



Injury from falling objects occurs predominantly in urban areas where construction is more common (Figure 10.3). In urban areas, the danger from falling objects is relatively high. The highest rate for injuries from falling objects is for urban males aged 15 to 17 at 106 per 100,000.

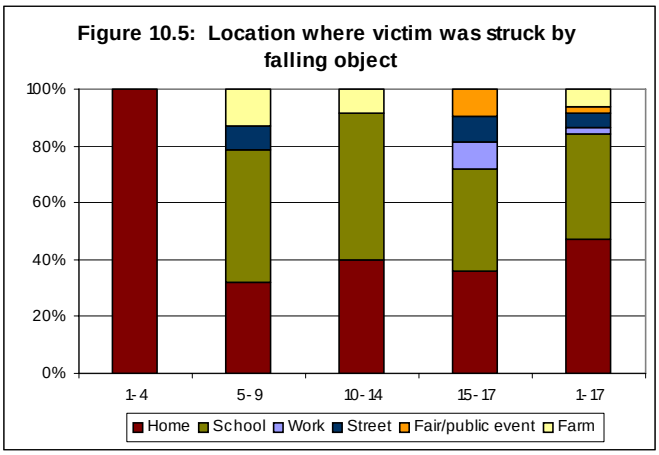


All recorded falling object injuries were either moderate or major in severity (Figure 10.4). Most were moderate but almost a quarter (22%) required hospitalization.

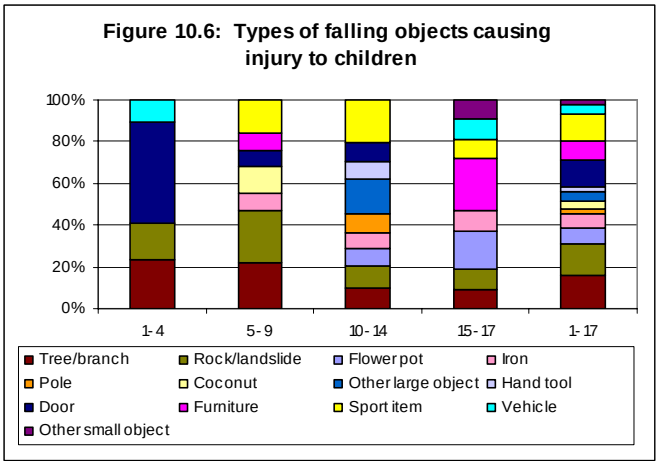


Children aged 1 to 4 were invariably in the home when they were injured by falling objects (Figure 10.5). A significant amount of injury due to falling objects in school-aged children (5-17 years old) occurred at their school or other place of education.

In 5-9 year olds, this percentage was 47 per cent; 10-14 year olds, 52 per cent; and 15-17 year olds, 36 per cent. The corresponding percentages of falling object injury occurring in the home are 32 per cent, 33 per cent and 26 per cent, respectively.



Falling trees and branches cause 16 per cent of falling object injuries in children (Figure 10.6); falling rocks caused an additional 16 per cent. The third leading source of falling object injuries are doors (13%) and the fourth are sporting objects, such as balls and sticks (also accounting for 13%).



Falling branches, trees and rocks together account for 41 per cent of these injuries in toddlers and almost half (47%) in 5 to 9 year olds.

All the injuries caused by falling objects in schools are from rocks, trees, branches and iron bars.

As a proportion of all falling object injuries, Figure 10.7 shows that males obtain the majority of their injuries from falling rocks, sporting items and trees and branches, while females are largely injured from accidents with doors.

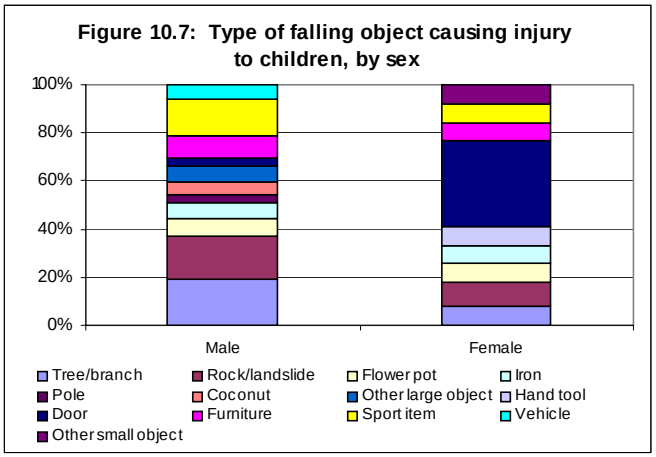
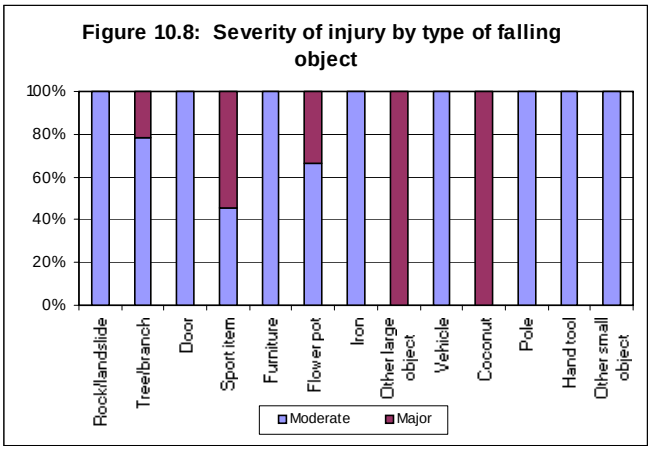


Figure 10.8 shows the severity of the injury by the type of falling object. Most objects caused moderate injuries, but major injuries, with a hospital stay of less than 10 days, resulted from about one quarter of falling trees or branches, a third of flower pots, more than half of sporting items, all coconuts and "other large objects". Falling rocks, vehicles and furniture only resulted in moderate injuries.



Chapter 11

Poisonings

- Fatal child poisoning is rare and no poisoning deaths were found in the survey
- Non-fatal child poisoning is a common, with more than 1,200 children poisoned each year, about 3 every day
- Child-proof containers for toxic substances and drugs are almost unknown in Thailand, as is the presence of consumer information about emergency treatment on the packaging of toxic substances

Poisonings

Fatal poison injury

The survey lacked the power to measure rare fatal events, and no deaths from poisoning were found. This section focuses exclusively on morbidity.

Non-fatal poison injury

The non-fatal poisoning rate for all children 1 to 17 is 8.3 per 100,000 children (Figure 11.1). The age group with the highest rate is 15 to 17 years (21.2/100,000). No infant poisonings were seen..

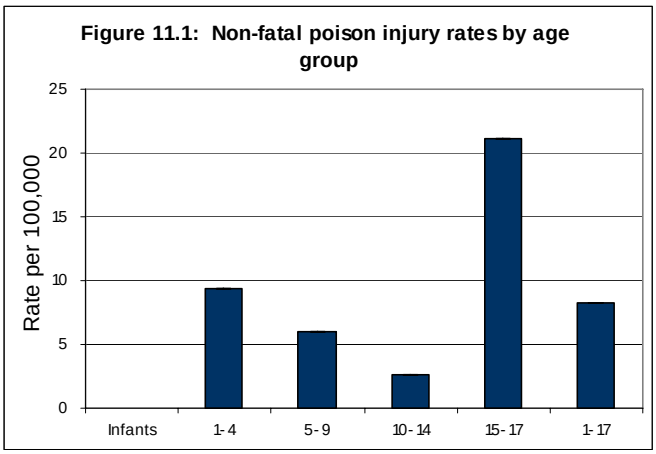
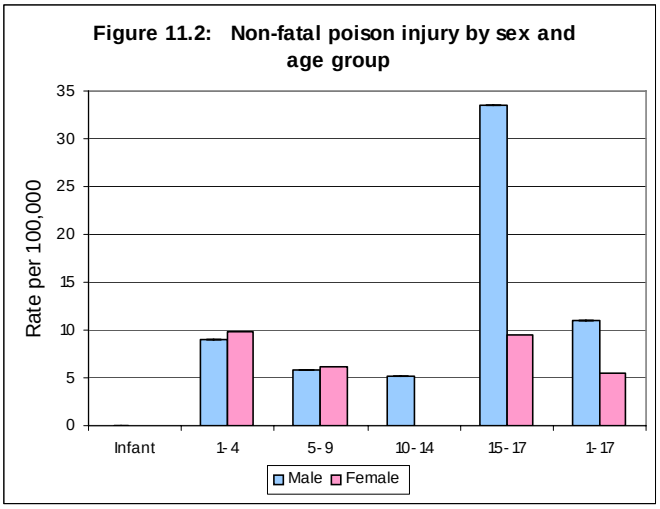


Figure 11.2 shows that for all children, most poisonings occur in males. While young children aged 1 to 9 are poisoned with little sex difference, males aged 10 to 17 are poisoned far more frequently than females of the same ages. The peak rate is found among adolescent males aged 15 to 17 at 33.5 per 100,000.



Poisoning is primarily an urban problem. There was no rural poisoning measured except in 15 to 17 year olds. The rate of poisoning for urban males of age 15 to 17 is 57 per 100,000. All poison morbidities measured were moderate in severity.

Figure 11.5 shows the substances causing poisoning by age. Soaps and detergents are the principal cause of poisoning. These substances cause half of the poisoning in 1-4 year olds and all the poisoning in 5-14 year olds. In older children aged 15-17, pesticides and kerosene caused 31 per cent and 23 per cent of poisoning respectively, with cosmetic and hair products making up 23 per cent of poisoning in this age group.

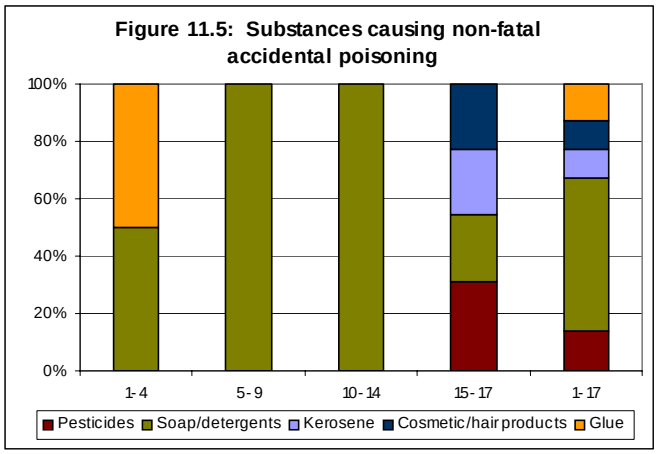
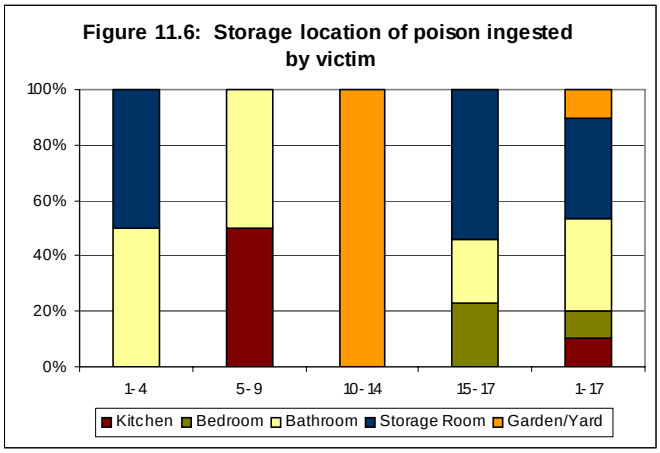


Figure 11.6 shows the places that poison is stored. Poisons are most commonly kept in the bathroom and storage rooms. Some poisons were found by the victim in the garden or the yard of the house.



The caretaker or head of household was asked whether in their opinion, the poison involved was readily accessible to the child. Figure 11.7 shows that in all age groups, every child injured by poisonous substances had easy access to that poison.

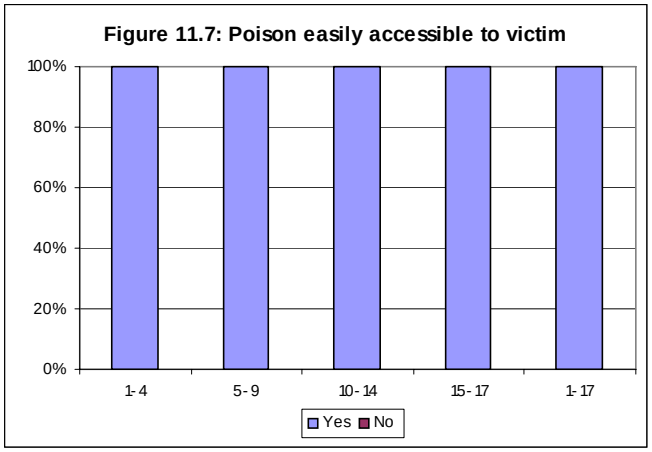


Figure 11.8 shows the packaging of the poison recorded. For children 1-9, half of the poisons were in the original container. For the 10-14 year olds, the poisons were always in their container. This figure drops slightly for older adolescents, with the poison being in its original container three-quarters of the time (77%).

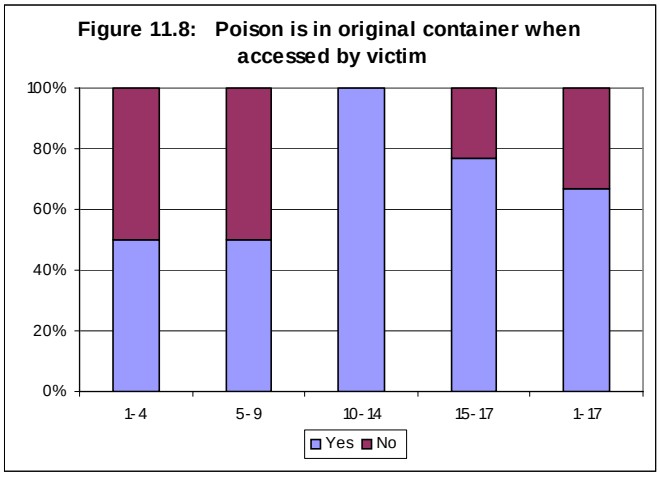


Figure 11.9 that follows shows that most poisonings in children 1 to 17 result from taking a liquid that is stored in a bottle or can.

In toddlers, half of the poisonings are from chemicals packaged in a strip, most often pharmaceuticals.

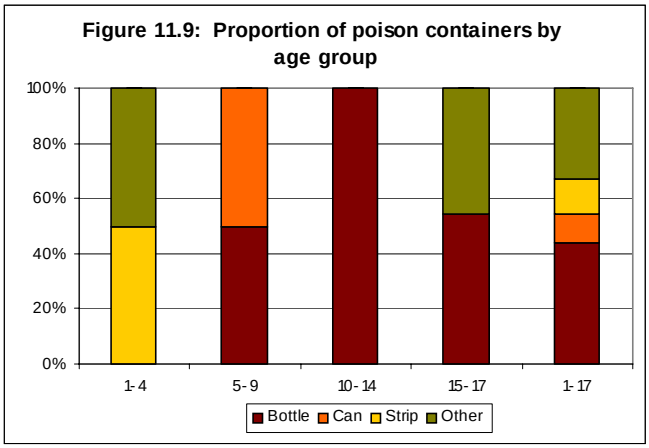


Figure 11.10 shows that the substance poisoning toddlers (1-4) was a pill or tablet (drug). In older age groups, liquids and powders were the most common.

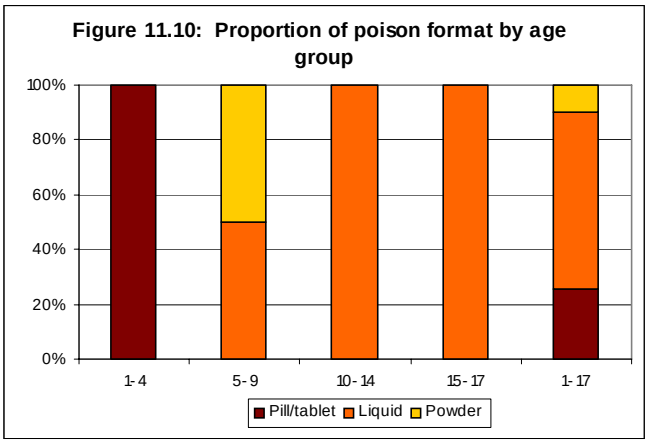
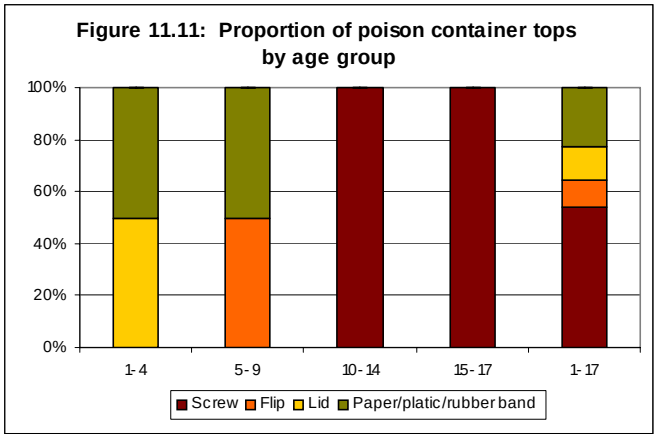


Figure 11.11 shows that most poison containers containing liquids were closed with screw tops. In toddlers, half of the tops for the non-strip packages were simple lids while the other half were paper/plastic/rubber bands that were securing the package (usually a plastic bag) that contained the pills.



Child poisoning issues

While child poisoning is not a frequent event, it is an area that has been shown to be readily preventable at relatively low cost. Most commercial substances involved in poisoning are manufactured and bottled or packaged within Thailand. Thus, there is an opportunity for prevention of child poisonings by adopting the same strategies that have been so effective in developed countries. These strategies minimize risk by ensuring that all toxic commercial substances such as cleaners or other household chemicals are packaged in child resistant containers. Containers should also show post-sale consumer information that provides information on first aid or treatment if the substance is ingested by a child. Warning symbols such as a skull and cross-bones are used to mark containers and the manufacturer is often required to maintain a telephone hotline that dispenses advice on how to render care if ingested. Poison control centers maintain detailed information on the ingredients in the materials so that initial therapy is correct.

Safe Home and Safe School programs provide opportunities to teach parents and children the dangers inherent in household and agricultural chemicals. They can advocate about the importance of keeping poisons locked away and in their original containers so identification and treatment can be facilitated.

Having a lockable box within every home and keeping poisons stored within this is easily achievable at Thailand's current stage of development. So is the mandated use of child resistant containers and packaging of toxic substances, and requiring that all drugs be dispensed in child-resistant pill bottles. Currently many pharmaceuticals are dispensed in blister packs or in plastic bags that are dangerous to young pre-school children because they are easily accessible and they look like candy.

Chapter 12

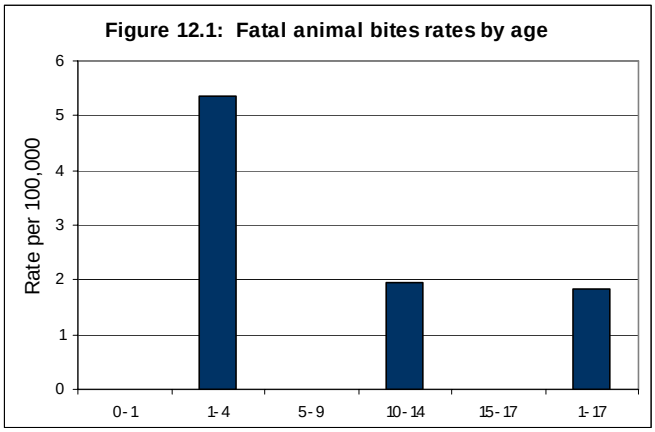
Animal Injury

- Animals are a significant cause of child mortality
- Some 280 children die from animal bites each year
- The majority of these bites are inflicted by rabid dogs
- Animals are the fourth leading cause of non-fatal child injury accounting for almost 35,000 injured children annually, or about 95 per day

Animal Injury

Fatal animal injury

Deaths from animal injury occurred in the 1 to 4 and 10 to 14 year old age groups (Figure 12.1). However, these rates must be interpreted with caution because there were only three fatalities in the survey.

