

CHAPTER 25

PAEDIATRIC TRAUMA: EPIDEMIOLOGY, PREVENTION, AND CONTROL

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Introduction

Trauma is the leading cause of disability, death, and hospitalisation among children and adolescents globally. It constitutes an enormous financial burden on society in particular and governments in general. The impact of injury in developing nations has not been as extensively studied as in industrialised countries, and therefore often is not fully appreciated. Traditionally, infectious diseases and malnutrition have predominated as causes of morbidity and mortality in developing countries. All the same, injury is a major health problem among children of all ages worldwide.

For most parts of the African subregion, there are no trauma registries, and as such, it is difficult to know how much trauma contributes to injuries and death. Accurate data on the extent and nature of injuries are required to formulate effective policies targeted at reducing the burden of injury and in particular to compare the contribution to morbidity and mortality due to injuries with that due to infectious diseases and malnutrition. Most of the studies on injuries in the subregion are hospital-based; given the limited access to hospital care and emergency transport in low-income countries, these studies are unlikely to be truly representative of what is happening in the communities.

By the estimates of the World Health Organization (WHO) and the World Bank, injury is likely to account for 20% of all disability-adjusted life year (DALY) losses for the world's population by 2020. Road traffic injuries alone are the third leading cause of DALY losses. In spite of this, very little attention is paid to injury as a major health problem globally, particularly in the developing world.

The care of trauma patients is a continuous process and involves the initial first aid, the in-hospital care for the acute phase, and finally rehabilitation. For this to be successful, a trauma system must be put in place involving hospitals, trained personnel, and public agencies such as the ambulance services and the Red Cross, among others. Such a trauma system will require communication capabilities to be able to triage and rapidly transport injured children from the field of injury to a suitable facility for immediate treatment and rehabilitation. Frankly, the focus in the African subregion should be on injury prevention because treating injuries is very expensive and the costs of injuries to society are enormous.

Epidemiology of Injury in Children

Knowledge of the epidemiology of injury will help with prevention methods. Epidemiology is the study of the factors determining and influencing the frequency and distribution of disease, injury, and other health-related events, as well as their causes in a defined human population. Epidemiology of injury involves the collection of data concerning the time, the place, the mechanism, and the victim of injury. The purpose of studying injury and its causes is to establish programmes to prevent and control its development and spread. Injury is known to be a leading threat to the health of children in Africa, with unintentional injuries being the leading cause of morbidity and mortality.

Injuries are subdivided into life threatening and non-life threatening. Life-threatening injuries may be intentional or unintentional. Such

injuries occur when a child is exposed to mechanical, electrical, or thermal energy. Childhood injuries can be penetrating or nonpenetrating, with blunt injuries predominating; but many penetrating injuries can be disturbing and life threatening.

Injuries should not be considered as random events or accidents. They have an association with many predictable factors, such as age, sex, geographic location, and socioeconomic status. Risk for serious injury is highly age-related. There are also developmental-related vulnerabilities. Young infants are at higher risk of inflicted trauma due to their small size and inability to protect themselves. Risks for teenagers are higher as a result of increased exposure to hazards and risk-taking behaviours. In other words, the range of causes of injury and the character of the injuries seen in children vary with age. For example, transport-related injuries are common in all age groups but are found to be more common in teenagers and adolescents, with resultant high morbidity and mortality rates in these age groups. Also, burn injuries are more rampant in children younger than 4 years of age than in older children. In developing countries, falls are usually the most common cause of injury seen in hospitals, affecting the age group of 5–9 years more than other age groups.

Overall, injury rates are higher in socioeconomically less-endowed communities than in more affluent societies. In addition, boys are more likely than girls to be harmed by unintentional injuries. Various research studies have demonstrated this fact and have concluded that male sex is a risk for all types of injury death, with the ratio of male deaths to female deaths varying by injury mechanism.

Unintentional Injuries

The mechanisms of unintentional injuries in children include transportation accidents, falls, burns, insect or animal stings and bites, agricultural injuries, drownings and submersions, poisonings, suffocations, and gunshot wounds.

Transport-related injuries

Transport-related injuries are considered in many studies (mostly hospital-based in the subregion) to be the leading cause of injuries, sometimes fatal, in children. Transport-related mechanisms of injury include motor vehicle crashes, pedestrian knockdowns, motorcycle crashes, bicyclists either falling off their bicycles or being hit by motorised vehicles, and injuries related to tractors, among others. Motor vehicle crashes predominate in low-income and middle-income countries. Road traffic injuries lead to serious head, chest, abdominal, and limb injuries with resultant severe permanent disability or even death. From two hospital-based studies in Ghana and Nigeria, for example, road traffic crashes were the most common cause of injuries to children; over 81% and 90% of children, respectively, in the two reports were pedestrians knocked down by automobiles and motorcycles. Table 25.1 illustrates the problem associated with pedestrian knockdowns, which is partly a result of rapid urbanisation and increased motorisation all over Africa in recent years. The table shows that a vast majority of road traffic injuries involve child pedestrians who have been knocked down by moving vehicles. Any prevention efforts should therefore target this mechanism of injury directly.

