

Childhood Accidents: an Emerging Concern

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ABSTRACT

The study of childhood and injury prevention is emerging as a legitimate field of clinical practice and research in pediatrics and community health. In the Philippines, accidents rank sixth both in terms of morbidity and mortality. Children and adolescents comprise a sizeable number of cases, accounting for about 40% of the total number of accidents.

In terms of serious disability, medical costs and morbidity, the total impact of childhood injuries is enormous. An accident is defined by the World Health Organization as an event which is independent of human willpower, caused by an external force, acts rapidly and results in bodily or mental damage. Haddon defines injury as a damage by a transfer of energy from a hazardous agent to a susceptible host in a conducive environment. The leading causes of injuries in the Philippines are traffic accidents, drowning, falls, burns and poisoning. Most injuries occur at home and in school. The interactive model of agent-host-environment can be adopted for understanding childhood injuries. A developmental approach that emphasizes that children have different cognitive, perceptual, motor, and language competencies can provide a better understanding of the child's contributions to the occurrence of injuries. A good injury prevention program depends on significant researches on accident and injury prevention. Clinical, epidemiological, and biotechnical research can provide a basis for rational prevention of accidents. Educational packages for injury should be prepared by medical schools, hospitals, and health organizations. Pediatricians must advocate for legislation and enforcement of laws on injury prevention, cost efficient preventive measures, good accident data collection. The creation of national, regional, and local safety committees will accelerate a national injury prevention program.

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Introduction

The study of childhood injuries and injury prevention is emerging as a legitimate field of clinical practice and research in pediatrics and community health. With the significant decrease in infant and child mortality due to communicable disease and malnutrition, deaths due to injuries are gaining prominence. In industrialized countries, injuries are the chief causes of death in children between ages of 1 and 15. In the Philippines, the number of fatal injuries is still high although deaths from injuries are lost among other causes, like infections, which are statistically more numerous. In terms of serious disability, medical costs, and morbidity, the total impact of childhood injuries, is enormous.

A number of definitions have been suggested to cover the concept of an accident or injury. The term "accident" has been abandoned in favor of the more accurate term "injury". This represents a change of attitude from the idea of accidents as random, chance, uncontrollable events to the recognition of injuries as describable epidemiologic conditions that can be controlled and prevented. The use of the term "accident" implies unpredictability. However, the reality is that injuries are no more likely to occur by chance than are diseases. The nature of injury, just like a disease varies with age, sex, and a number of other factors. Not every child has the same probability of being injured therefore, injuries are not random events. As the experts succinctly state, "an injury is not accident."

The World Health Organization (WHO) defines an accident as an event which is independent of human willpower, caused by an external force, acts rapidly, and results in bodily or mental damage.

Haddon defines injury as any damage caused by a transfer of energy (chemical, mechanical, thermal, electrical or radiation) from a hazardous agent to a susceptible host in a conducive environment (physical and social).

The use of the term "injury" allows separation of the event (accident) from its consequences (injuries) and advocates the application of a scientific approach to the injury epidemic; the most important aspect is PRIMARY PREVENTION. These are the programs and strategies to be implemented before any accident ever happens. SECONDARY PREVENTION are the strategies in order to minimize the severity of the resulting injuries.

The Philippine Health Statistics (PHS, 1992) ranks injuries as the fifth among the ten leading causes of morbidity and sixth among the ten leading causes of

mortality in the general population (Figures 1 and 2). This rank represents a five-year average from 1987 to 1991. Of those who died, only about 35% (1990) were attended by a health worker.