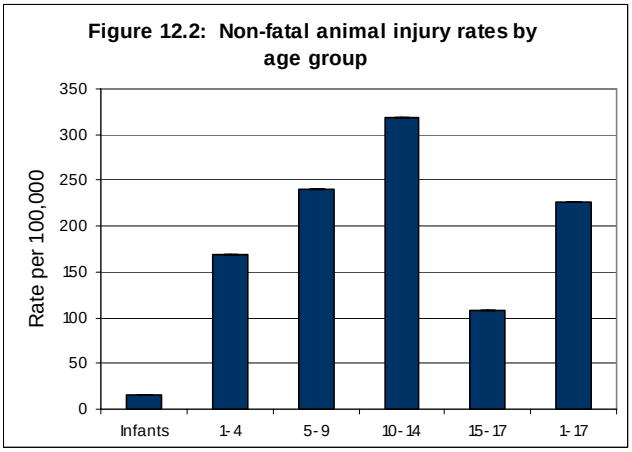


All fatal animal injuries occurred in rural areas. Stray dogs were the cause for those deaths (in which the animal type was able to be determined) and all resulted from rabies. All deaths were from unprovoked bites (there was no prior contact with the animal beforehand) from the rabid dog.

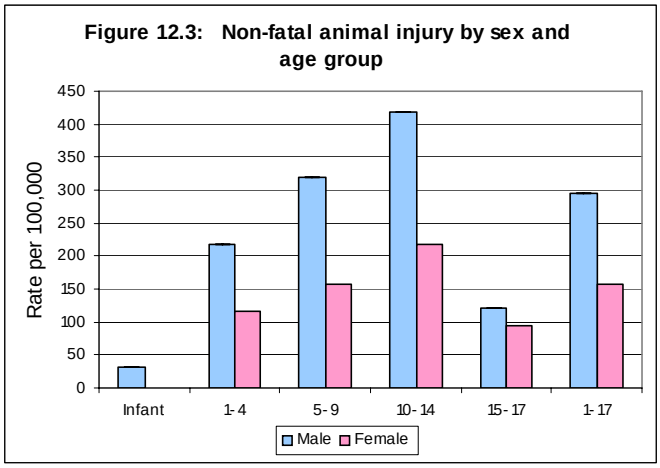
Non-fatal animal injury

Animal injury is one the three leading causes of injury morbidity in Thailand. As can be seen in Figure 12.2, every age group, including infants, experiences some level of morbidity from animal attacks.

Overall, 226 per 100,000 children from 1 to 17 years old suffered a non-fatal injury from animals. Each age category except infants had a rate greater than 100 per 100,000, with the 10-14 year olds having the greatest rate, (318/100,000).



There is a strong and consistent patterns of males suffering more injury from animals compared to females in all age categories (Figure 12.3). Overall, males are nearly twice as likely to have an injury from an animal than females (1.9:1).

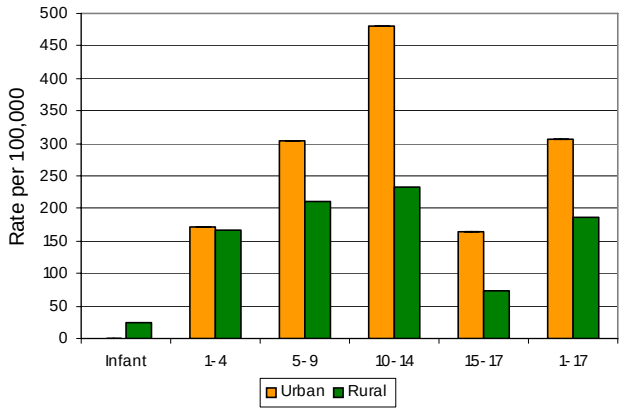


Most animal injuries occur in urban areas (Figure 12.4, follows). This is not surprising given the preponderance of stray dogs and cats that live in urban areas in Thailand, in very close proximity to children.

However, while the non-fatal animal injury rate was higher in urban areas, all the fatal injuries occurred in rural areas. The reasons for this are unclear but factors could include: less access to the

rabies' immunoglobulin in rural areas; different rabies immunization rates in animals by location or differences in animal control services (for example the presence of metropolitan animal control officers). However, no data was collected on these issues in the survey.

Figure 12.4: Non-fatal animal injury by place of residence and age group



Most animal injuries were moderate in severity, although a relatively large number (16%) were severe enough to require at least one day of hospitalization. One per cent of injuries in the 10 to 14 year old age group resulted in permanent disability (Figures 12.5 and 12.6).

Serious injuries were only found in urban areas, and severe injuries were only in rural areas.

Figure 12.5: Proportion of injury by severity and age group in urban non-fatal animal attacks

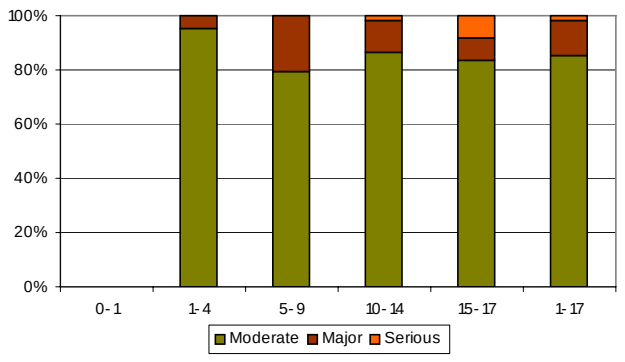
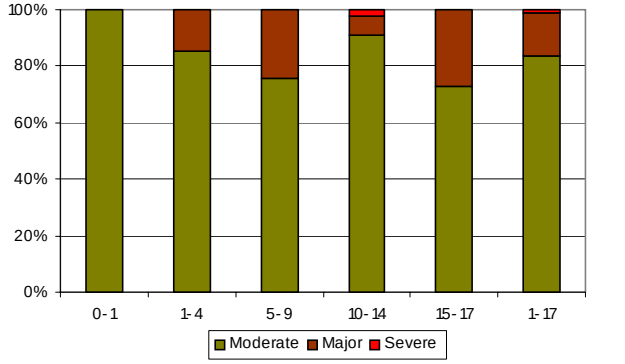


Figure 12.6: Proportion of injury by severity and age group in rural non-fatal animal attacks



Stray dogs were the sole cause of non-fatal injury in infants, and those only occurred in rural areas (Figures 12.7 and 12.8).

In older children (1 to 17), pet dogs were a major source of child injury caused by animals (48% in urban children, 51% in rural ones) as were stray dogs (19% of injury in urban children and 20% in rural children 1 to 17). Stray cats caused approximately 14 per cent of animal injuries in rural 1-4 year olds and 3 per cent in urban 5-9 year olds. Insects caused about 15 per cent of animal injuries in both rural and urban areas, but snake bites are more common in urban areas (4.5%) than rural ones (0.6%).

Figure 12.7: Animals causing non-fatal injury in urban areas

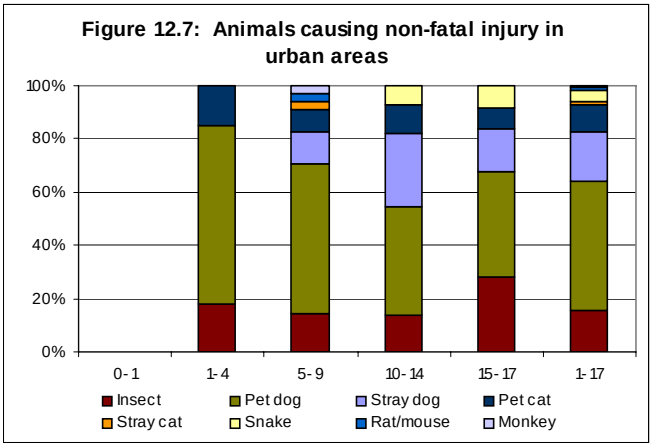
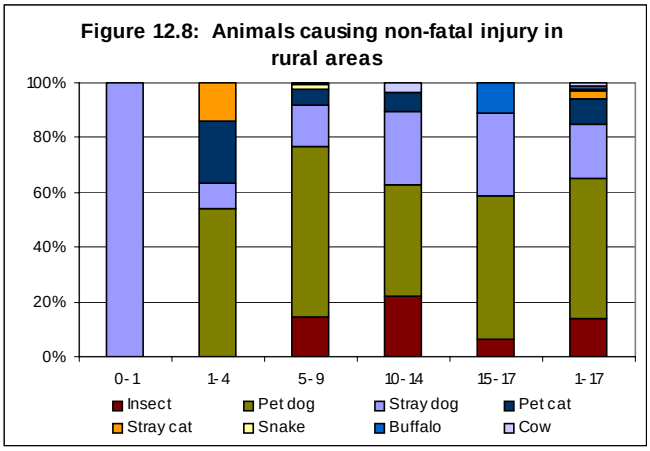


Figure 12.8: Animals causing non-fatal injury in rural areas



In rural infants (Figure 12.9), non-fatal animal injuries were a result of unprovoked interactions between the child and the animal. In the older urban age groups, injury results predominantly from play (49%) and unprovoked attacks (45%) (Figure 12.10). Overall rural children suffered animal injuries for the same reasons - play (58%) and unprovoked attacks (28%).

Figure 12.9: Reasons for non-fatal animal injury in rural areas

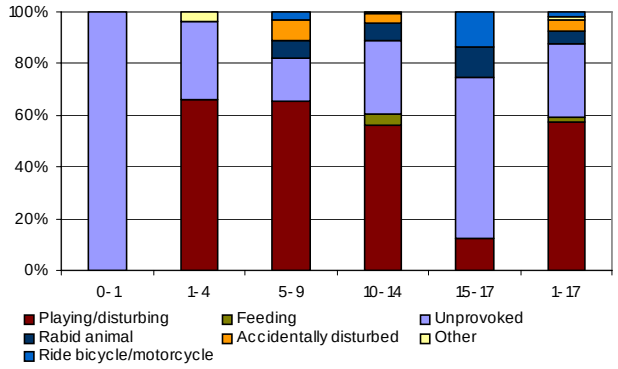
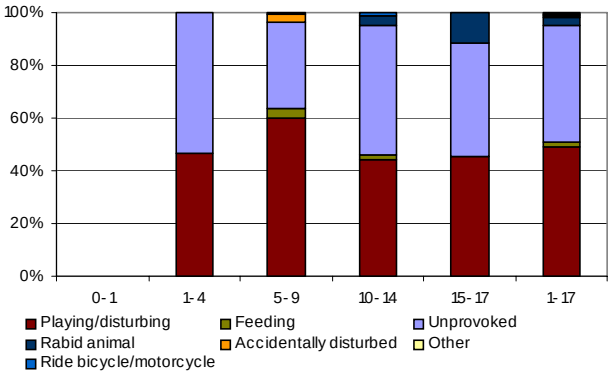


Figure 12.10: Reasons for non-fatal animal injury in urban areas



The majority of injury by animal attack in both urban (95%) and rural (86%) areas was from biting (Figures 12.11 and 12.12).

Figure 12.11: Type of non-fatal animal injury in urban areas

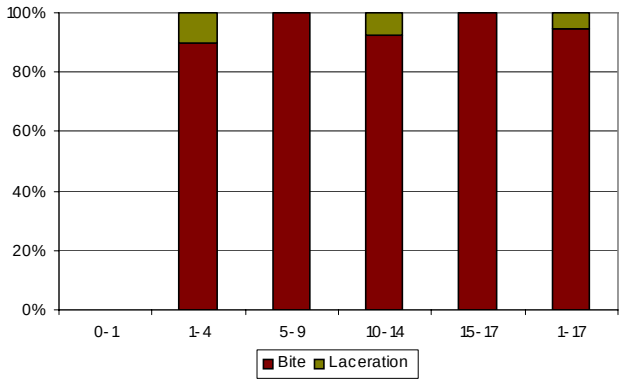
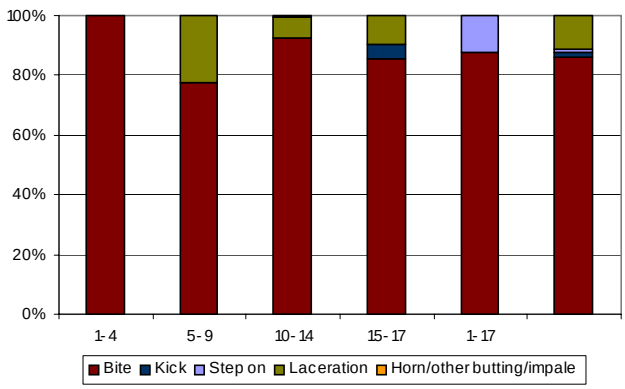


Figure 12.12: Type of non-fatal animal injury in rural areas



Among those children injured by the bite or sting of an insect, bees and wasps are the most likely insects (Figures 12.13 and 12.14). Scorpions are also common insects causing injury in both urban and rural areas.

Figure 12.13: Insect type causing non-fatal injury in urban areas

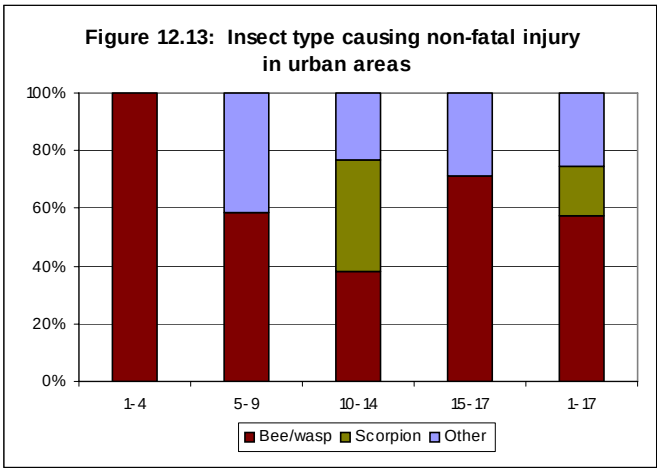
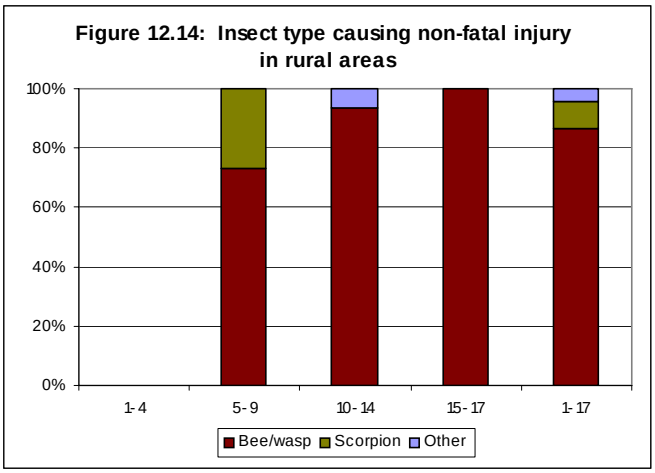


Figure 12.14: Insect type causing non-fatal injury in rural areas



Issues for child safety

Animal injury was the third leading cause of child injury mortality, mainly as a result of rabies from dog bites, and the fourth leading cause of child injury morbidity. Dog bites were one of the most common reasons that children sought medical care.

The pain and suffering caused by dog bites is significant, as are the economic costs with one in six bites leading to hospitalization Rabies is endemic to Thailand and the numbers of rabid animals, especially dogs, make it a leading public health problem. While the survey was powered to find only the common fatal injuries, three deaths were found, which statistically is a significant number in this sample. The only effective means of preventing rabies after a bite from an unvaccinated dog is to give the child post exposure vaccination and this is expensive and often unavailable in rural areas. Given the rabid bite rates in the survey, there is a clear need to develop a national policy on mandatory canine rabies vaccination.

Chapter 13

Electric shocks

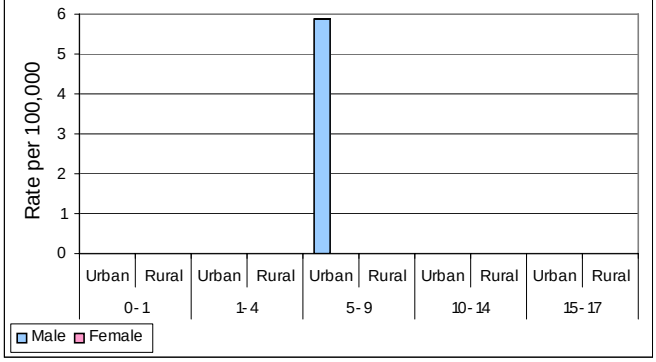
- About 40 Thai children are fatally electrocuted each year
- More than 1,530 children are injured from electrical shock every year, this is more than four a day

Electric shock injury

Fatal electrocutions

There was only one fatal electrocution of a child. It occurred in a 7 year old male in Bangkok, who was electrocuted in his home (Figure 13.1).

Figure 13.1: Fatal electrocution rates by age, sex, and place of residence

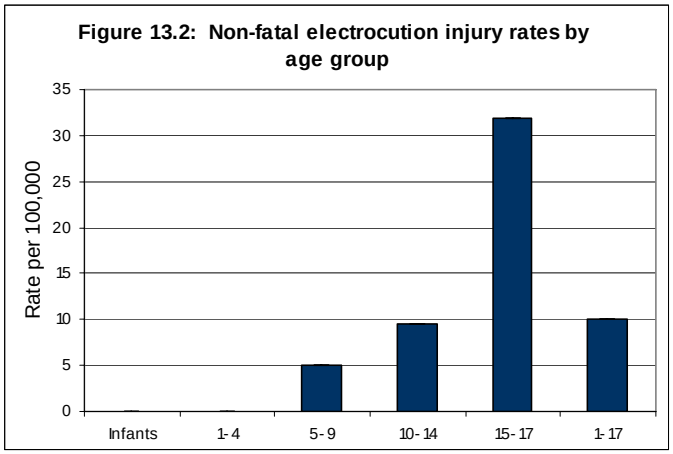


With only one reported case it is impossible to draw any meaningful comparisons for fatalities, and so the rest of this chapter will looks at non-fatal electrocutions.

Non-fatal electric shock

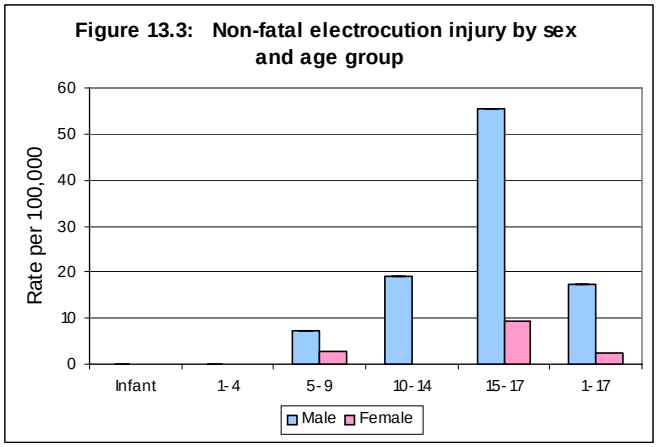
No infants or toddlers suffered injury from electric shock. Thereafter, rates increased with as children got older (Figure 13.2). The 15 to 17 year olds had the highest rate (31.9/100,000). Overall, 10.0 per 100,000 children 1 to 17 were injured from electric shock..