Table 25.1: Childhood road traffic injuries with emphasis on pedestrian knockdowns in sub-Saharan Africa.

Source*	Country	Age bracket (years)	Number of road traffic injuries	Number of pedestrian injuries**
Kibel SM, et al., 1990	South Africa	0–12	1311	927 (70.7)
Abantanga FA, et al., 1998	Ghana	0–14	271	219 (80.8)
Lerer LB, et al., 1997	South Africa	0–14	150	123 (82.0)
Roux P, et al., 1992	South Africa		100	91 (91.0)
Archibong EO, et al., 1996	Nigeria	0–14	17	12 (68.6)
Adejugigbe O, et al., 1992	Nigeria	0–15	16	9 (56.3)
Adesunkanmi ARK, et al., 1998	Nigeria	0–15	324	292 (90.0)
Solagberu BA, 2000		0–15	169	109 (64.5)

*See Suggested Reading at the end of the chapter.

**Numbers in parentheses show pedestrian injuries as a percentage of road traffic injuries.



Figure 25.1: Injury sustained by an 8-year-old boy who climbed a carpenter's work table to pluck mangoes from a mango tree. He fell off the table, and in the process fractured his radius and ulna. He was treated by a traditional bonesetter who applied herbal concoctions. This is the end result of his fall. Treatment in hospital was by above-elbow amputation of the right upper limb. He survived the ordeal, but he will be permanently disabled.

Falls

Unintentional falls are usually the most common cause of nonfatal injury leading to a hospital visit in children younger than 15 years of age in developing countries. Accident and emergency (A&E) departments and outpatient surveillance systems show that falls are one of the most common mechanisms of injuries that require medical care and the most common nonfatal injury that at times needs hospitalisation. As many as 60% of all visits to the emergency department due to unintentional injuries in children younger than 1 year of age are due to falls. The combination of inquisitiveness, immature motor skills, and lack of judgment renders infants and toddlers particularly susceptible to falling. Most studies identify young age (0 to 6 years), male sex, and low socioeconomic status as consistent risk factors for fall injuries. In children younger than

4 years of age, most fall-related injuries occur at home; in those aged 5 to 15 years, approximately half of the falls occur at home and about a quarter at school on playgrounds during sports and recreational activities. Studies have shown that infants are at risk of falling from furniture or stairs, toddlers are at risk of falling from windows and beds, and older children are at risk of falling from playground equipment, especially climbing equipment and trees. Fall injuries range from very minor (bump or bruise) to severe, depending on the height of the fall, and may result in fractures, cuts, head injury, or even death.

The following ways children fall and injure themselves is by no means exhaustive. Falls can occur on level ground while playing or running, or from a height. Falls may occur either at home or in school. Locations for unintentional falls include playgrounds (from equipment such as climbing apparatus, trampolines, seesaws, tree houses, swings and so on); football fields; or from trees (especially fruit trees). Other fall scenarios are from multistorey buildings, down the stairs, from cots or beds, in the bathroom (due to water and slippery surfaces), or from objects or collapsing walls falling on children. Falls from the back or arms of caregivers/attendants also can cause injury.

Fall injuries can be blunt or penetrating, with the possibility of permanent disability, loss of an organ or part of it (Figure 25.1), or even death.

Burns

Paediatric burn injuries in sub-Saharan African are rampant and often lead to permanent disfigurement or death. The majority of fire deaths occur in homes, and most victims die from smoke and toxic gases rather than from the actual burns. Factors cited that may lead to an increase in burn injury include: poverty, illiteracy, cooking with open fires, and smoking. It is difficult to infer the rate of paediatric burns in communities in Africa because there are not many community-based studies available. Most of what we know about burns is largely from hospital-based studies. Available literature about paediatric burns treated per annum in Africa reveals the following:

- Luanda, Angola – 1,407
- Ashanti Region, Ghana – 1,300
- Abidjan, Cote d'Ivoire – 195

- Enugu, Nigeria – 107
- Harare, Zimbabwe – 104

It is estimated that in the Red Cross Children's Hospital in Cape Town, South Africa, about 650 to 900 paediatric burns are admitted per year. In the African literature, children aged less than 5 years are at the greatest risk of sustaining burn injuries; more young boys than girls are burned—a ratio of about 2:1.

The most common causes of paediatric burns in Africa are flames, hot liquids, and chemicals, with regional variations. For example, the most common cause of burns in Ghana is hot water, contact with hot objects, and flame burns, whereas in Southeastern Nigeria, it is hot liquids, followed by flames, petrol, kerosene explosions, and chemical burns. A vast majority of the burns in children occur in those younger than 6 years old, mostly at home and in the mornings when, for example, hot water is boiled to bathe the children.

Burn injuries are also due to electricity, caustic soda used in households for making soap, acid from vehicle batteries, and friction (e.g., from being dragged along a rough surface or tarred road). Explosions from kerosene or petrol are also reported among burn injuries.