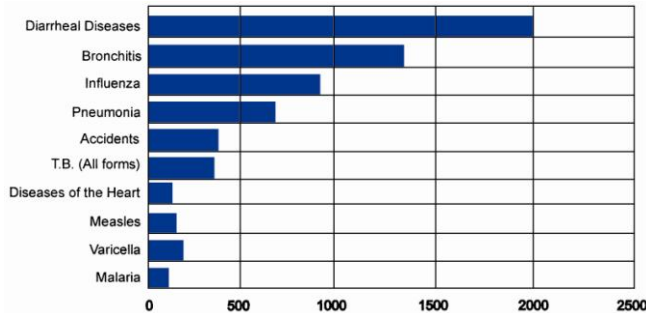


Figure 1. Morbidity: Ten Leading Causes
Rate per 100,000 Population, Philippines, 1993

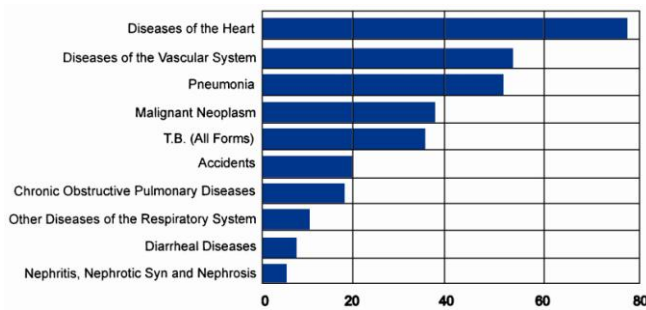


Figure 2. Mortality: Ten Leading Causes
Rate per 100,000 Population, Philippines, 1993

In our own survey, as well as, in the date of the Philippine Health Statistics (1992), the leading causes of injuries are traffic accidents, submersion injury or drowning and near drowning, falls, burns, poisoning. Most injuries with children occur at home and in school.

The patterns of injury vary in different cultures, economies, and climates. In most of Asia, just like the Philippines, the leading causes of injuries are vehicular or traffic accidents and drowning.

Mortality statistics are not the best measure of the grave consequences of childhood injuries. An alternate parameter is the number of working years of life lost, calculated on the basis of life expectancy. This parameter brings out more clearly the gravity of injuries which occur primarily in childhood and take a high toll of young and potentially productive lives. As shown in Figure 3, injury is the primary cause of the loss of more years of life than all forms of cancer and heart disease combined. Only AIDS is now beginning to compete with accident and violence as a cause of death in these age groups.

Morbidity statistics locally are less adequate than the mortality data. Not very much is known about the number

and the consequences of accidents that are not fatal. However, various epidemiological studies make it possible to state the following: for one fatal injury there are between 200 to 900 nonfatal injuries leading to about 10 hospitalizations: between one and four handicaps with permanent invalidity resulting from these accidents. Other studies have shown that every year between 6% and 10% of all children consult a doctor as a result of an injury. A study done a few years ago indicate that almost 40% of children suffer an injury each year that results in medical consultation or at least one restricted activity per day like absence from school or staying in bed.

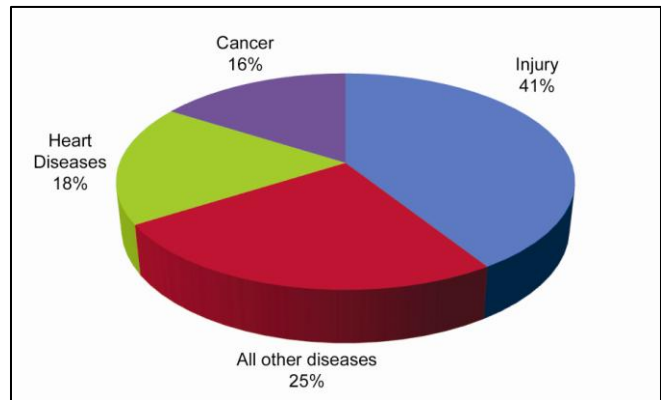


Figure 3. Percentage years of potential life lost to injury, cancer, diseases, and other diseases before age 65.