Figure 13.2: Non-fatal electrocution injury rates by age group



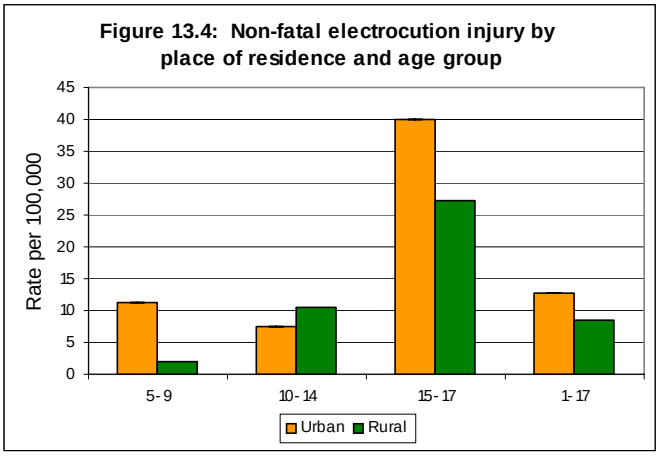
Electric shock injury is predominantly an issue for older male children as seen in Figure 13.3.

Figure 13.3: Non-fatal electrocution injury by sex and age group



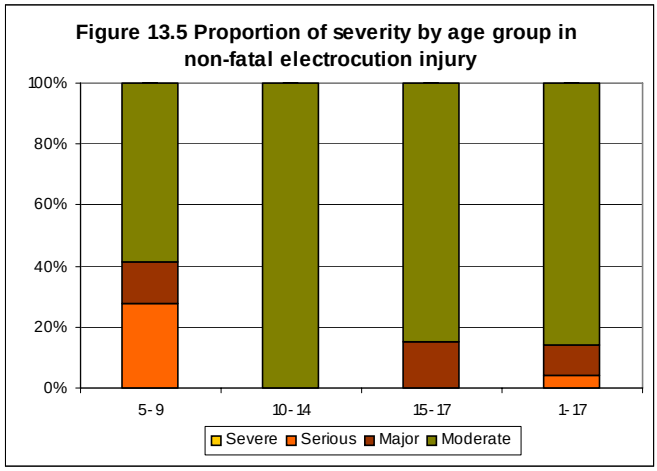
Most electric shock injury occurs in urban areas (Figure 13.4), although more 10 to 14 year olds are injured by electricity in rural areas.

Figure 13.4: Non-fatal electrocution injury by place of residence and age group



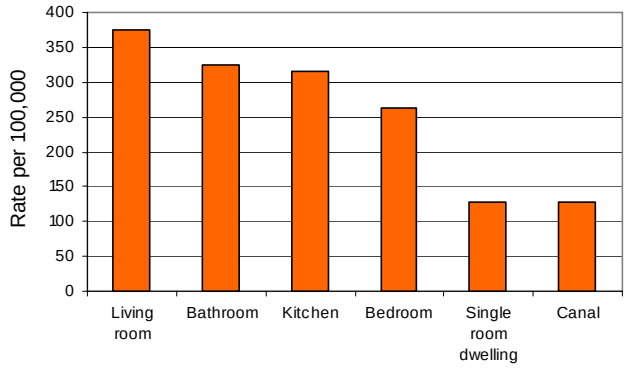
Most electric shock morbidities are considered moderate injuries, but about 40 per cent of the injuries in the 5 to 9 age group required hospitalization (Figure 13.5).

Figure 13.5 Proportion of severity by age group in non-fatal electrocution injury



No injuries by lightning strikes were recorded; all electrocution morbidities were caused by man made electrical sources used mostly inside the home (Figure 13.6).

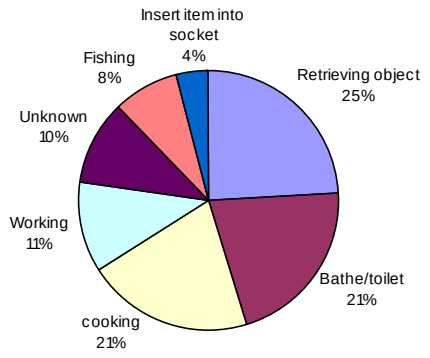
Figure 13.6: Location of non-fatal electocution in children



Most (24%) electrocutions occurred in the living room. The only electrocution that occurred outside the home was in a canal.

Figure 13.7 shows the activity that the child was engaged in when they were injured by electricity. The top three activities that led to being shocked were "retrieving an object", such as a kite, "bathe/toilet" and "cooking".

Figure 13.7: Activity leading to non-fatal electrocution



Electrocution Life Story

- A girl, 9, was severely shocked while plugging an electric fan into a socket in her living room in the south of Thailand. She had to stay in the provincial hospital for 10 days and could not use her hand for one month.

Issues for child safety

With about 40 children electrocuted each year in Thailand electrical shock injury is a significant problem. Non-fatal injury from electrical shocks was common and in many cases resulted in hospitalization and loss of school days.

Homes in Thailand can present many electric shock hazards. In rural areas, ungrounded electrical systems are common and the lack of housing codes that mandate placement of electrical outlets at frequent intervals on all walls in inhabited rooms leads to extensive use of extension cords and power strips/boards. These are often ungrounded themselves and by their nature are on the floor in areas where they may be encountered by young children. Most do not have devices to prevent insertion of fingers or objects, and are especially hazardous to crawling infants and toddlers who are unaware of the hazard. "Child-proofing" homes as part of antenatal care programs is rare and most Thai parents do not know that there are very economical and low technology ways to reduce electrocution hazards in their homes. The use of ground fault interrupter devices in homes in areas of high electrocution hazard, such as bathrooms and kitchens is almost unheard of in Thailand. It is therefore unsurprising that electrical shocks are relatively common.

Electrical outlet caps and other child safety devices are extremely cheap and the experience of developed countries is that introducing ''child-proofing" programs as parts of antenatal care programs for parents-to-be are effective ways to decrease electrical shock injury in infants and pre-school children. After reaching school age, children in Safe School programs learn directly about the hazards of electricity and safety issues for themselves. Thus, a potential first step to programs that build to national scope over time is to begin to integrate the concept of a child-proof home into national antenatal policy. This would directly link the public health and medical communities to interventions at the home and community level and would decrease hazards from electric shocks and electrocutions, as well as many other types of child injury that can be addressed in child-proofing programs.

While adopting housing codes and enforcement of them in rural areas may be beyond the state of current development in Thailand, this is not the case for urban areas.

Chapter 14

Injury from machines

- Child deaths from machines and tools was not found in the survey
- Non-fatal injury from machines and tools from an occupational exposure in late adolescence is an issue

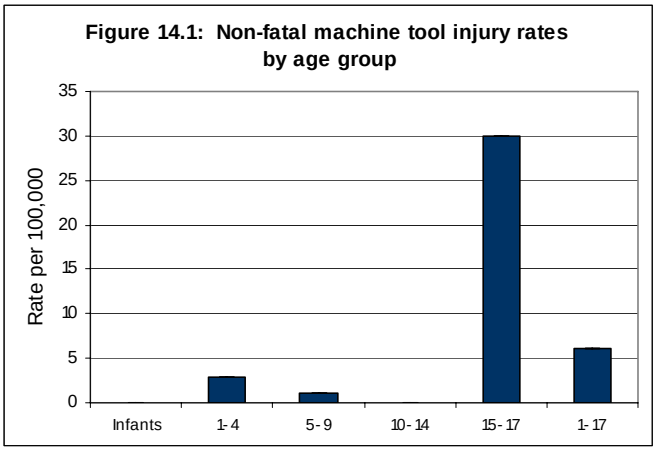
Machine Injury

Fatal machine tool injury

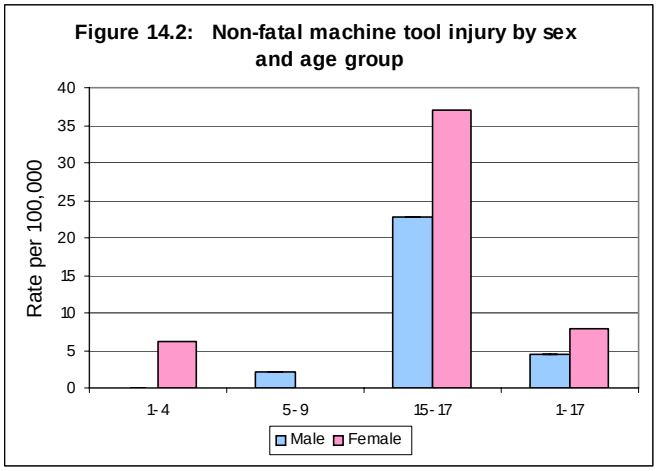
No deaths from machine tool injury were found in the survey, so this section will focus on morbidity.

Non-fatal machine tool injury

Machine injury is a significant problem for older adolescents (Figure 14.1). Relatively low levels of morbidity were measured for children between 1 and 14 years old but this increased markedly in the 15 to 17 year olds, likely as a result of their entrance into the workforce.



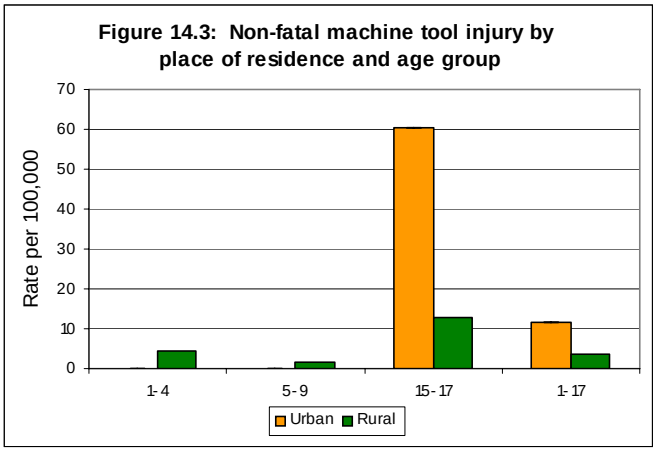
Most machine injuries are suffered by females (Figure 14.2) in urban areas (Figure 14.3). The strong preference for older urban females may indicate that the machines causing these injuries are found in urban factories with large female workforces, such as in garment factories.



The rate of machine injury for 15 to 17 year old urban females is 57 per 100,000.

Figure 14.3 below illustrates that the majority of non-fatal machine tool injuries were sustained by those in the 15-17 age bracket living in urban areas. These are probably work related.

The injuries occurring in the younger age groups are likely due to tools and machinery being unsafely stored. Such household injuries are preventable simply by storing the hazardous items out of the reach of young children.



While no permanent disabilities were found from machine injuries, there are large proportions that required hospitalization (Figure 14.4). Almost half (43%) of all machine injuries in 15 to 17 year olds required hospitalization, and almost a fifth (17%) required a stay of 10 or more days.

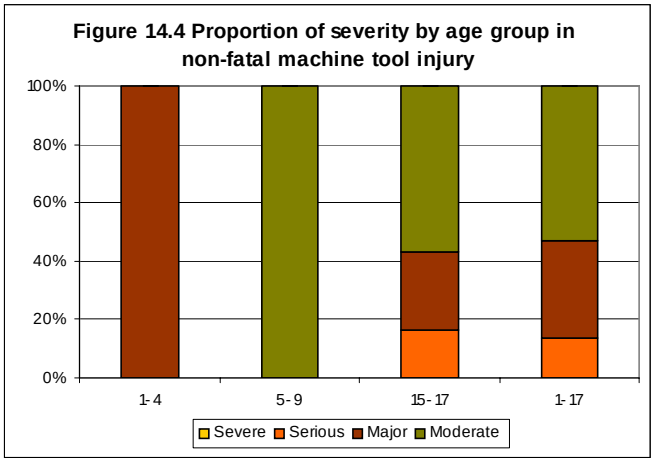
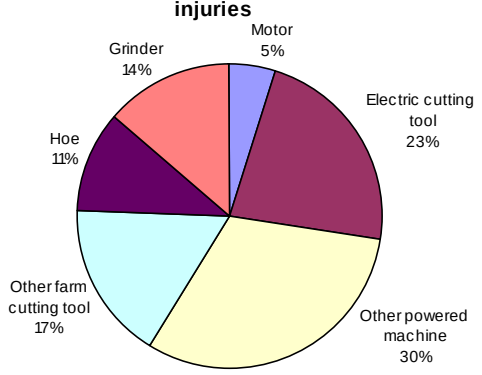


Figure 14.5 shows the machines involved. Powered machines, including electric cutting tools, comprise more than half of all the non-fatal injuries (53%) and the leading contributor to the "other" category was electric sewing machines..

Figure 14.5: Types of machines causing non-fatal injuries



Machine Injury Life Story

- A 16-year-old girl badly sliced her finger on a cutting machine in her Bangkok factory. She had to have surgery and stay in a hospital for two weeks. Even more devastating for her and her family was that she could not work for three months, meaning the family lost that income as well has having to pay the added costs of the hospital bills.

Discussion

Similar surveys in other countries in Asia which preceded the survey in Thailand found that injury caused by machines was a major contributor to child injury. The machines involved were those used in farming in rural areas and factories in urban areas and because of this, the same issue was examined in the TNIS.

In Thailand, machine injury does not show a level of hazard similar to that of the other countries. This may be linked to higher development in Thailand, where social and economic conditions do not favor children being exposed to hazardous machinery at very early stages in their lives. This is not to say that injury from machines is not a child injury issue — it is, but at lower levels than in other Asian countries surveyed In Thailand, injury from machines is mainly an issue of older children associated with working in a factory.

Chapter 15

Intentional Injury

- Household surveys rely on voluntary reports of injury and for unintentional injury (accidents) and respondents speak freely. However, for violence and suicide, there are personal, cultural, social and often legal barriers to discussion. As a result, household surveys greatly underestimate the frequency of intentional injuries
- The survey confirmed that violence and suicide are significant child health issues in Thailand but the levels found are clearly underestimates

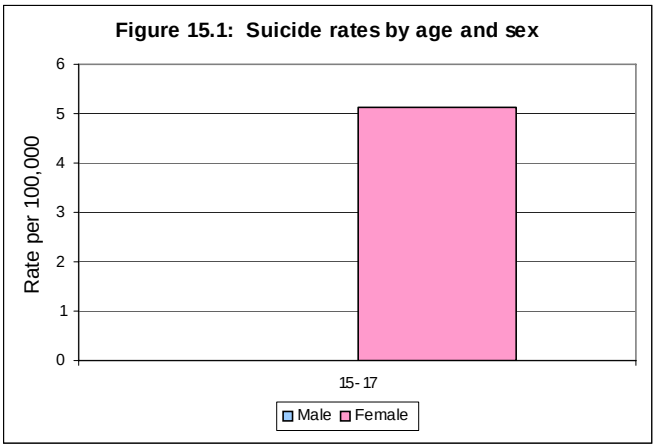
Intentional Injury

Suicide

Magnitude of suicide

Suicide and attempted suicide are problems not normally associated with children. Nevertheless, both are causes of child injury mortality and morbidity in Thailand. It is important to keep in mind that retrospective community surveys are not good methods for examining this type of injury because of the cultural and societal sensitivities surrounding this issue. Generally, surveys such as these greatly underestimate the actual rates. Thus, the data presented below should be interpreted with caution.

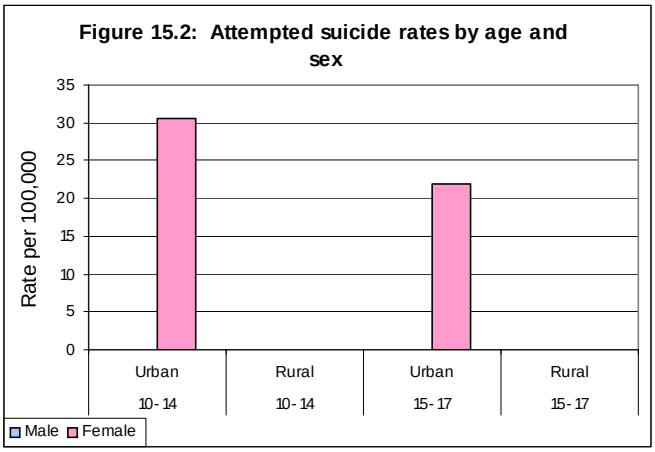
There were two suicide deaths in children: one occurred in a 15 year old female, the other in a 17 year old female. One was a rural death and the other was urban. This gives an annual suicide rate of 2.6 deaths per 100,000 children in the 15-17 age group (Figure 15.1).



Magnitude of attempted suicide

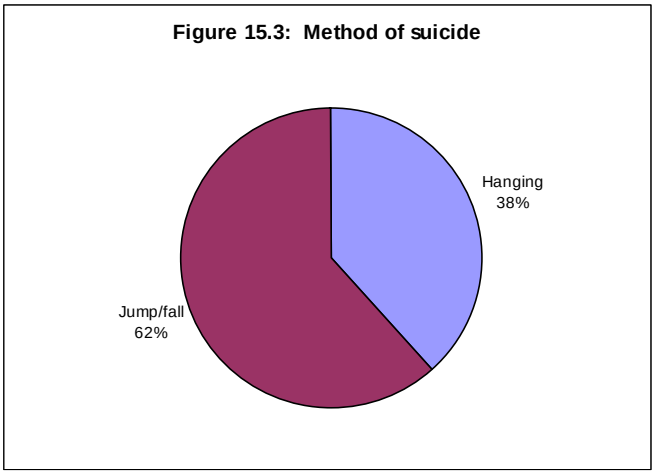
The survey recorded three attempted suicides. These attempts occurred in the two oldest age cohorts. All were urban females (Figure 15.2). Again, one must be careful when interpreting such low numbers.

The highest rate of attempted suicide is among urban females aged 10 to 14, who injure themselves attempting suicide at a rate of 31 per 100,000 every year.

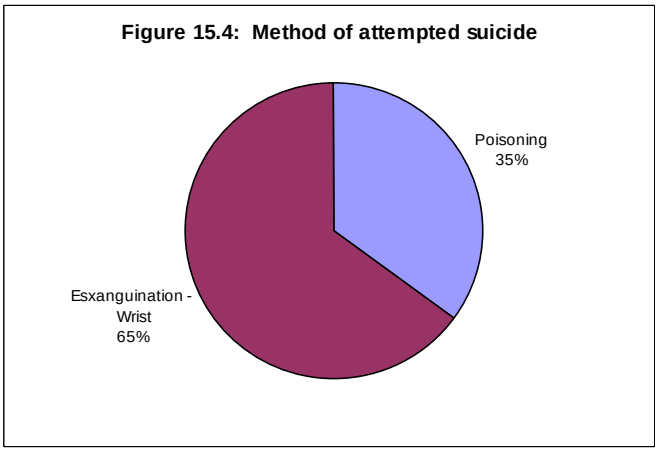


Factors associated with suicide

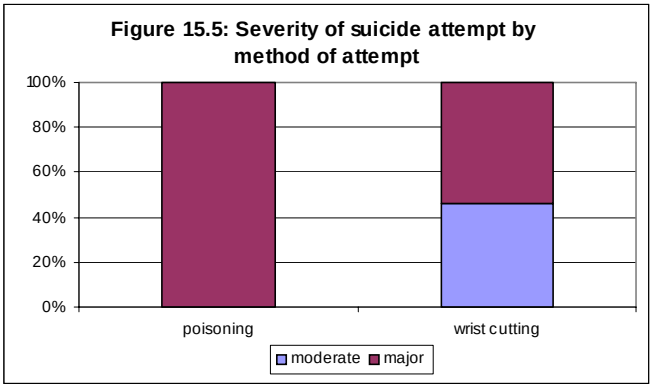
All of the suicide deaths occurred by hanging or by jumping/falling from a great height (Figure 15.3).



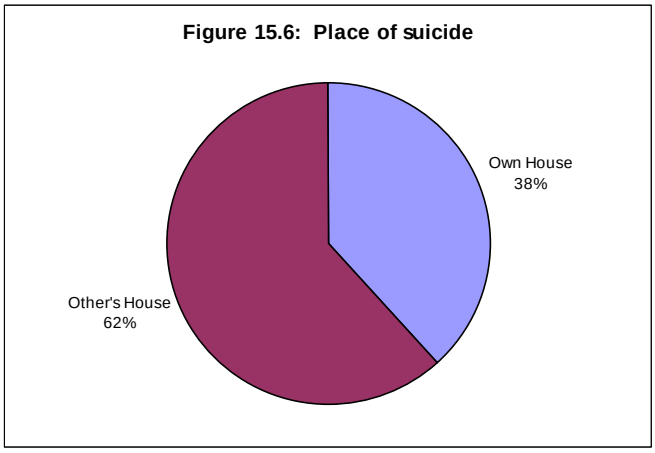
In contrast, all of the unsuccessful suicide attempts were by poisoning (sleeping pills) or cutting the wrists (Figure 15.4).

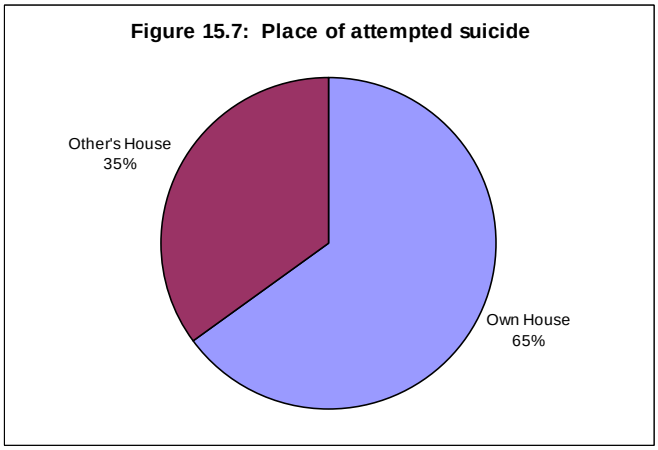


The suicide attempts by poison resulted in hospitalization (Figure 15.5). The attempts by wrist cutting were almost equally likely to result in major injury as in moderate injury.



All suicide attempts, whether fatal or not, occurred at or in a home. Two-thirds of all fatal suicides and one-third of non-fatal attempts were in another's home, while the remainder occurred in the child's own home (Figures 15.6 and 15.7).





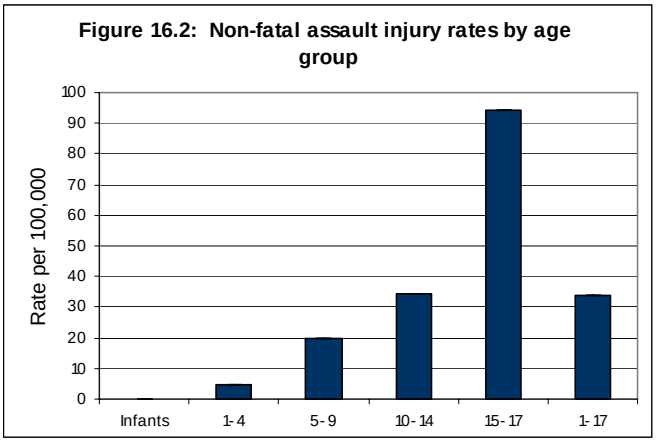
Assault

Magnitude of fatal assault

Fatal assault, or homicide, is another injury category that occurs only in the older age groups. Our survey recorded two homicides, both of males 15 to 17 years old (Figure 16.1). One was urban and the other was rural. This frequency is too low to draw any meaningful conclusions about homicide among Thai children.

Magnitude of non-fatal assault

Unlike fatal assault, assault morbidities occur in every age category except infants (Figure 16.2). Beginning with toddlers, the rate steadily increased until it peaks with 15 to 17 year olds (94.3/100,000). Overall, children aged 1 to 17 experience non-fatal assault injury at a rate of 33.9 per 100,000.



There is a strong male predominance in assault injuries, especially in the 15 to 17 year olds (Figure 16.3). There is also a strong urban preference (Figure 16.4). The highest rate of assault is among 15 to 17 year old urban males (328/100,000).

Figure 16.3: Non-fatal assault injury by sex and age group

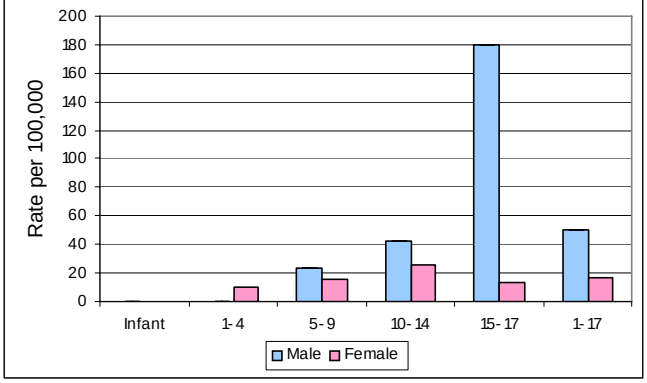
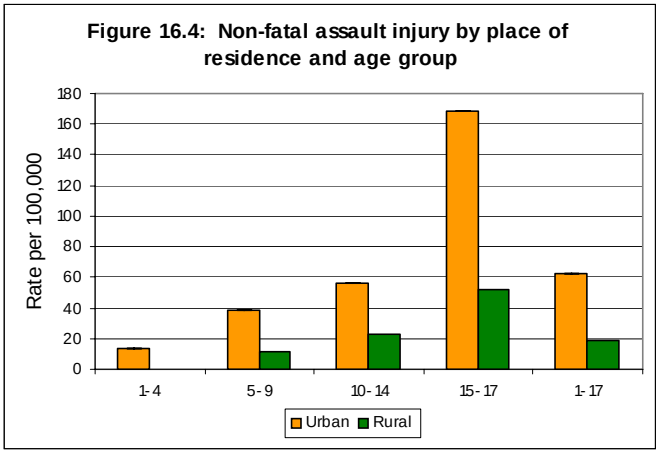
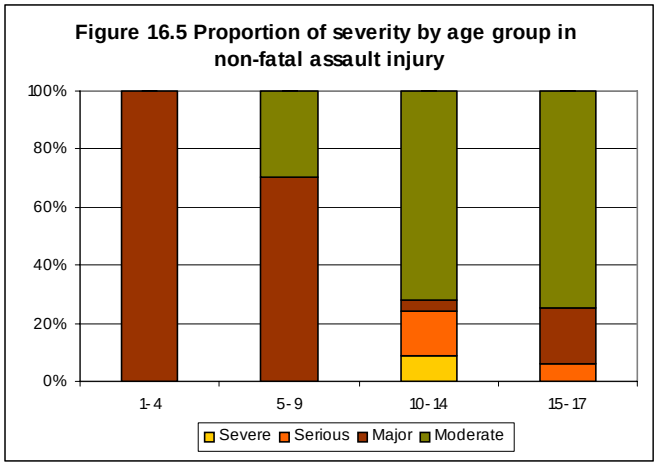


Figure 16.4: Non-fatal assault injury by place of residence and age group



Severity levels from assault injury increase as children get older (Figure 16.5). Among 10 to 14 year olds, almost 10 per cent (8.8%) of assaults result in permanent disability. Around one-third (33.1%) of assault injuries to children aged 1 to 17 result in hospitalization of at least one day.

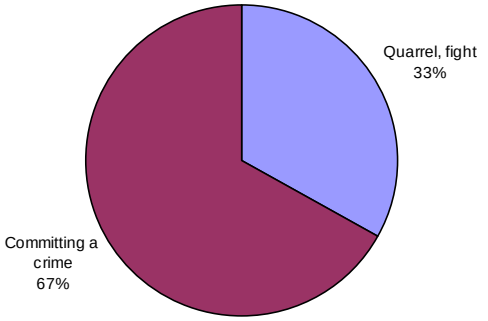
Figure 16.5 Proportion of severity by age group in non-fatal assault injury



Factors associated with assault

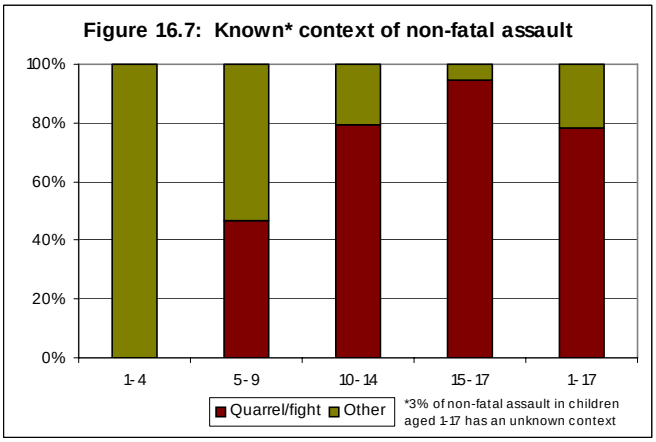
Two-thirds of homicides occurred in the process of a criminal act, while the remaining one-third occurred during a fight (Figure 16.6).

Figure 16.6: Context of fatal assault



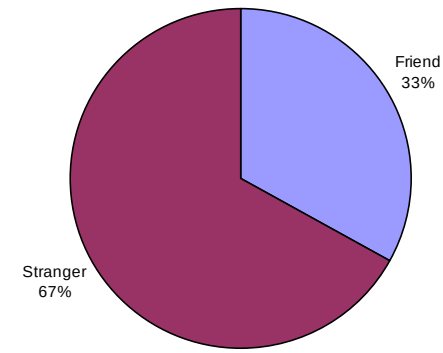
While most non-fatal assaults occur in the context of a quarrel or a fight (Figure 16.7), cases in younger age groups are likely to occur in an "other" context.

Figure 16.7: Known* context of non-fatal assault



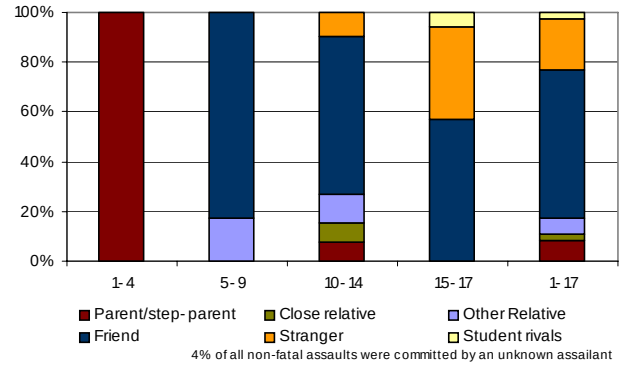
Overall, two-thirds of homicides were perpetrated by a stranger (66%) while one third was committed by a friend (Figure 16.8).

Figure 16.8: Perpetrator of fatal assault



Non-fatal assault injuries, which were much more common, were perpetrated by a broader range of individuals (Figure 16.9). Most commonly, non-fatal assault was committed by a friend or acquaintance (58%). Assaults by a stranger account for 20 per cent of injuries in this category. Less than one out of 10 (8%) of all non-fatal assault injuries were inflicted by a parent. Among 1 to 4 year olds, all morbidity from assault was caused by parents. However, this must be interpreted with caution as the survey recorded only one case of assault in this age group.

Figure 16.9: Known* perpetrator of non-fatal assault



There were a total two cases reported in which parents assaulted their children and caused an injury. Of those cases, one was of major severity and the other was serious. In both cases the parent used a stick or club.

The preferred method used for homicide was a gun (67%) or knife (33%). For non-fatal assault, sticks (32%) or personal body parts such as fists or feet (40%) were most likely to be employed (Figure 16.10).

Figure 16.10: Known* objects used in non-fatal assault

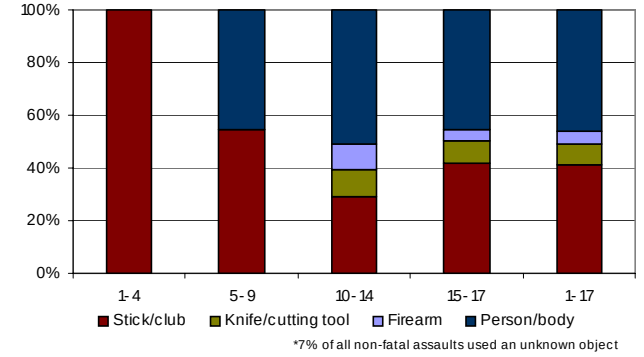
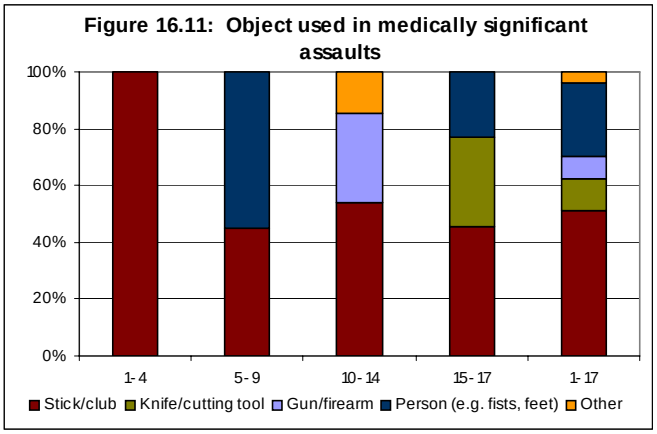


Figure 16.11 that follows, shows the object used in medically significant assaults – that is, assaults that resulted in an injury requiring hospitalization.

In every age group, sticks and clubs are a large portion of the total (51% of objects in 1 to 17 year olds). In 5 to 9 and 15 to 17 year olds, physical assaults such as kicking or punching are common (55% and 23% respectively). Guns and other firearms account for 32 per cent of medically significant assaults in the 10 to 14 age group.

Figure 16.11: Object used in medically significant assaults



Intentional injury and children

Household surveys are not the best way to measure intentional injury and usually underestimate incidence significantly. This survey is no exception. However, the survey shows that intentional injury, whether self directed or at other children is a significant public health issue in Thailand.

In developing countries there is often a reluctance to consider intentional injury as a public health problem. Many policy-makers see it as a judicial or social issue that cannot be addressed by prevention programs in the home, school or community. However, the experience of developed countries contradicts this theory and shows that while less amenable to direct interventions, some issues, particularly preventing suicide in adolescents has effective interventions that are readily feasible in Thailand.

Provision of social support networks is an effective way of dealing with suicide, a leading cause of death among adolescents. These networks are most effective when they have a broad peer-base and can be accomplished through the school system. Children in Thailand have very rapidly adopted mobile phones and text messaging, both of which are opportunities to provide psychological support and avenues for peer and professional counseling. Thus, the well developed communications infrastructure and strong community alliances may place Thailand in a unique regional position to address suicide as a preventable public health issue.

Chapter 16

Injury Orphanhood

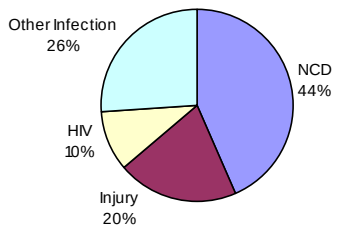
- Injury is the leading cause of death in parents during most of the child-raising years
- More than 1,000 infants lose a parent to injury every year, about 3 per day
- About 2,800 parents of children 1-4 years old die by injury annually, about 8 per day
- About 16,700 children of all ages lose a parent because of injury annually, about 46 children each day

Injury orphanhood

Mothers

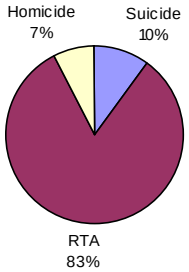
About 2,700 mothers die from injury in Thailand every year (Table 17.1). This accounts for 20 per cent of all deaths in women aged 24 to 42, or twice those killed by HIV related causes.

Figure 17.1: Proportional mortality for mothers of children aged 0 - 17



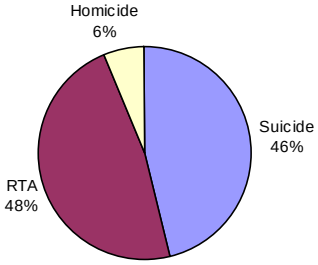
The younger the child, the greater the impact of the loss of their mother. Infants are particularly vulnerable because they are still dependent upon their mother for food and warmth. Among women at the age most likely to have an infant, road traffic accidents (RTA) are the largest injury killer (83%). Homicide and suicide make up the rest.

Figure 17.2: Cause of injury death in mothers of infants



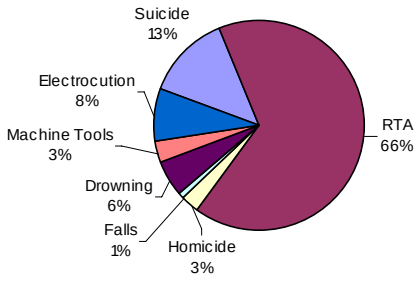
Mothers of toddlers (women age 25 to 28) die by the same three causes (Figure 17.3) but suicide and road traffic are nearly equal causes of death.

Figure 17.3: Cause of injury death in mothers of toddlers



For mothers of all children age 0 to 17 (women age 24 to 42) killed by injury, RTA is the dominant cause, accounting for one third (66%) of injury deaths in these women. Suicide and electrocutions combine for 21 per cent, and machine injuries, drowning, falls and homicide are also significant causes of injury death (Figure 17.4).

Figure 17.4: Cause of injury death in mothers of children age 0 - 17



Figures 17.5 and 17.6 show the rates and estimated numbers of the three leading causes of deaths for mothers of all children age 0 to 17. As can be seen, RTA alone accounts for almost 1,800 deaths annually.

Figure 17.5: Leading causes of injury death for mothers of children age 0 - 17, rates per 100,000

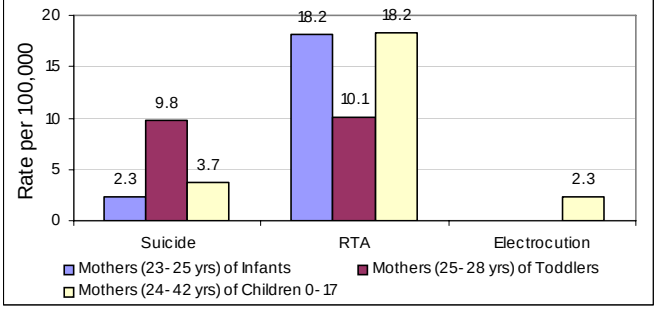
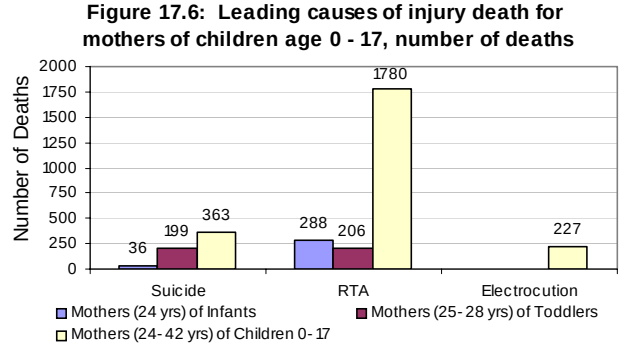
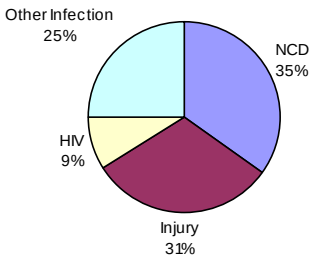


Figure 17.6: Leading causes of injury death for mothers of children age 0 - 17, number of deaths



Losing a father also has a strong negative impact upon a child, as Thai men are typically the primary earners for the family. Amongst all men of the fatherhood age (27 to 45 years old), injury accounts for 31 per cent of all deaths, about three times as many as die from HIV** (Figure 17.7).