Table 1. Injury Priorities in Asia

COUNTRY	MAJOR CAUSES
HONG KONG	Transport Homicide, other violence
TAIWAN	Suicide Traffic Burns Falls
MALAYSIA	Foreign body in airway Transport Burns
SINGAPORE	Poisoning Traffic Drowning Falls, Head Injuries Hanging, Strangulation Burns
INDONESIA	Poisoning Traffic Accident Falls Poisoning Drowning Work-related Injuries
THAILAND	Drowning Burns Transport Falls Intoxication Animal Bites (snakes, dogs)

(Source: 9th Asian Congress of Pediatrics, Hong Kong, March 1997)

In the local studies that we did, the following were the epidemiological features noted:

- The types of childhood injuries have a relationship with the child's age and development. Younger children get injured at home, whereas children get injured outside the home – on the way to school or in the school campus.
- The data shows a predominance of males over females in the number of childhood injuries.
- More injuries occurred during the daytime (7:00a.m. to 6:00p.m.) when children are most active and at play either at home, in school, or even on the streets.
- There were more injuries among children of families in the low income group and in those undergoing stress like parental separation or parental illness.
- Increasing urbanization was associated with an increase in traffic injuries. Good roads lead to over speeding and vehicular injuries.
- In most injuries at home and in schools, fall and burns were the most common types of accidents in these settings. The common resulting injuries were lacerations, contusions, and abrasions.
- Kerosene and isoniazid were the leading causes of accidental poisoning.
- Physical abuse was common among male adolescents who were usually involved in teenage fights or rumbles. Female child abuse was usually family-related molestation.
- Drowning usually involved a daring and curious male child, less than 10 years old. The high incidence of drowning cases is related to the long coastline of the country's 7,100 islands.
- Cases of bites were mostly caused by dogs. Filipino families love to keep dogs as their pets. There is no good local data on snake bites, a major problem in other Asian countries.

Prevention of accidents requires a good knowledge of their "natural history." The interactive model of agent-host-environment has long been used to describe the epidemiology of communicable diseases and can be adopted for understanding childhood injuries as illustrated in Figure 4.

Any accident involves the following: the person who has the accident, in this case, a child or adolescent; the physical or human environment in which the person lives; and the agent of the accident itself.

Since a child is concerned, he or she has neither the experience nor the psychomotor and sensory capacity of an adult. He is thus more vulnerable.

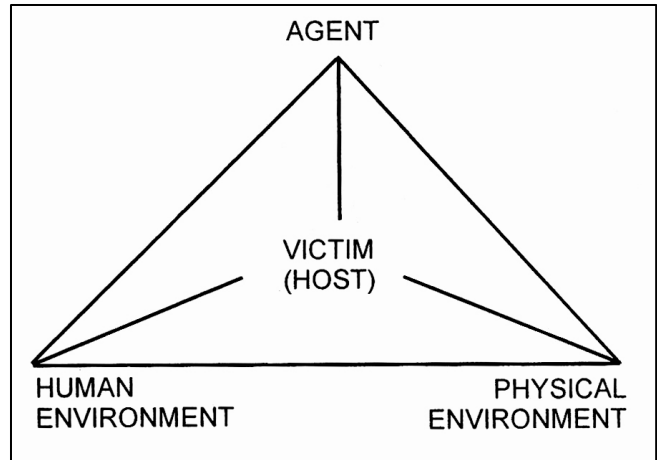


Figure 4. Epidemiologic Framework: The Agent-Host Environmental Model

The human environment obviously plays an important role. The fact that the child is under the supervision of an adult does not always prevent accidents. More than half of the accidents happen in the presence of an adult, perhaps in a moment of absent-mindedness, or simply because the adult did not imagine that the situation posed any danger for the child. The physical environment includes not only the physical situation, like vehicles, staircases, or scalding hot tap water, but also the psychosocial one. Serious stresses within the family, like a parent in the hospital, may create an environment in which a child is more likely to be injured.

The agent of the injury is the form of energy that damages body issues. For example, in a flame burn, the thermal energy damages cells, tissues, and blood vessels. In many poisonings, a chemical reaction interrupts the body's ongoing metabolic processes.

A developmental approach that emphasizes that children have different cognitive, perceptual, motor, and language competencies can provide a better understanding of the child's contributions to the occurrence of injuries. This approach characterizes the child in terms of the "how", "why", and "what" of this behavior. The "how" of children's behavior reflects the child's behavioral style or temperament. The "why" reflects the child's motivations to accomplish certain tasks. The "what" of behavior involves what children are capable of doing, their competencies at different ages.