Figure 17.7: Proportional mortality for fathers of children aged 0 - 17



Of these injury deaths, RTA is the greatest single cause, causing more than half of all injury deaths (Figure 17.8).

Figure 17.8: Cause of injury death in fathers of children aged 0 - 17

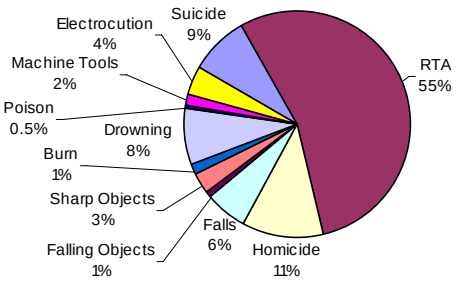


Figure 17.9 and 17.10 show the rates and estimated numbers of deaths of these men by the three leading injury causes: RTA, suicide, and homicide. RTA alone kills almost 5,500 fathers annually, meaning about 15 children lose their fathers per day because of RTA injury.

Figure 17.9: Leading causes of injury death for fathers of children age 0 - 17, rates per 100,000

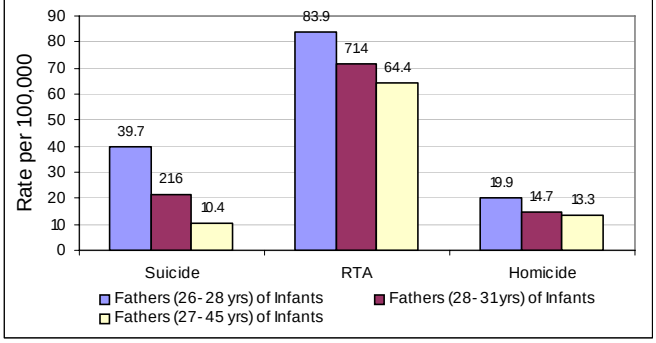


Figure 17.10: Leading causes of injury death for fathers of children age 0 - 17, numbers of deaths

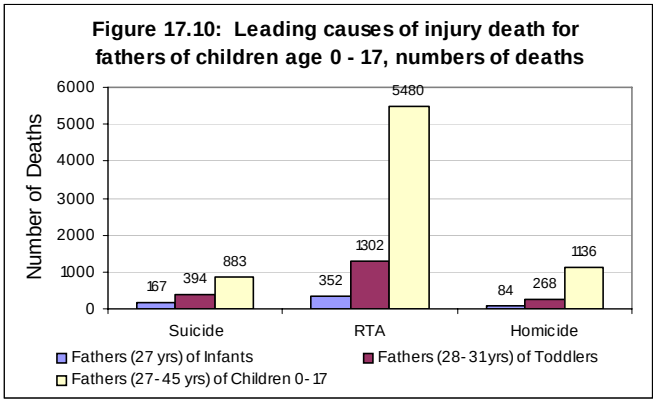
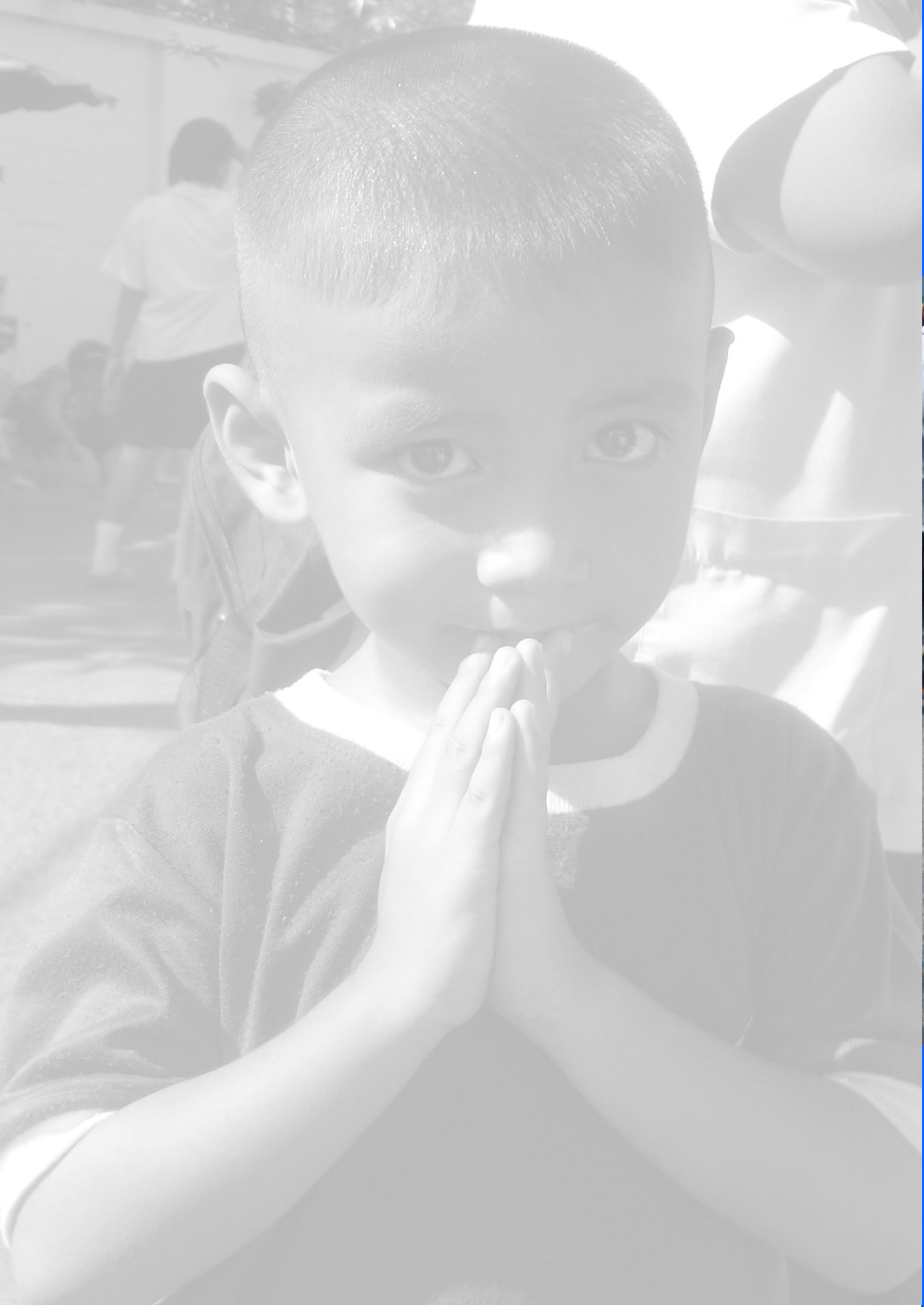


Table 17.1: Annual mortalities of mothers and fathers due to injury

	Suicide	RTA	Homicide	Drowning	All Injury
Mothers (24 yrs) of Infants*	36	288	26		350
Mothers (25-28yrs) of Toddlers	199	206	26	57	489
Mothers (24-45yrs) of Children 0-17	363	1780	79	151	2711
Fathers (27yrs) of Infants*	167	352	84	25	694
Fathers (27yrs) of Toddlers	394	1302	268	94	2370
Fathers (27-45 yrs) of Children 0-17	883	5480	1136	821	10120

*The average age of marriage in Thailand according to the 2000 Household Census was 24 for women and 27 men. These ages were taken to be the median age for a couple to have an infant child.

**The total country-wide number of HIV deaths in 2003 by age, and sex was obtained from the Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health, Thailand.



Chapter 17

Conclusions and Recommendations

- Injury is the leading killer of children after infancy in Thailand and the rates of child death and disability will not decrease without action at the national level as well as within the local communities, schools and homes
- To make effective national injury prevention programs a reality requires political will, a multi-sectoral coordinating body at a national level to oversee activities and the creation of a national safety plan

Conclusions

Injury is a major contributor to child deaths and is the leading cause of child death after infancy

- Injury caused almost two thirds (64%) of all child deaths for children older than one. For children five years and older, injury accounted for almost seven deaths out of 10 (69.4%).
- The focus on children under five years old has led to dramatic decreases in deaths for these age groups. The decreases in infectious and NCD deaths in the 1-4 year age group have been so large that injury is now the leading killer in this age group, causing almost half (45.8%) of all deaths.
- Since injury accounts for almost 70 per cent of the child mortality after four years of age, Thailand has to develop injury intervention programs as a core component of child health programs.

The pattern of child injury differs in different age groups

Child injury is a stage of development issue. As children grow and develop, their environment changes and they are exposed to different risks. Infants and toddlers stay in the home or very close to it and are overseen by caretakers. Most injury in this group occurs inside or immediately outside the home, while the child is not being effectively supervised. Older, school-aged children spend a great deal of time outside the home going to and from school and with peers accompanying them, instead of caretakers. Most of the serious injury in this older group occurs outside the home, often traveling to and from school or while playing with friends or classmates. Because of different factors such as these, certain injury types cluster among the different age groups.

- Suffocation and drowning are the major fatal injuries in infancy and early childhood. Falls, burns and animal bites are the leading causes of non-fatal injury.
- Middle childhood and early adolescence have a more complex set of injury issues with drowning, RTA, falls and animal injuries all prominent as the children range further outside the home and further away from adult supervision.
- RTA is the leading cause of fatal injury for adolescents but violence is also a significant cause of injury throughout adolescence. Suicide is a significant issue for late adolescence.

The impact of non-fatal injury exceeds that of fatal injury

For Thailand as a whole, the number of children non-fatally injured is enormous. In the year prior to the survey, there were more than 220,000 children injured significantly enough for to be taken for medical care, or to miss three days of school or work. This is more than 2,400 children injured every day.

Three causes alone accounted for more than three-quarters of all non-fatal injury (77%):

- RTA was responsible for one third (33%) of non-fatal injury, this is 72,500 child injuries every year, or almost 200 a day.
- Falls caused more than one quarter (28.5%) of non-fatal injuries and accounted for more than 62,500 child injuries in the country or almost 175 a day.
- Animal bites, which accounted for almost one sixth (15.5%) of non-fatal child injuries and caused about 34,750 child injuries in the country, about 95 a day.

There is a large difference in the social and economic burden of an injury depending on the severity of the child's injuries. For those hospitalized with serious injury requiring lengthy recuperation periods, and especially for those permanently disabled, the direct, indirect and social costs of non-fatal injury far outstrip that of fatal injury.

Injury is a leading cause of disability

- Injury is a leading cause of disability for children in Thailand. At the rates found in the survey, more than 1,600 children are permanently disabled each year, or more than four a day. RTA and falls ranked as the first and second causes of permanent disability from injury for children.
- Almost 1 per cent of injured children (0.8%) were permanently disabled and needed permanent care.

Drowning and RTA outstrip all other injury causes of death and so deserve a special focus

These two leading causes account for almost nine out of 10 (88.5%) of all child injury deaths and more than half (56.4%) of all child deaths from any cause after infancy. This provides an opportunity for a special focus as part of a national intervention strategy.

Drowning caused more child injury deaths than any other cause and 40 per cent of all child deaths after infancy. Some 2,650 children drowned in the year before the survey, about seven children each day.

The survey showed an inverse relationship between drowning and swimming ability. Children who could not swim were more than twice as likely (2.3 times) to drown than those who could. This finding is similar to the results from the other injury surveys conducted in China and Bangladesh. These provide evidence that teaching children basic water-safety knowledge and survival swimming early in childhood as a basic life skill would reduce drownings in children older than five years old.

Risk factors for drowning are different in preschool children than that of school-aged children and prevention strategies will depend on this difference. Preschool children drowned in small bodies of water very near home after escaping supervision of a distracted caretaker. Prevention will focus on increasing effective supervision and putting barriers around the bodies of water near the house.

School aged children drowned further from the home in larger bodies of water. The child was usually accompanied by a peer of the same age, and the drowning occurred despite the presence of that peer, who did not know how to swim or perform a rescue. Prevention requires water safety programs that include teaching swimming as well as how to safely rescue a drowning peer when no adult is nearby.

RTA was the second leading cause of injury death and the leading cause of injury morbidity and disability in children. The already high child RTA injury rates will only increase as motorization rates increase in Thailand.

An estimated 2,600 children were killed by RTA in the year prior to the survey, about seven per day, with most of the deaths associated with motorcycles. RTA was the leading cause of hospitalization from injury in children, hospitalizing more than 150 children a day. It was also the leading cause of permanent disability in children from injury – disabling two children every day.

There is an important age pattern to RTA. Almost three-quarters (72%) of children aged 5-9 killed by RTA are struck as pedestrians. As children get older, pedestrian deaths become a smaller proportion of total RTA mortality when children start to ride motorcycles as drivers and passengers. In late adolescence children are killed almost exclusively on or by motorcycles. More than nine out of 10 (92%) of all RTA deaths were associated with motorcycles.

A targeted approach is needed for other leading causes of injury mortality and morbidity

- Suffocation was the leading cause of fatal injury in infants. All were accidental suffocation, which has been shown to be readily preventable. The high prevalence of the risk factors of prone and side sleeping, unprotected bed-sharing in early infancy and feeding infants foods often associated with choking make an efficient prevention program possible. All of these can be addressed in antenatal care programs in the last trimester of pregnancy when the expectant parents are most receptive to the messages and in mother/baby programs immediately after birth.
- Animal injury was the third leading cause of mortality, mainly as a result of rabies from dog bites, and the fourth leading cause of child injury morbidity in Thailand. Animal injuries were one of the most common reasons for children to seek medical care.

Injury affects children by affecting their parents.

The leading cause of death in parents during most of the child-raising years is injury. Serious or fatal parental injury can have a large impact on the child(ren) in that family. Loss of a father, mother, or most tragically both, has a devastating impact on a child's future health, social and economic well being. From the survey:

- More than 1,000 infants lost a parent to injury, or about 3 per day.
- About 2,800 children, aged 1-4 years, had a parent killed from injury, about 8 per day
- About 16,700 children under 18 (0-17 years) lost a parent to injury, or about 46 children every day

Parental injury affects children regardless of their socio-economic status or gender. However, the impact of the loss of the primary caretaker (mother) or the primary economic earner (father) depends on the age of the children and the family's socio-economic situation. 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. 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, the loss of their mother or father often results in them dropping out of school and taking over the lost earnings or caretaking role for the family.

In either case, whether in early or later childhood, the injury orphans' physical health and continued development are placed in certain jeopardy.

Recommendations

1. Implement a national child injury prevention program in Thailand

While fatal injury rates are high in children in Thailand, there are effective interventions for the leading causes of injury deaths. A national prevention effort would significantly lower mortality in childhood and lower the very high rates of serious injury and permanent disability in children. Given the complexity of the problem, and its magnitude in all age groups, the overall response will require an integration of prevention, control and rehabilitation interventions to comprehensively address this problem.

2. Broaden child health interventions to target all children, not just the under-fives

Addressing the differing causes of injury requires working in all child age groups. Interventions need to be designed to target children most effectively, depending on where the child spends most of their time.

- Interventions that focus on infants and young children will target parents and homes.
- Those that focus on school aged children will need to extend their focus to the children themselves, the schools and teachers, and the areas of the community where school children spend most time. For most, this is the travel to and from school, as well as the time in school itself.
- For older adolescents, interventions need to recognize the importance of intentional injury, in particular suicide for these children, focusing on issues of psychological resiliency and social support.

3. Use the tested conceptual framework of Safe Home, Safe School and Safe Community

The conceptual framework of **Safe Home, Safe School and Safe Community** meets the need to target children where their injury risks are highest and therefore, where the interventions are most effective. This maximizes efficiency and long-term sustainability.

- Homes in Thailand are dangerous places for children — full of risks for falls, burns, scalds, poisons, cuts, and other major causes of injury. There are cheap and effective ways that they can be made safer and a Safe Home program is needed to do this.
- The walk or ride to and from schools in Thailand is hazardous for children, and much can be done to ensure that the schools themselves are safer, as well as the journey to and from them. Safe Schools need to develop and enforce safety standards and regulations, promote education for behavior change of students and modify the environments to remove injury hazards.
- While parents and teachers are major participants in child safety, the community at large will play a vital role as well. The public safety and welfare institutions — police, fire and the health and governing structures — must provide leadership and authority for the Safe Community programs.

4. Integrate injury prevention into existing child health and protection interventions. Avoid creating new, free-standing interventions wherever possible

Child safety is cross-sectoral in nature. Child injury interventions need to cross the boundaries of health, education, public security and communication.

Injury prevention activities can be most efficiently combined with successful ongoing activities, extending and reinforcing them. Addressing child injury provides an opportunity to integrate resources and activities that affect children of all ages by integration into the antenatal program, EPI, early childhood development, nutrition, girls' education, HIV/AIDS and other adolescent programs.

Injury prevention provides an opportunity to implement inter-sectoral interventions that target children of all age groups, and presents an opportunity for more direct collaboration between health and education, the two sectors that most directly deal with children. The health sector interacts with preschool children and their parents and provides many programs to integrate injury prevention within. The educational sector interacts with school-aged children and their parents, and likewise presents many opportunities for building effective prevention programs. A comprehensive effort, combining both sectors to address child injury across all age groups would be the most effective approach to child injury prevention in Thailand.

5. Prioritize interventions so they are most easily achievable

First and foremost, do the easy things first, since they will have the lowest cost, are the most achievable with the fewest resources, are the most easily institutionalized and hence, the most sustainable.

- **Drowning** is the leading cause of child injury deaths. In the toddler (1-4 years) age group, drowning caused almost half of all deaths; reducing these would lead to a rapid decrease in the U5MR. For Thai children of all ages, drowning rates are 10 times the rates of child drowning in rich countries. A country does not have to be rich to successfully decrease child drowning rates; programs in Bangladesh have shown a reduction of two-thirds in child drownings. Thailand could emulate the successful approach of many other countries to drowning reduction by integrating water safety and swim teaching programs into the primary school curricula to ensure that this necessary life skill is obtained at the earliest possible age.
- **RTA** is the second leading cause of injury death in children in Thailand. It is entirely age dependent with no RTA deaths in children under five found in the survey, low rates in the 5-9 year olds where almost three-quarters (72%) of RTA deaths in this group were as pedestrians, and then a dramatic increase in RTA deaths at age 14, composed almost entirely by males on motorcycles. The predominance of this "adolescent male motorcyclist" issue was such that most RTA deaths occurred in this group.

  Thus, prevention programs that target child pedestrians will be more efficient in reducing child RTA injury in the pre-adolescent ages than those that target passengers of vehicles. Conversely, effective programs to decrease RTA mortality in adolescent children will only be possible through targeting male motorcyclists and their passengers.
- **Suffocation** is the leading cause of fatal injury in infancy. This provides an opportunity to reduce the infant mortality rate significantly. The interventions are efficient as they are implemented through the same providers that work directly with pregnant women and mothers of young infants.
- **Animal injury** (mainly rabies from dog bites and snake envenomations) is the third leading cause of fatal child injury in Thailand, and the fourth leading cause of injury morbidity. Given the predominance of dog bites as the leading animal injury, a program focusing on keeping dogs separate from young children, teaching children how to avoid being bitten and enforcing rabies immunizations for owners of dogs would have a major impact on child morbidity and mortality.

Appendices

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Appendix A

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 purposely inflicted by an aggressor or self inflicted by the victim.

Injury Severity:

Moderate: Injury that required seeking medical care or missing three days of work or school; but no permanent disability and did not requiring hospitalization.

Major: Injury requiring hospitalization; but for less than 10 days.

Serious: Injury requiring hospitalization of 10 days or more.

Severe: Injury that resulted in permanent disability, regardless of length of hospitalization.

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 Disease: 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 behavior 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 Mortality Rate: The number of deaths of children aged one to four years (before completion of the 5th birthday) per 1000 children of the 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 a 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 form 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.

Appendix B

These tables present detailed information for the figures from the text. Those figures in which individual data points are clearly determined from the figure itself are not represented here.

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Mortality Overview*

Table 3.1: Child mortality rates (per 100,000) and proportional mortality by cause and age

Causes	Infant n = 16		1-4 n = 22		5-9 n = 45		10-14 n = 33		15-17 n = 38		1-17 n = 138	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Injury	44.6	2	45.8	52	30.2	54	24.1	74	70.0	82	38.6	64
NCD	1165.2	60	7.4	8	8.3	15	4.7	14	3.0	3	6.0	10
Infection	730.8	38	34.6	39	17.2	31	3.7	11	12.0	14	15.9	26

Table 3.2: Leading causes of deaths in infants (rates per 100,000)

Causes	All n = 16	95% Confidence Interval	
	Rate	Lower	Upper
Heart Disease	840.7	60.6	3314.2
Pneumonia	541.6	39.0	2146.3
Birth Defect	250.6	6.3	1159.8
Hepatitis	94.6	0.1	878.6
Measles	94.6	0.0	1050.8
Cancer	73.9	0.0	821.3
Suffocation	44.6	0.0	414.2

Table 3.3: Leading causes of deaths in children 1-4 (rates per 100,000)

Causes	All n = 22	95% Confidence Interval	
	Rate	Lower	Upper
Drowning	40.4	12.1	87.3
Pneumonia	12.3	1.5	41.9
Sepsis	10.2	0.0	72.5
Heart Disease	7.4	0.2	34.5
Animal	5.4	0.0	31.8
Diarrhea	5.0	0.0	34.7
Dengue	3.3	0.0	23.5
UTD	1.8	0.0	12.7
Polio	1.3	0.0	9.2
Aids	0.8	0.0	5.5

Table 3.4: Leading causes of deaths in children 5-9 (rates per 100,000)

Causes	All n = 45	95% Confidence Interval	
	Rate	Lower	Upper
Drowning	18.5	5.5	40.3
Transport	8.7	2.1	20.5
Pneumonia	8.4	3.1	18.1
Cancer	5.9	1.6	15.1
Sepsis	3.5	0.3	13.9
UTD	2.1	0.1	11.7
Allergic Reaction	2.1	0.2	8.8
Encephalitis	1.6	0.0	8.7
Electrocution	1.0	0.0	5.2
Fall	1.0	0.0	5.2
Burn	1.0	0.0	5.2
Dengue	1.0	0.0	6.2
Aids	0.6	0.0	3.9
Heart Disease	0.3	0.0	1.8

Table 3.5: Leading causes of deaths in children 10-14 (rates per 100,000)

Causes	All n = 33	95% Confidence Interval	
	Rate	Lower	Upper
Transport	12.3	4.9	23.0
Drowning	9.0	2.9	18.8
Cancer	3.2	0.2	12.6
Animal	1.9	0.0	10.2
Pneumonia	1.4	0.1	5.6
Tb	1.3	0.0	7.0
Fall	0.9	0.0	4.5
Asthma	0.9	0.0	5.4
Vascular Disease	0.6	0.0	3.4
Dengue	0.4	0.0	2.4
UTD	0.4	0.0	2.4
Diarrhea	0.2	0.0	0.8

*Exact design-adjusted confidence intervals are shown for mortality estimates (Korn & Graubard, 1998) .

Table 3.6: Leading causes of deaths in children 15-17 (rates per 100,000)

Causes	All		
	n = 38	95% Confidence Interval	
	Rate	Lower	Upper
Transport	61.3	36.3	90.8
Assault	6.0	0.4	20.6
UTD	4.9	0.3	20.5
Sepsis	3.0	0.1	16.7
Self-Harm	2.6	0.2	8.8
Pneumonia	2.5	0.1	13.9
Cancer	1.9	0.0	10.2
Dengue	1.6	0.0	8.8
Heart Disease	1.1	0.0	6.0

Table 3.7: Leading causes of deaths in children 1-17 (rates per 100,000)

Causes	All		
	n = 138	95% Confidence Interval	
	Rate	Lower	Upper
Drowning	17.2	6.9	32.2
Transport	17.0	10.7	24.1
Pneumonia	6.0	2.3	12.7
Sepsis	3.8	0.5	13.2
Cancer	3.0	1.2	6.2
UTD	2.0	0.3	6.2
Heart Disease	1.9	0.2	6.6
Animal	1.8	0.1	6.4
Dengue	1.4	0.2	4.4
Diarrhea	1.2	0.0	6.3
Assault	1.0	0.1	3.6
Allergic Reaction	0.6	0.0	2.7
Fall	0.6	0.0	3.0
Self-Harm	0.5	0.0	1.6
Encephalitis	0.4	0.0	2.8
Tb	0.4	0.0	2.6
Aids	0.3	0.0	1.4
Polio	0.3	0.0	1.9
Electrocution	0.3	0.0	1.5
Burn	0.3	0.0	1.5
Asthma	0.3	0.0	1.8
Vascular Disease	0.2	0.0	1.3

Table 3.8: Leading causes of deaths in children 1-17 by sex (rates per 100,000)

Causes	Male			Female		
	n = 86	95% Confidence Interval		n = 50	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Transport	25.8	15.4	38.0	7.9	2.9	15.4
Drowning	20.0	4.8	48.4	14.3	6.4	25.3
Pneumonia	7.3	2.0	18.6	4.7	1.7	10.1
Cancer	4.7	1.6	10.5	1.3	0.0	8.1
Unable to determine	2.5	0.2	10.6	1.4	0.0	8.8
Heart Disease	2.3	0.1	12.0	1.6	0.1	6.9
Assault	2.0	0.1	7.2			
Sepsis	1.8	0.1	7.0	5.9	0.2	27.9
Animal	1.2	0.0	6.6	2.5	0.0	13.1
Allergic Reaction	1.2	0.0	5.4			
Fall	1.1	0.0	5.9			
Encephalitis	0.9	0.0	5.5			
Polio	0.6	0.0	3.7			
Electrocution	0.6	0.0	2.9			
Dengue	0.6	0.0	3.5	2.3	0.3	8.3
Vascular Disease	0.4	0.0	2.5			
Diarrhea	0.1	0.0	0.6	2.3	0.0	14.3
Self-Harm				0.9	0.1	3.2
Tb				0.8	0.0	5.2
Aids				0.7	0.1	2.8
Burn				0.6	0.0	3.0
Asthma				0.6	0.0	3.6

Table 3.9: Leading causes of deaths in children 1-17 by place of residence (rates per 100,000)

Causes	Urban			Rural		
	n = 35	95% Confidence Interval		n = 103	95% Confidence Interval	
	Rate	Low er	Upper	Rate	Low er	Upper
Transport	16.8	7.3	30.2	17.0	9.9	25.5
Sepsis	6.8	0.0	43.3	2.3	0.4	7.2
Pneumonia	5.8	0.4	24.8	6.1	2.3	13.3
Heart Disease	4.9	0.4	19.8	0.4	0.0	1.7
Drow ning	4.9	0.3	17.4	23.6	8.7	46.5
Assault	2.0	0.0	10.9	0.5	0.0	2.8
Cancer	1.9	0.1	7.9	3.6	1.2	8.3
Fall	1.6	0.0	8.8			
Electrocution	0.8	0.0	4.4			
Burn	0.8	0.0	4.4			
Asthma	0.8	0.0	5.3			
Dengue	0.8	0.0	5.3	1.8	0.2	6.3
Self-Harm	0.8	0.0	4.4	0.3	0.0	1.4
Diarrhea	0.1	0.0	0.9	1.7	0.0	10.7
UTD				3.0	0.5	9.4
Animal				2.8	0.2	9.7
Allergic Reaction				0.9	0.1	3.8
Encephalitis				0.7	0.0	4.2
Tb				0.6	0.0	3.9
Aids				0.5	0.0	2.1
Polio				0.4	0.0	2.8
Vascular Disease				0.3	0.0	1.9

Morbidity Overview

Table 4.1: Child morbidity rates (per 100,000) and proportional morbidty by cause and age

Causes	Infant n = 324		1-4 n = 2444		5-9 n = 2743		10-14 n = 2490		15-17 n = 1165		1-17 n = 8842	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Injury	196.9	2	792.1	6	1211.7	14	1724.2	24	2066.9	34	1428.6	16
NCD	1080.1	14	1870.6	14	1365.1	15	1384.9	19	1461.2	24	1502.2	17
Infection	6706.7	84	10241.4	79	6275.1	71	4067.7	57	2576.2	42	5825.8	67

Table 4.2: Leading causes of injury morbidity in infants (rates per 100,000)

Causes	All n = 8	95% Confidence Interval	
	Rate	Lower	Upper
Falls	86.2	0.0	227.3
Burn	72.2	0.0	200.2
Transport	22.3	0.0	67.2
Animal	16.2	0.0	48.8

Table 4.3: Leading causes of injury morbidity in children 1-4 (rates per 100,000)

Causes	All n = 149	95% Confidence Interval	
	Rate	Lower	Upper
Falls	282.5	169.3	611.4
Animal	168.4	82.9	373.7
Burn	105.2	43.6	237.6
Transport	101.3	31.7	234.0
Sharp Objects	75.7	40.1	166.5
Falling Objects	26.8	0.7	65.8
Drowning	15.3	0.0	38.8
Poison	9.4	8.8	18.7
Assault	4.7	0.0	13.9
Machine Tools	2.9	0.0	8.7

Table 4.4: Leading causes of injury morbidity in children 5-9 (rates per 100,000)

Causes	All n = 380	95% Confidence Interval	
	Rate	Lower	Upper
Falls	414.6	261.3	890.8
Transport	282.2	179.3	605.6
Animal	240.8	144.1	521.3
Sharp Objects	125.7	62.9	278.5
Burn	49.7	17.2	114.1
Falling Objects	35.4	14.4	80.0
Drowning	31.2	10.3	71.9
Assault	20.0	6.2	46.2
Poison	5.9	0.0	17.6
Electrocution	5.1	0.0	13.9
Machine Tools	1.1	0.0	3.2

Table 4.5: Leading causes of injury morbidity in children 10-14 (rates per 100,000)

Causes	All n = 606	95% Confidence Interval	
	Rate	Lower	Upper
Falls	545.6	349.8	1169.2
Transport	489.4	355.4	1027.5
Animal	318.0	202.2	682.4
Sharp Objects	186.5	114.9	402.1
Burn	85.6	57.2	182.4
Assault	34.2	13.8	77.4
Falling Objects	27.4	13.5	60.7
Drowning	20.2	1.1	49.2
Electrocution	9.5	0.0	23.6
Self-Harm	5.2	5.1	10.3
Poison	2.6	0.0	7.7

Table 4.8/4.9: Injury morbidity rates (per 100,000) by age and sex

Age	Males n = 996 Rate	Females n = 533 Rate	Both n = 1529 Rate
Infants	108.4	289.5	196.9
1-4	927.9	644.6	792.1
5-9	1411.5	1000.0	1211.7
10-14	2335.2	1110.1	1724.2
15-17	2949.8	1229.6	2066.9
1-17	1848.3	997.1	1428.6

Table 4.12: Leading causes of injury morbidity in children 1-17 by sex (rates per 100,000)

Causes	Male n = 1123	95% Confidence Interval		Female n = 613	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Transport	629.8	470.7	1315.6	309.0	217.8	652.1
Falls	545.7	375.5	1156.5	264.3	165.7	568.5
Animal	294.1	185.9	631.8	156.2	84.8	342.7
Sharp Objects	140.3	105.1	293.0	123.8	48.9	280.9
Burn	89.0	53.7	192.5	66.1	36.0	145.0
Assault	50.1	31.0	108.0	17.2	7.3	49.8
Falling Objects	45.5	30.2	96.9	21.7	3.8	46.6
Drowning	19.5	0.5	42.3	19.6	2.3	41.3
Electrocution	17.2	12.7	41.6	2.5	0.1	19.7
Poison	10.9	5.9	24.0	5.5	3.1	12.1
Machine Tools	4.4	0.0	12.4	8.0	2.0	11.0
Self-Harm				4.9	0.0	6.8

Table 4.13/4.14: Causes of permanent disability in children by age

Cause	5-9 n = 1		10-14 n = 7		15-17 n = 2		1-17 n = 10	
	Rate	%	Rate	%	Rate	%	Rate	%
Animal			3.6	16			1.1	11
Assault			3.0	14			1.0	9
Cut			3.9	18			2.5	24
Fall	3.0	100	5.2	24			1.3	12
Transport			6.4	29	14.8	100	4.6	44

Table 4.15: Permanent disablity due to injury in children by age and sex

Age	Males n = 3 Rate	Females n = 7 Rate
Infants		
1-4		
5-9		6.1
10-14	13.1	31.3
15-17	22.8	7.1

Table 4.17: Injury severity rates by place of residence

Severity	Urban n = 818		Rural n = 711	
	Rate	%	Rate	%
Moderate	1492.8	70	628.3	59
Major	467.8	22	352.5	33
Serious	153.2	7	77.3	7
Severe	13.0	1	9.2	1

Mechanism Specific Injury Rates and Proportions

Table 5.1: Drowning rates (per 100,000) by age

Age	All		
	n = 27	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	40.4	12.1	87.3
5-9	18.5	5.5	40.3
10-14	9.0	2.9	18.8
15-17			

Table 5.2: Drowning rates (per 100,000) by age and sex

Age	Male			Female		
	n = 15	95% Confidence Interval		n = 12	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	55.5	9.2	149.7	24.0	1.7	87.0
5-9	24.0	2.9	72.8	12.7	2.1	34.9
10-14	1.0	0.0	4.7	17.0	5.1	36.9
15-17						
1-17	20.0	4.8	48.4	14.3	6.4	25.3

Table 5.3: Drowning rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 4	95% Confidence Interval		n = 23	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	14.6	0.4	57.7	53.4	12.9	126.6
5-9	6.1	0.0	32.0	24.5	5.9	57.8
10-14				13.7	4.5	28.6
15-17						
1-17	4.9	0.3	17.4	23.6	8.7	46.5

Table 5.4: Near drowning rates (per 100,000) by age

Age	All		
	n = 18	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	15.3	0.0	32.6
5-9	31.2	10.3	52.1
10-14	20.2	1.1	39.2
15-17	4.9	0.0	14.4
1-17	19.5	10.5	28.5

Table 5.5: Near drowning rates (per 100,000) by age and sex

Age	Male			Female		
	n = 11	95% Confidence Interval		n = 7	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	14.7	0.0	35.1	16.0	0.0	47.3
5-9	38.8	16.7	60.9	23.2	1.9	44.6
10-14	15.6	5.5	25.8	24.7	0.0	64.3
15-17				9.5	0.0	28.0
1-17	19.5	12.7	26.2	19.6	3.8	35.5

Table 5.6: Near drowning rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 12	95% Confidence Interval		n = 6	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4				23.0	0.0	49.0
5-9	63.6	44.4	82.9	15.5	0.0	45.8
10-14	30.3	28.8	31.7	14.8	0.0	44.0
15-17	13.3	0.0	39.5			
1-17	29.4	19.6	39.3	14.4	1.5	27.3

Table 5.9: Place of drowning of children

Age	Pond	Ditch	Well	Storage device	River	Dam	Other
1-4	17%	24%	28%		16%		15%
5-9	24%			4%	72%		
10-14	40%				25%	35%	
15-17							
1-17	23%	13%	15%	1%	34%	6%	8%

Table 5.10: Place of drowning of children

Age	1-5m	6-10m	11-20m	21-50m	51-100m	100m+	Unknown/Other
1-4	15%	24%	7%		28%	21%	5%
5-9				5%	22%	65%	7%
10-14	35%	14%		6%		40%	6%
15-17							
1-17	14%	15%	4%	2%	22%	37%	6%

Table 5.15: Known person accompanying child prior to drowning

Unknown: 3%

Age	Mother/ caregiver	Father	Other relative	Friend/ peer	None	Neighbor	Stranger
1-4	15%		52%		23%		10%
5-9	15%	12%	11%	32%	26%	3%	
10-14				43%	50%	7%	
15-17							
1-17	13%	4%	33%	16%	29%	2%	3%

Table 5.16: Known activity of mother/caregiver at time of child drowing

Unknown: 1%

Age	Household chores	Gossiping	Sleeping	Working outside home	Accompany the child	Looking after another child	Sick at home
1-4	31%	9%		42%			19%
5-9	46%		6%	41%	4%	3%	
10-14	38%			56%	6%		
15-17							
1-17	36%	5%	2%	44%	2%	1%	10%

Table 5.18: Place of near drowning of children

Age	Well	River	Sea	Swimming Pool
1-4		77%		23%
5-9	16%	29%	27%	29%
10-14		87%		13%
15-17		100%		
1-17	8%	59%	12%	21%

Table 5.19: Known distance to water body where near drowning occurs

Unknown: 4%

Age	1-5 m	11-20 m	21-50 m	51-100 m	100+ m	other
1-4	28%		50%		23%	
5-9		10%		19%	35%	36%
10-14	55%			15%		30%
15-17		100%				
1-17	22%	9%	9%	13%	21%	26%

Table 5.24: Person accompanying the child at time of near drowning

Age	Mother/ caregiver	Father	Elder sibling	Other relative	Friend/ peer	Neighbor	Teacher	Stranger
1-4	28%	50%						23%
5-9	27%	29%		16%	10%	10%	10%	
10-14			13%	74%	13%			
15-17					100%			
1-17	17%	22%	4%	32%	13%	4%	4%	4%

Table 5.25: Known age of individual accompanying near drowning victim

Unknown: 3%

Age	11-15	16-19	20+
1-4			100%
5-9	16%	10%	74%
10-14		13%	87%
15-17		100%	
1-17	8%	13%	79%

Table 5.27: Known time of day near drowned child is determined to be missing

Unknown: 2%

Age	00:00-5:59	6:00-11:59	12:00-17:59	18:00-23:59
1-4				100%
5-9		42%	25%	33%
10-14			34%	66%
15-17			100%	
1-17		15%	26%	60%

Table 5.26: Known activity of mother/caregiver at time of near-drowning

Unknown: 9%

Age	Household chores	Gossiping	Working outside home	Accompany the child	Having a meal
1-4		100%			
5-9	35%	29%	10%	10%	17%
10-14	17%	65%		17%	
15-17			100%		
1-17	23%	49%	10%	10%	9%

Table 6.1: Transport mortality rates (per 100,000) by age

Age	All		
	n = 49	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9	8.7	2.1	20.5
10-14	12.3	4.9	23.0
15-17	61.3	36.3	90.8
1-17	17.0	10.7	24.1
1-17	17.0	10.7	24.1

Table 6.2: Transport mortality rates (per 100,000) by year of age

Age	All		
	n = 49	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1			
2			
3			
4			
5			
6	17.0	2.1	51.4
7	8.7	0.6	29.3
8	16.8	0.4	78.5
9	0.0		
10	8.3	0.0	43.7
11	9.1	0.7	30.1
12	4.5	0.3	14.9
13	4.5	0.0	23.7
14	35.2	14.7	64.4
15	20.0	4.8	47.9
16	96.0	37.0	184.4
17	68.7	31.4	119.7