Temperament is defined as the child's behavioral style when interacting with the environment. It describes how a child behaves rather than what he/she can do or why he/she does it. Thus a child can be classified as a difficult child, easy child, or a slow to warm up child. Motivation reflects the child's interest in accomplishing a task. The first aspect of motivation is the normal drive for autonomy. The children want to do things whether they are physically able to or not.

For example, older children want to learn how to strike a match, ride bicycles further away from home or climb trees.

Child Development & Injuries	
TEMPERAMENT – the “how” of behavior	<ul style="list-style-type: none"> • difficult child • easy child • slow to warm up child
MOTIVATION – the “why” of behavior	<ul style="list-style-type: none"> • autonomy • imitating behavior • risk-taking or self-destructive behaviors
COMPETENCIES – the “what” of behavior	<ul style="list-style-type: none"> • infants • pre-school • school age • adolescent

A second motivational incentive is the child’s interest in imitating behavior, especially that seen in the movies or television, and this may be a contributing factor to injuries. A third aspect of motivation includes risk-taking or self-destructive behaviors. The child may be motivated to injure himself as a consequence of family or peer stress. Children from emotionally impoverished homes demonstrate a general lack of bodily care, heedlessness, and lack of self-protective caution.

Epidemiologic data suggest a relationship between ages or developmental stages and types of injuries. By examining children’s functioning during certain developmental stages, we can propose theoretical and common sense reasons for risk to certain injuries.

The infant’s normal drive for autonomy, their relatively underdeveloped motor coordination, their inability to adequately perceive danger, control their impulses, or understand the consequences of their actions, explain why children at this development stage experience a high rate of injuries during childhood.

Preschool-age children have cognitive limitations. Parents need to continually remind children not to do certain things. The emphasis at this age should be that certain behaviors – hitting, throwing stones at people, and crossing the street are not acceptable. While they learn to accomplish certain motor tasks, the quality of their performance may be poor.

School-age children tend to be daring and adventurous. They are inclined to challenge rules. Road and traffic safety should be emphasized to them. These children do not understand many traffic terms and signs. They have a reduced ability to localize sounds and impaired perception of movement in their peripheral visual fields. They are still unable to appreciate speed and danger and this is aggravated by their physically being at a lower eye level. Their distractibility and impulsiveness increase the risk of traffic injury at this age.

The adolescent’s intellectual ability is better developed. They become overly involved in abstract matters and

sometimes lose touch with reality. They develop a feeling of immortality. This, combined with an innate need for experimentation, a tendency to imitate the behavior of older adolescents and adults, and the pressure of one’s peer group can lead to serious consequences in terms of injuries.

A knowledge of children’s developmental characteristics and behavior has at least two important implications. First, it will provide a framework for clinicians who want to individualize their injury prevention counseling to patients and their parents. Second, it will provide a framework for possible future research.

Compared to other major public health problems there has been little research in the field of injuries. This is due to insufficient funding, few scientists trained in epidemiology on injury control, and a negative perception that injury control is not a legitimate social and scientific pursuit. The reasons often cited by physicians are that:

- Physicians are too busy with treatment
- Injury research: not of medical interest
- Injuries: not important medical problem
- Diseases, not “ACCIDENTS,” are the concern of health professionals

The number of years of life lost annually due to injuries is much more compared to those of cancer and heart disease combined. However, the resources abroad allocate for cancer research alone are about 10 times greater than those devoted to accident research.