Table 6.3: Transport mortality rates (per 100,000) by age and sex

Age	Male			Female		
	n = 37	95% Confidence Interval		n = 12	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4						
5-9	2.6	0.0	13.8	15.1	2.5	40.6
10-14	19.2	6.7	38.8	5.4	1.1	13.8
15-17	114.6	64.9	175.2	10.7	1.3	31.8
1-17	25.8	15.4	38.0	7.9	2.9	15.4

Table 6.4: Transport mortality rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 13	95% Confidence Interval		n = 36	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4						
5-9	6.1	0.0	32.0	10.0	1.7	26.8
10-14	2.5	0.0	13.2	17.4	6.4	34.1
15-17	78.2	35.8	135.7	51.6	24.8	87.4
1-17	16.8	7.3	30.2	17.0	9.9	25.5

Table 6.5: Transport morbidity rates (per 100,000) by age

Age	All		
	n = 500	95% Confidence Interval	
	Rate	Lower	Upper
Infant	22.3	0.0	68.4
1-4	101.3	31.7	170.8
5-9	282.2	179.3	385.1
10-14	489.4	355.4	623.3
15-17	1232.5	927.5	1537.5
1-17	471.6	361.0	582.2

Table 6.6: Transport morbidity rates (per 100,000) by year of age

Age	All		
	n = 500	95% Confidence Interval	
	Rate	Lower	Upper
Infant	22.3	0.0	68.4
1			
2	129.9	0.0	303.2
3	104.7	3.1	206.2
4	147.6	48.7	246.6
5	189.9	57.5	322.3
6	276.3	133.2	419.4
7	282.5	109.0	456.0
8	417.9	151.6	684.3
9	226.2	112.3	340.1
10	247.5	122.3	372.8
11	267.5	115.9	419.1
12	560.2	337.8	782.7
13	475.3	223.8	726.8
14	873.1	559.5	1186.7
15	908.5	556.6	1260.3
16	1324.2	877.4	1771.1
17	1469.2	1019.3	1919.0

Table 6.7: Transport morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 333	95% Confidence Interval		n = 167	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant	45.8	0.0	132.9			
1-4	95.3	19.4	171.0	108.0	4.3	211.5
5-9	313.9	163.9	463.9	248.6	107.7	389.6
10-14	636.0	427.8	844.1	342.0	227.4	456.6
15-17	1911.9	1419.4	2404.5	588.2	335.6	840.9
1-17	657.4	470.7	844.1	318.8	217.8	419.7

Table 6.8: Transport morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 223	95% Confidence Interval		n = 277	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant				34.0	0.0	102.9
1-4	192.2	17.6	366.8	55.6	12.4	98.7
5-9	517.9	304.1	731.8	167.6	88.6	246.7
10-14	618.8	379.1	858.5	421.1	270.5	571.7
15-17	1359.2	1000.1	1718.3	1160.0	812.7	1507.3
1-17	633.3	468.1	798.6	387.9	277.8	498.0

Table 6.9: Mode of travel involved in fatal RTA

Age	Pedestrian	Bicycle	Motorcycle	Car	Other MV
1-4					
5-9	72%		11%	17%	
10-14	17%	5%	64%	7%	7%
15-17		5%	92%	3%	
1-17	14%	4%	74%	6%	2%

Table 6.10: Mode of travel involved in non-fatal RTA

Age	Pedestrian	Bicycle	Other NMV	Motorcycle	Car	Other MV
1-4	10%	46%		44%		
5-9	18%	50%		28%	1%	1%
10-14	6%	35%		52%	4%	3%
15-17	3%	5%	1%	88%	2%	1%
1-17	7%	25%	0%	64%	2%	2%

Table 6.11: Type of road user in fatal RTA

Age	Pedestrian	Driver/ operator	Passenger
5-9	72%	7%	21%
10-14	17%	55%	29%
15-17		82%	18%
1-17	14%	65%	21%

Table 6.12: Type of road user in non-fatal RTA

Age	Pedestrian	Driver/ Operator	Passenger
1-4	10%	29%	61%
5-9	18%	50%	31%
10-14	6%	70%	24%
15-17	5%	80%	16%
1-17	8%	69%	23%

Table 6.13: Known time of accident in fatal RTA by age

Unknown: 7%

Age	0000-0559	0600-1159	1200-1759	1800-2359
5-9		60%	40%	
10-14		23%	57%	20%
15-17	5%	28%	44%	23%
1-17	3%	32%	47%	19%

Table 6.14: Known time of accident in fatal RTA by role

Unknown: 7%

Role	0000-0559	0600-1159	1200-1759	1800-2359
Pedestrian		63%	31%	5%
Driver/operator	4%	22%	49%	25%
Passenger		40%	53%	8%

Table 6.18: Proportion of transport morbidity by severity and age

Severity	Infant n = 1		1-4 n = 22		5-9 n = 77		10-14 n = 172		15-17 n = 228		1-17 n = 499	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate	22.3	100	68.8	68	162.1	57	240.9	49	500.5	41	224.6	48
Major			32.5	32	87.0	31	182.4	37	468.6	38	171.1	36
Serious					33.1	12	59.7	12	248.6	20	71.3	15
Severe							6.4	1	14.8	1	4.6	1

Table 7.1: Burn mortality rates (per 100,000) by age, sex, and place of residence

Age	Urban Females n = 1 Rate	95% Confidence Interval Lower	Upper
Infant			
1-4			
5-9	6.2	0.0	32.8
10-14			
15-17			
1-17	1.6	0.0	23.1

Table 7.2: Burn morbidity rates (per 100,000) by age

Age	All n = 81 Rate	95% Confidence Interval Lower	Upper
Infant	72.2	0.0	187.2
1-4	105.2	43.6	166.8
5-9	49.7	17.2	82.3
10-14	85.6	57.2	114.1
15-17	72.9	25.6	120.2
1-17	77.8	48.5	107.0

Table 7.3: Burn morbidity rates (per 100,000) by age and sex

Age	Male n = 42 Rate	95% Confidence Interval Lower	Upper	Female n = 39 Rate	95% Confidence Interval Lower	Upper
Infant				147.8	0.0	385.8
1-4	163.7	68.1	259.2	41.6	0.0	95.5
5-9	35.7	9.5	62.0	64.6	13.1	116.0
10-14	111.4	67.8	155.0	59.8	16.5	103.0
15-17	33.6	0.0	72.2	110.2	44.1	176.2
1-17	89.0	53.7	124.3	66.1	36.0	96.3

Table 7.4: Burn morbidity rates (per 100,000) by age and place of residence

Age	Urban n = 48 Rate	95% Confidence Interval Lower	Upper	Rural n = 33 Rate	95% Confidence Interval Lower	Upper
Infant	209.5	0.0	568.6			
1-4	157.7	17.5	297.8	78.8	16.4	141.2
5-9	60.2	0.0	141.7	44.6	16.9	72.4
10-14	181.7	126.9	236.6	35.0	10.8	59.1
15-17	99.5	8.2	190.8	57.7	0.0	115.4
1-17	128.5	62.0	194.9	51.5	28.5	74.5

Table 7.5: Proportion of burn morbidity by severity and age

Severity	Infant n = 2		1-4 n = 16		5-9 n = 18		10-14 n = 31		15-17 n = 14		1-17 n = 79	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate	72.2	100	84.7	81	43.6	88	75.6	82	63.1	72	66.5	86
Major			7.0	7	4.8	10	10.1	11	4.9	6	7.0	9
Serious			13.4	13	1.4	3			5.0	6	4.3	5
Severe							6.4	7	14.8	17		

Table 7.6: Burn mechanism in non-fatal burns

Age	Flame	Hot liquid	Hot object	Explosive
Infant		100%		
1-4		84%	16%	
5-9	11%	73%	16%	
10-14	4%	63%	20%	12%
15-17	12%	64%	18%	6%
1-17	6%	70%	18%	6%

Table 7.10: Activity of person at time of non-fatal burning

Uknown: 5%

Age	Work (outside home)	Work (inside home)	Housework	Playing with fire/hot object	Heating/ warming body	Operating/r epairing vehicle	Eating/ drinking	Using/ watching fireworks	Sleeping
Infant							32%		68%
1-4	10%		37%	14%	6%	3%	30%		
5-9	3%		74%	15%	3%		6%		
10-14	6%	12%	46%	18%		9%	5%	4%	
15-17	15%		69%	8%			8%		
1-17	7%	5%	53%	15%	2%	5%	12%	1%	

Table 8.1: Fall mortality rates (per 100,000) by age, sex, and place of residence

Age	Urban Male n = 2	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9	5.9	0.0	31.5
10-14	5.0	0.0	26.2
15-17			
1-17	3.2	0.0	46.8

Table 8.2: Fall morbidity rates (per 100,000) by age

Age	All n = 437	95% Confidence Interval	
	Rate	Lower	Upper
Infant	86.2	0.0	200.8
1-4	282.5	169.3	395.7
5-9	414.6	261.3	567.8
10-14	545.6	349.8	741.4
15-17	300.1	197.0	403.2
1-17	407.0	273.6	540.3

Table 8.3: Fall morbidity rates (per 100,000) by age and sex

Age	Male n = 292	95% Confidence Interval		Female n = 145	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant	33.2	0.0	101.5	141.7	0.0	365.5
1-4	327.5	142.1	512.8	233.6	120.7	346.5
5-9	503.8	335.1	672.5	320.1	135.2	504.9
10-14	828.3	521.5	1135.0	261.5	159.9	363.0
15-17	383.4	241.1	525.6	221.2	84.0	358.3
1-17	545.7	375.5	716.0	264.3	165.7	363.0

Table 8.4: Fall morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 260	95% Confidence Interval		n = 177	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant	136.0	0.0	442.4	59.9	0.0	145.8
1-4	482.4	279.7	685.0	181.9	69.1	294.8
5-9	710.9	387.5	1034.3	270.6	139.1	402.1
10-14	721.6	569.2	873.9	452.7	209.1	696.4
15-17	520.3	346.6	693.9	174.1	64.1	284.2

Table 8.5: Level of non-fatal falls among children

Age	Same Level	Different Level
Infant	54%	46%
1-4	55%	45%
5-9	55%	45%
10-14	48%	52%
15-17	59%	41%
1-17	52%	48%

Table 8.6: Proportional non-fatal fall injury by age, place of residence, and height of fall

Uknown: 0.5%

Age	Same level		< 1m		1-5m		6-10m		>10m	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Infants	100%			100%						
1-4	52%	42%	37%	27%	12%	30%				
5-9	53%	40%	23%	18%	23%	42%	1%			
10-14	48%	33%	14%	18%	36%	41%	1%	8%		
15-17	65%	35%	9%		17%	65%	6%		3%	
1-17	53%	36%	19%	18%	25%	42%	2%	4%	0%	

Table 8.7: Proportion of non-fatal fall locations by age group

Age	Inside Home	Outside Home	Away from home
Infants	100%		
1-4	90%	6%	5%
5-9	58%	33%	9%
10-14	49%	33%	18%
15-17	38%	43%	20%
1-17	55%	31%	14%

Table 8.8: Severity of non-fatal falls by location of fall

Age	Inside Home	Outside Home	Away from home
Moderate	62%	63%	54%
Major	33%	30%	43%
Serious	4%	7%	3%
Severe	0%	1%	

Table 8.9: Severity by height of fall

Unknown: 1%

Age	< 1 m	1-5 m	6-10 m	>10 m
Moderate	66%	38%	22%	100%
Major	32%	53%	61%	
Serious	1%	8%	16%	
Severe	1%	1%		

Table 8.10: Places of same level non-fatal fall injuries

Unknown: 5%

Age	Bathroom	Bedroom	Kitchen	Sidewalk	Street	Workplace	Sports
Infants				50%			50%
1-4	10%	10%		20%	24%		3%
5-9		4%		18%	8%		41%
10-14	7%	2%	1%	8%	7%		54%
15-17	5%			4%	2%	3%	60%
1-17	5%	3%	0%	12%	9%	0%	45%

Age	Home (other)	Outside home	School	Store/ market	Beach/ park/ playground	Stairs	
Infants							
1-4	3%	26%			3%		
5-9	17%	8%	3%				
10-14	6%	5%	6%		2%	2%	
15-17	7%		11%	2%	6%		
1-17	9%	8%	5%	0%	2%	1%	

Table 8.11: Places of different level non-fatal fall injuries

Unknown: 3.5%

Age	Stairs	Tree	Roof /balcony	Furniture	Ladder	Vehicle	Canal/ ditch/drain/pit
Infants				100%			
1-4	16%	5%		68%		10%	
5-9	19%	44%	5%	14%		11%	3%
10-14	14%	53%	2%	6%	3%	9%	4%
15-17	13%	42%	7%	4%		4%	
1-17	17%	48%	3%	16%	2%	10%	3%

Age	Unlevel floor	Playground/ sports equipment	Natural cliff	Other man-made structure	Wall/fence	Rope	
Infants							
1-4				6%	3%		
5-9	2%	3%		4%	10%		
10-14		4%	1%	2%		1%	
15-17		7%		9%			
1-17	0%	3%	0%	4%	3%	0%	

Table 8.13: Proportion of fall morbidity by severity and age

Severity	Infant n = 4		1-4 n = 54		5-9 n = 133		10-14 n = 189		15-17 n = 57		1-17 n = 433	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate	86.2	100	209.1	74	284.4	69	307.2	56	170.3	57	255.0	63
Major			60.2	21	110.0	27	203.8	37	125.9	42	131.5	32
Serious			13.2	5	17.2	4	29.4	5	4.0	1	17.9	4
Severe					3.0	1	5.2	1			2.5	1

Table 9.1: Cut morbidity rates (per 100,000) by age

Age	All n = 143	95% Confidence Interval	
	Rate	Lower	Upper
Infant			0.0
1-4	75.7	40.1	111.3
5-9	125.7	62.9	188.5
10-14	186.5	114.9	258.1
15-17	115.8	43.6	188.1
1-17	132.2	83.6	180.8

Table 9.2: Cut morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 83	95% Confidence Interval		n = 60	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	82.8	38.2	127.3	68.0	13.0	122.9
5-9	109.1	68.1	150.1	143.3	35.1	251.6
10-14	225.7	175.7	275.7	147.1	28.7	265.5
15-17	111.5	41.6	181.5	119.9	20.0	219.8
1-17	140.3	105.1	175.6	123.8	48.9	198.7

Table 9.3: Cut morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 85	95% Confidence Interval		n = 58	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	139.3	81.3	197.2	43.7	0.0	90.0
5-9	188.3	36.3	340.3	95.3	31.7	158.9
10-14	333.9	199.3	468.5	108.8	49.2	168.3
15-17	154.2	22.4	285.9	93.9	32.4	155.4
1-17	218.4	124.9	311.9	87.6	45.2	129.9

Table 9.4: Proportion of cut morbidity by severity and age

Severity	Infant		1-4		5-9		10-14		15-17		1-17	
	n = 0		n = 14		n = 43		n = 66		n = 20		n = 143	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate			52.5	69	97.2	77	149.2	82	104.4	90	105.0	79
Major			23.2	31	26.1	21	27.1	15	11.4	10	23.2	18
Serious					2.4	2	6.3	3			2.7	2
Severe											1.3	1

Table 9.5: Categories of instruments causing non-fatal cut injury

Unknown: 0.25%

Age	Knife	Scissor	Firearm	Explosive/ fireworks	Needle	Broken glass/ plastic/tile	Wood/ plant	Barbed wire	Metal can
1-4	66%					16%			
5-9	49%	2%		2%		20%	5%	1%	
10-14	50%			1%	3%	13%	1%	4%	1%
15-17	71%		3%			8%			
1-17	55%	1%	1%	1%	1%	15%	2%	2%	1%

Age	Sword	Cotton bud	Farm utensil	Vehicle	Fan	Nail	Grinder	Pen/pencil	Shells/ rocks
1-4		46%				54%			
5-9					10%	64%	13%	13%	
10-14	3%		23%	3%		46%			24%
15-17						100%			
1-17	2%	4%	11%	2%	3%	60%	4%	4%	12%

Table 9.6: Activity with object in which injured child was engaged

Age	Work	Play	Neither
1-4		94%	6%
5-9	2%	79%	19%
10-14	11%	54%	35%
15-17	32%	17%	52%
1-17	10%	60%	30%

Table 9.8: Sharp object was easily accessible by victim

Age	Yes	No
1-4	39%	61%
5-9	64%	36%
10-14	57%	43%
15-17	64%	39%
1-17	58%	43%

Table 10.1: Falling object morbidity rates (per 100,000) by age

Age	All		
	n = 39	105% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	26.8	40.1	111.3
5-10	35.4	62.9	188.5
10-14	27.4	114.9	258.1
15-17	52.0	43.6	188.1
1-17	33.7	26.4	41.0

Table 10.2: Falling object morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 28	105% Confidence Interval		n = 11	105% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	17.5	0.0	36.1	36.8	0.0	88.4
5-10	51.4	11.3	91.5	18.4	6.4	30.3
10-14	33.8	6.0	61.5	20.9	20.2	21.7
15-17	96.8	3.3	190.2	9.5	0.0	28.0
1-17	45.5	30.2	60.7	21.7	7.3	36.0

Table 10.3: Falling object morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 27	105% Confidence Interval		n = 12	105% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	52.7	0.0	127.4	13.7	0.0	28.3
5-10	71.9	18.1	125.7	17.6	0.0	35.5
10-14	55.2	28.3	82.2	12.7	0.0	29.5
15-17	106.5	29.7	183.4	20.7	0.0	61.5
1-17	68.6	53.6	83.7	15.7	6.3	25.0

Table 10.4: Proportion of falling object morbidity by severity and age

Severity	Infant		1-4		5-9		10-14		15-17		1-17	
	n = 0		n = 6		n = 12		n = 11		n = 10		n = 39	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate			26.8	100	22.2	63	18.5	68	47.1	91	26.4	78
Major					13.1	37	8.9	32	4.9	9	7.4	22
Serious												
Severe												

Table 10.5: Location where victim was struck by falling object

Age	Home	School	Work	Street	Fair/public event	Farm
1-4	100%					
5-9	32%	47%		8%		13%
10-14	40%	52%				9%
15-17	36%	36%	9%	9%	9%	
1-17	47%	37%	2%	5%	2%	6%

Table 10.6: Types of falling objects causing injury to children

Age	Tree/branch	Rock/ landslide	Flower pot	Iron	Pole	Coconut	Other large object
1-4	23%	18%					
5-9	22%	25%		8%		13%	
10-14	10%	11%	9%	8%	9%		17%
15-17	9%	9%	19%	9%			
1-17	16%	16%	7%	7%	2%	4%	5%

Age	Hand tool	Door	Furniture	Sport item	Vehicle	Other small object
1-4		48%			11%	
5-9		7%	8%	16%		
10-14	9%	9%		21%		
15-17			25%	9%	9%	9%
1-17	2%	13%	9%	13%	4%	2%

Table 10.7: Type of falling object causing injury to children, by sex

ect Age	Male	Female
Tree/branch	19%	8%
Rock/landslide	18%	10%
Flower pot	7%	8%
Iron	7%	8%
Pole	3%	
Coconut	5%	
Other large object	7%	
Hand tool		8%
Door	3%	35%
Furniture	9%	8%
Sport item	15%	8%
Vehicle	6%	
Other small object		8%

Table 10.8: Severity of injury by falling object

Age	Moderate	Major
Rock/landslide	100%	
Tree/branch	79%	21%
Door	100%	
Sport item	45%	55%
Furniture	100%	
Flower pot	67%	33%
Iron	100%	
Other large object		100%
Vehicle	100%	
Coconut		100%
Pole	100%	
Hand tool	100%	
Other small object	100%	

Table 11.1: Poison morbidity rates (per 100,000) by age

Age	All		
	n = 9	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	9.4	8.8	10.0
5-9	5.9	-5.7	17.6
10-14	2.6	-2.5	7.7
15-17	21.2	5.0	37.3
1-17	8.3	6.0	10.5

Table 11.2: Poison morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 6	95% Confidence Interval		n = 3	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4	9.0	0.0	26.7	9.8	0.0	29.0
5-9	5.8	0.0	17.1	6.1	0.0	18.1
10-14	5.2	0.0	15.5			
15-17	33.5	0.0	80.8	9.5	0.0	28.0
1-17	10.9	5.9	16.0	5.5	3.1	8.0

Table 11.5: Substances causing non-fatal accidental poisoning

Age	Pesticides	Soap/ detergents	Kerosene	Cosmetic/hair products	Glue
1-4		50%			50%
5-9		100%			
10-14		100%			
15-17	31%	23%	23%	23%	
1-17	14%	53%	10%	10%	13%

Table 11.6: Storage location of poison ingested by victim

Age	Kitchen	Bedroom	Bathroom	Storage Room	Garden/ Yard
1-4			50%	50%	
5-9	50%		50%		
10-14					100%
15-17		23%	23%	54%	
1-17	10%	10%	33%	37%	10%

Table 11.7: Poison easily accessible to victim

Age	Yes	No
1-4	100%	
5-9	100%	
10-14	100%	
15-17	100%	
1-17	100%	

11.8: Poison is in original container when accessed by victim

Age	Yes	No
1-4	50%	50%
5-9	50%	50%
10-14	100%	
15-17	77%	23%
1-17	67%	33%

Table 11.9: Proportion of poison containers by age group

Age	Bottle	Can	Strip	Other
1-4			50%	50%
5-9	50%	50%		
10-14	100%			
15-17	54%			46%
1-17	44%	10%	13%	33%

Table 11.10: Proportion of poison format by age group

Age	Pill/tablet	Liquid	Powder
1-4	100%		
5-9		50%	50%
10-14		100%	
15-17		100%	
1-17	26%	64%	10%

Table 11.11: Proportion of poison container tops by age group

Age	Screw	Flip	Lid	Paper/platic/ rubber band
1-4			50%	50%
5-9		50%		50%
10-14	100%			
15-17	100%			
1-17	54%	10%	13%	23%

Table 12.1: Animal attack mortality rates (per 100,000) by age

Age	All		
	n = 2	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	5.4	0.0	31.8
5-9			
10-14	1.9	0.0	10.2
15-17			
1-17	1.8	0.1	6.4

Table 12.2: Animal attack morbidity rates (per 100,000) by age

Age	All		
	n = 240	95% Confidence Interval	
	Rate	Lower	Upper
Infant	16.2	0.0	49.8
1-4	168.4	82.9	253.9
5-9	240.8	144.1	337.5
10-14	318.0	202.2	433.9
15-17	107.2	53.1	161.2
1-17	226.1	148.3	303.9

Table 12.3: Animal attack morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 158	95% Confidence Interval		n = 82	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant	31.6	0.0	97.2			
1-4	217.6	73.3	361.9	115.0	26.1	203.9
5-9	319.9	174.4	465.5	156.9	78.2	235.7
10-14	417.5	258.6	576.5	218.0	80.9	355.1
15-17	120.9	0.0	244.3	94.1	28.1	160.2
1-17	294.1	185.9	402.4	156.2	84.8	227.7

Table 12.4: Animal attack morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 117	95% Confidence Interval		n = 123	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant				24.7	0.0	74.7
1-4	170.5	42.3	298.7	167.3	46.9	287.8
5-9	303.4	189.8	417.0	210.4	87.8	332.9
10-14	479.2	318.2	640.2	233.0	125.2	340.8
15-17	164.0	59.5	268.5	74.6	12.0	137.2
1-17	305.3	215.2	395.4	185.2	96.3	274.0

Table 12.6/12.7: Proportion of animal attack morbidity by severity and age and place of residence

	Severity	Infant n = 1		1-4 n = 30		5-9 n = 76		10-14 n = 112		15-17 n = 21		1-17 n = 239	
		Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Urban	Moderate			162.8	95	3395.8	79	7055.8	87	1324.8	84	260.9	85
	Major			7.7	5	893.5	21	959.4	12	128.5	8	39.5	13
	Serious							128.7	2	128.5	8	4.9	2
	Severe												
Rural	Moderate	24.7	100	142.4	85	4643.0	76	6821.3	91	916.1	73	154.8	84
	Major			24.9	15	1476.5	24	510.9	7	341.1	27	28.7	15
	Serious							175.3	2			1.7	1
	Severe												

Table 12.8: Animals causing non-fatal injury in urban areas

Age	Insect	Pet dog	Stray dog	Pet cat	Stray cat	Snake	Rat/mouse	Monkey
1-4	18%	67%		15%				
5-9	14%	56%	12%	9%	3%		3%	3%
10-14	14%	41%	27%	11%		7%		
15-17	28%	39%	16%	8%		8%		
1-17	16%	48%	19%	10%	1%	5%	1%	1%

Table 12.9: Animals causing non-fatal injury in rural areas

Age	Insect	Pet dog	Stray dog	Pet cat	Stray cat	Snake	Buffalo	Cow
1-4		54%	9%	23%	14%			
5-9	15%	62%	15%	6%		2%	1%	
10-14	22%	41%	27%	7%				3%
15-17	6%	53%	30%				11%	
1-17	14%	51%	19%	9%	3%	1%	1%	1%

Table 12.10: Reasons for non-fatal animal injury in urban areas

Age	Playing/ disturbing	Feeding	Unprovoked	Rabid animal	Accidentally disturbed	Other	Ride bicycle/ motorcycle
1-4	47%		53%				
5-9	60%	4%	33%		3%	1%	
10-14	44%	2%	49%	4%			1%
15-17	45%		43%	11%			
1-17	49%	2%	45%	3%	1%	0%	1%

Table 12.11: Reasons for non-fatal animal injury in rural areas

Age	Playing/ disturbing	Feeding	Unprovoked	Rabid animal	Accidentally disturbed	Other	Ride bicycle/ motorcycle
1-4	66%		30%			4%	
5-9	66%		17%	6%	8%		3%
10-14	56%	5%	28%	6%	4%	1%	
15-17	12%		63%	11%			14%
1-17	58%	2%	28%	5%	4%	1%	2%

Table 12.12: Type of non-fatal animal injury in urban areas

Age	Bite	Laceration
1-4	90%	10%
5-9	100%	
10-14	92%	8%
15-17	100%	
1-17	95%	5%

Table 12.13: Type of non-fatal animal injury in rural areas

Age	Bite	Kick	Step on	Laceration
1-4	77%			23%
5-9	93%			7%
10-14	86%	4%		10%
15-17	88%		12%	
1-17	86%	2%	1%	11%

Table 12.14: Insect type causing non-fatal injury in urban areas

Age	Bee/wasp	Scorpion	Other
1-4	100%		
5-9	58%		42%
10-14	38%	39%	23%
15-17	71%		29%
1-17	58%	17%	25%

Table 12.15: Insect type causing non-fatal injury in rural areas

Age	Bee/wasp	Scorpion	Other
1-4			
5-9	73%	27%	
10-14	93%		7%
15-17	100%		
1-17	87%	9%	4%

Table 13.1: Electrocution mortality rates (per 100,000) by age, sex, and place of residence

Age	Urban Male		
	n = 1	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9			
10-14	5.9	0.0	31.1
15-17			
1-17	1.6	0.0	23.0

Table 13.2: Electrocution morbidity rates (per 100,000) by age

Age	All		
	n = 13	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9	5.1	0.0	12.8
10-14	9.5	0.0	19.3
15-17	31.9	0.0	67.7
1-17	10.0	0.1	19.9

Table 13.3: Electrocution morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 11	95% Confidence Interval		n = 2	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4						
5-9	7.1	0.0	21.1	2.9	0.0	8.6
10-14	19.0	0.0	38.4			
15-17	55.5	0.0	114.8	9.5	0.0	28.0
1-17	17.2	0.5	34.0	2.5	0.0	6.2

Table 13.4: Electrocution morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 6	95% Confidence Interval		n = 7	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4						
5-9	11.2	0.0	33.1	2.1	0.0	6.2
10-14	7.6	0.0	22.4	10.5	0.0	23.3
15-17	40.0	0.0	118.6	27.2	0.0	61.1
1-17	12.8	0.0	38.0	8.5	0.9	16.1

Table 13.5: Proportion of electrocution morbidity by severity and age

Severity	Infant		1-4		5-9		10-14		15-17		1-17	
	n = 0		n = 0		n = 3		n = 4		n = 6		n = 13	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate					3.0	59	9.5	100	27.0	85	9.0	86
Major					0.7	14			4.9	15	1.1	10
Serious					1.4	28					0.4	4
Severe												

Table 14.1: Machine tool injury morbidity rates (per 100,000) by age

Age	All		
	n = 6	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	2.9	0.0	8.7
5-9	1.1	0.0	3.2
10-14			
15-17	30.1	0.0	60.9
1-17	6.1	0.8	11.5

Table 14.2: Machine tool injury morbidity rates (per 100,000) by age and sex

Age	Male			Female		
	n = 2	95% Confidence Interval		n = 4	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4				6.1	0.0	18.2
5-9	2.1	0.0	6.2			
10-14						
15-17	22.8	0.0	67.6	36.9	0.0	79.4
1-17	4.4	0.0	11.9	8.0	0.1	15.9

Table 14.3: Machine tool injury morbidity rates (per 100,000) by age and place of residence

Age	Urban			Rural		
	n = 3	95% Confidence Interval		n = 3	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant						
1-4				4.4	0.0	13.1
5-9				1.6	0.0	4.7
10-14						
15-17	60.4	0.0	133.2	12.7	0.0	37.7
1-17	11.1	0.0	24.4	3.6	0.0	8.0

Table 14.4: Proportion of machine tool morbidity by severity and age

Severity	Infant		1-4		5-9		10-14		15-17		1-17	
	n = 0		n = 1		n = 1		n = 0		n = 4		n = 6	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate					1.1	100			17.1	57	3.3	53
Major			2.9	100					8.1	27	2.1	33
Serious									4.9	16	0.8	14
Severe												

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

Age	Female		
	n = 2	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9			
10-14			
15-17	5.1	0.4	17.0
1-17	0.9	0.1	3.2

Table 15.2: Self harm morbidity rates (per 100,000) by age, sex, and place of residence

Age	Urban Females		
	n = 3	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9			
10-14	5.2	5.1	5.4
15-17	4.2	0.0	12.5
1-17	2.4	1.0	3.8

Table 15.5: Severity of suicide attempt by method of attempt

Age	Poisoning	Wrist cutting
moderate		100%
major	50%	50%

Table 16.1: Homicide rates (per 100,000) by age and sex

Age	Male n = 2	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4			
5-9			
10-14			
15-17	12.4	0.9	42.5
1-17	2.0	0.1	7.2

Table 16.2: Assault morbidity rates (per 100,000) by age

Age	All n = 40	95% Confidence Interval	
	Rate	Lower	Upper
Infant			
1-4	4.7	0.0	13.9
5-9	20.0	6.2	33.7
10-14	34.2	13.8	54.6
15-17	94.3	37.3	151.2
1-17	33.9	19.8	48.0

Table 16.3: Assault morbidity rates (per 100,000) by age and sex

Age	Male n = 30	95% Confidence Interval		Female n = 10	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant			0.0			0.0
1-4			0.0	23.9	0.0	47.8
5-9	23.9	0.0	47.8	42.7	0.0	85.5
10-14	42.7	9.2	76.3	179.8	0.0	359.7
15-17	179.8	77.8	281.9	50.1	0.0	100.3
1-17	50.1	31.0	69.3	17.2	2.3	32.1

Table 16.4: Assault morbidity rates (per 100,000) by age and place of residence

Age	Urban n = 26	95% Confidence Interval		Rural n = 14	95% Confidence Interval	
	Rate	Lower	Upper	Rate	Lower	Upper
Infant			0.0			0.0
1-4	14.0	0.0	28.1			0.0
5-9	38.5	10.0	66.9	11.0	0.0	22.0
10-14	56.5	19.6	93.3	22.5	0.7	44.3
15-17	168.1	25.4	310.7	52.0	14.2	89.8
1-17	62.7	35.3	90.2	19.0	7.3	30.6

Table 16.5: Proportion of assault morbidity by severity and age

Severity	Infant n = 0		1-4 n = 1		5-9 n = 6		10-14 n = 13		15-17 n = 20		1-17 n = 40	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Moderate					5.9	30	24.6	72	70.6	75	21.7	64
Major			4.7	100	14.0	70	1.4	4	17.8	19	8.5	25
Serious							5.2	15	5.9	6	2.7	8
Severe							3.0	9			1.0	3

Table 16.7: Context of non-fatal assault

Unknown: 3%

Age	Quarrel/ fight	Other
1-4		100%
5-9	47%	53%
10-14	79%	21%
15-17	95%	5%
1-17	78%	22%

Table 16.9: Perpetator of non-fatal assault

Unknown: 4%

Age	Parent/ step-parent	Close relative	Other Relative	Friend	Stranger	Student rivals
1-4	100%					
5-9	15%		15%	70%		
10-14	8%	8%	12%	64%	10%	
15-17				57%	37%	6%
1-17	8%	3%	6%	60%	20%	3%

Table 11.5: Substances causing non-fatal accidental poisoning

Age	Pesticides	Soap/ detergents	Kerosene	Cosmetic/hair products	Glue
1-4		50%			50%
5-9		100%			
10-14		100%			
15-17	31%	23%	23%	23%	
1-17	14%	53%	10%	10%	13%

Table 16.12: Object used in medically significant assaults

Age	Stick/club	Knife/ cutting tool	Gun/firearm	Person (e.g. fists, feet)	Other
1-4	100%				
5-9	45%			55%	
10-14	54%		32%		14%
15-17	45%	32%		23%	
1-17	51%	11%	8%	26%	4%

Appendix D

Contributors

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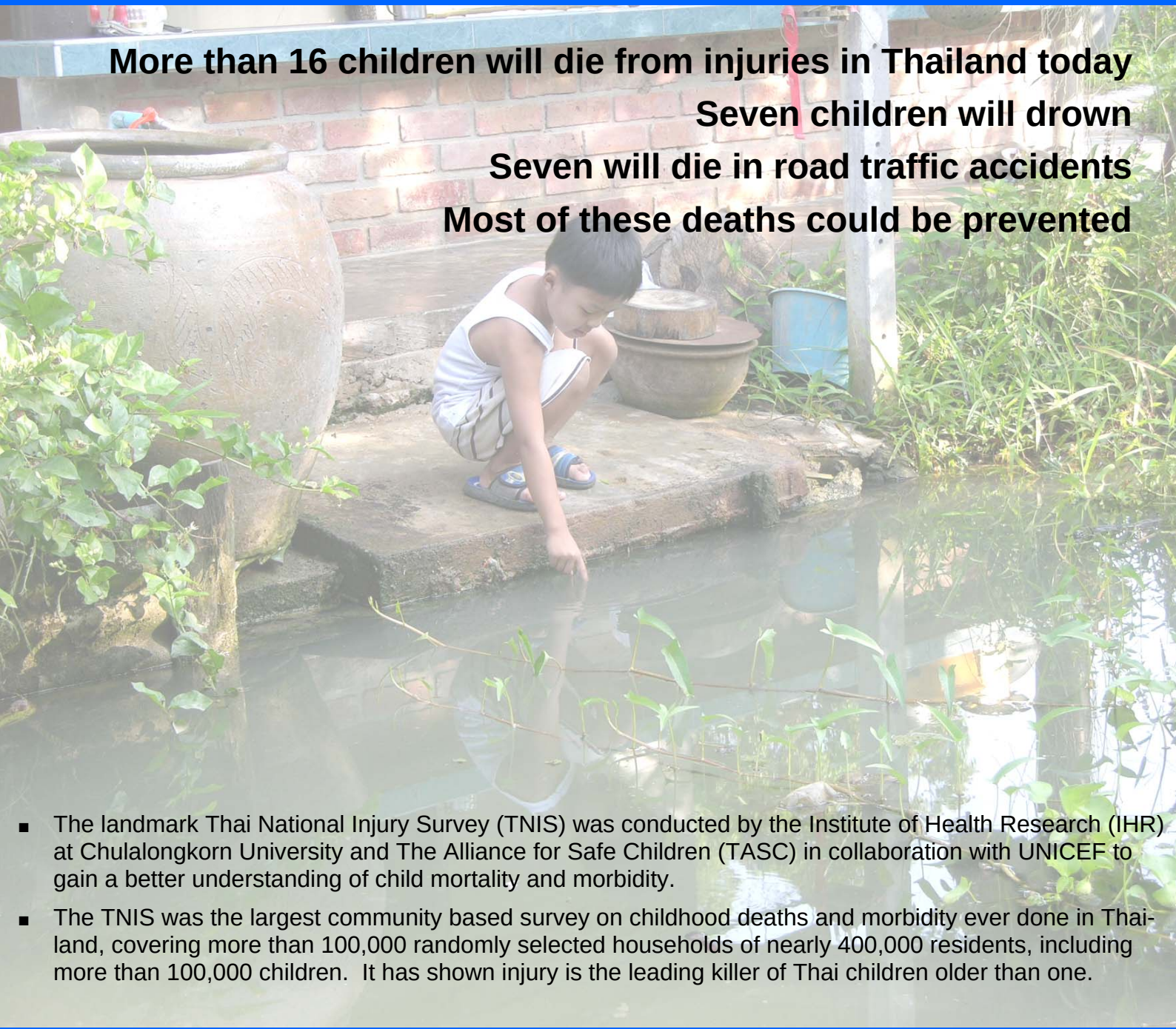
This document, *Child Injury in Thailand: A Report on the Thai National Injury Survey,* (TNIS) provides details on the largest community based survey on child mortality and morbidity ever conducted in Thailand. The sample size of 100,179 households covered a total survey population of 390,000 which included close to 99,000 children younger than 18.

The TNIS addresses all causes of death and helps characterize the causes within each age group. While communicable and non-communicable diseases are important concerns in child health, especially for very young children and infants, injury has emerged as a significant threat to the health and welfare of children after infancy. Details on the types of injuries and the ages which those are occurring bring focus to a problem that many still consider unavoidable. The facts are that many practical things can be done to prevent child injuries and to mitigate their long term effects.

Given the long term economic and social costs to Thailand, addressing child injury should be a matter of national priority.

The Thai National Injury Survey



More than 16 children will die from injuries in Thailand today

Seven children will drown

Seven will die in road traffic accidents

Most of these deaths could be prevented

- The landmark Thai National Injury Survey (TNIS) was conducted by the Institute of Health Research (IHR) at Chulalongkorn University and The Alliance for Safe Children (TASC) in collaboration with UNICEF to gain a better understanding of child mortality and morbidity.
- The TNIS was the largest community based survey on childhood deaths and morbidity ever done in Thailand, covering more than 100,000 randomly selected households of nearly 400,000 residents, including more than 100,000 children. It has shown injury is the leading killer of Thai children older than one.

90th Anniversary of Chulalongkorn University — www.chula.ac.th

TASC The Alliance for Safe Children — www.tasc-gcipf.org

unicef — www.unicef.org

Ministry of Public Health — www.moph.go.th

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