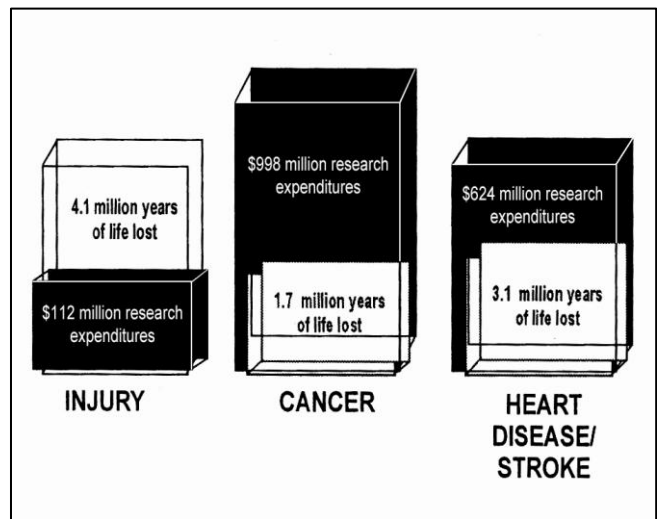


Figure 5. Pre-retirement years of life lost and research expenditures for major causes of death, USA, 1978

The three areas in injury control where research should be strengthened are: clinical, epidemiological and biotechnical (ergonomic) research. Clinical research will begin to answer a crucial question: is the reduction in accident mortality accompanied by an increase in persistent sequelae and long-lasting or permanent disability?

Epidemiological surveys seem all the more important in that they can provide, in addition to simple scientific facts, a basis for rational prevention of accidents. Biotechnical or ergonomic research unites biology and engineering to provide a safer environment and considerably reduce the number of deaths and severe disabilities.

Data about the circumstances leading to injuries and which described the magnitude of the problem in terms of mortality and morbidity supports the scientific approach to injury prevention. Injury surveillance data which provides information about the pre-event phase of injury is important for primary and secondary prevention. Injury surveillance data from small geographical areas is particularly relevant for community-based intervention programs, but also has value at a national level. Minimum data, such as those enumerated below, are required as this will enable specific forms of intervention to take place.

Need For Injury Database
<ul style="list-style-type: none"> • Characteristics of the child • Description of accident: circumstances, type, resulting injuries • Care provided, initially and as follow-up • Prognosis and final outcome • Source and place of recording

Education, training and information are very crucial in the prevention program for injuries. Educational or training packages should be prepared for professional groups and communicators, either to be used by them in educating target groups in the community, or to improve their own specialized knowledge and skills.

Professional groups and communicators are groups defined on the basis of their jobs or standing in the community who are potentially capable of educating target group in the community.

Target groups in the community are potential accident victims, people potentially causing accidents, close relatives or friends of these two groups.

The responsibility of teaching and preparing the educational packages directly concern medical schools, hospitals, medical and health organizations and other multidisciplinary and intersectoral groups.

As to what should be taught, a general framework can be developed as shown in Figure 6. For each type of accident, the content may include accident risks, preventive measures, management and resources.

Even if one considers injuries to be a health problem, vey often it remains difficult to think of all possible countermeasures because the problem appears too large and too wide. One useful approach is to consider each injury problem as resulting from an interaction between several discrete factors (host, vector, and environment), occurring over distinct phases in time (pre-event, event, post-event) which is illustrated in Figure 7. In developing a program of injury control measures for a particular injury problem we can go systematically through each cell of the matrix and

think up all possible countermeasures applicable to that cell. The usefulness is a tool for generating ideas. After all possible countermeasures have been listed, injury control experts and policymakers can select those which are most feasible, effective and politically acceptable.

ACCIDENT CONTENT	TRAFFIC ACCIDENTS	FALLS	POISONING	ETC
Accident Risks				
Preventive Measures				
Management First & Primary Secondary Tertiary				

Figure 6. General Framework

PHASES	FACTORS		
	HUMAN (HOST)	VEHICLE (VECTOR)	ENVIRONMENT
Pre-event			
Event			
Post-event			

Figure 7. Injury Matrix

In conclusion, the author is enjoining everyone to be advocates for injury control. He encourages the government to coordinate with industry to enhance safety of products, building, vehicles, and roads. The ultimate goal of all advocacy efforts to get injury prevention is the national health agenda and to create national, regional, and local injury control committees.

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