Bites

Bites are also a cause of injury in children in sub-Saharan Africa, even though not much has been written about these injuries in the available literature. The most common causes are bites by dogs and other animals, envenomation by poisonous snakes (when children go to the bush alone or with adults to hunt for bush meat and put their hands into holes to retrieve animals such as rats), and stings by scorpions. Human bites do occur, especially among quarrelling children. These are usually intentional, however, or as a means of defence.

Animal bites (e.g., dogs or snakes), insect stings, or injury sustained from a farm animal, such as goring of shepherds (mainly boys) by cattle, are sources of injury.

Agricultural injuries

Agricultural injuries occur when children either accompany parents or go alone to the farm to help or to cut firewood. The children use implements such as hoes, cutlasses, machetes, and other sharp instruments to work. In the process, they injure their hands, legs, or feet. The most common activity on the farm is weeding or clearing the land in preparation for sowing and planting, or harvesting the crops; because this labour is not mechanised, serious injuries do not occur very often. Most farm injuries are unintentional and nonfatal in the African subregion but do lead to severe morbidity. There is the need for community education and public advocacy in relation to agricultural injury prevention in children.

Agricultural injuries include lacerations of various parts of the body, piercing of the sole of the foot by thorns or other objects, and falls from trees when harvesting fruits or cutting firewood on the farm.

Submersion or drowning

Drowning is a process resulting in primary respiratory impairment from submersion or immersion in a liquid medium. The victim may live or die after this process. The victim can be rescued at any time during the drowning process, thus interrupting the progression.

In the United States, drowning is the second cause of death from unintentional injuries in children aged 1–14 years. For sub-Saharan African countries, there is lack of information on drowning or near-drowning among children. However, WHO data show that Africa has the highest rates of drowning in the world for all ages considered together. The rate of death for drowning for the entire world (all ages) is 6.8 deaths per 100,000 people per year; for Africa, it is 14.2 deaths per 100,000 people per year.

According to figures from the United States regarding near-drowning, for every child who drowns, at least five receive emergency

department care for nonfatal submersion injuries. The multiple causes of drowning are age and location related. Children younger than 1 year of age most often drown in bathtubs, buckets, or toilets. Drowning in bathtubs or water tanks or containers usually results from inadequate supervision. Children aged 1 to 4 years are likely to drown in swimming pools, ponds, and wells; this usually also happens when they are left unsupervised. Older children, in contrast, are likely to drown in fast-flowing streams, rivers, canals, and lakes; in such instances, alcohol use has been cited to be involved with 25–50% of adolescent drownings associated with water recreation. Male children are consistently more represented in drowning incidents than females.

Poisoning

A majority of unintentional poisoning injuries occur among children younger than 6 years old, and almost all exposures occur at home. Such children commonly ingest household products, such as cleaning substances, foreign bodies, drugs, and other substances (e.g., caustic soda used in manufacturing local soap). About half of the poisonings among teenagers, however, may be considered as intentional suicide attempts.

Others

Other unintentional injuries include suffocation and gunshot wounds on hunting expeditions from stray bullets or from children playing with guns.

Intentional Injuries

A big burden of injury-related disability and death in both high-income and less-developed countries is from self-inflicted injuries and interpersonal violence. These include violence against children, suicide, homicide, gunshot wounds, and war.

Assaults

Assault can take many forms: blunt or sharp instruments, rape or sexual abuse, and human bites, among others. Assault injuries can take the form of an adult molesting a child or a child maltreating another child. There is not much written in the literature about injuries as a result of assault in children in sub-Saharan Africa. Injuries as a result of assaults are known to occur with the use of sharp objects (knives, machetes, cutlasses, nails, glass or broken bottles, pens and pencils, scissors) or blunt objects (sticks, stones, rocks). Boys are more involved in assault injuries than girls.

Violence

The WHO defines violence as the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation. Types of violence include self-directed, interpersonal, and collective. Such violence can take the form of child abuse or assault. Child abuse takes various forms, such as child labour, sexual abuse (vaginal, anal, oral, or even poking the finger or objects into the anal or vaginal orifice of children); or burning a child.

A child may be burned as a disciplinary measure for one reason or another. This takes the form of putting the child's hands in an open fire or on burning charcoal, or the use of a hot metal (e.g., a pressing iron) or a burning stick to press on the child's body with the purpose of causing harm. A child also may be burned to bring it out of a state of convulsion or any catatonic state. In the latter case, the hands or feet of a child who has convulsed for one reason or another are dipped into hot water to get the child out of that state.

Injury Prevention and Control

Injuries are a global problem in all countries of the world. Data on the extent and characteristics of injuries have to be collected in every country, especially in sub-Saharan African countries, to allow better targeting of interventions and assessment of their success. It will

be difficult to design a meaningful injury prevention system without data on injuries and formal injury surveillance systems in place. Some less-developed countries have some system of collecting information on injuries, but these are usually unreliable and often underreported. Surveillance systems in sub-Saharan African countries should aim at upgrading preexisting systems such as police reports of injuries, hospital discharge data on injuries, and vital registries, and not seek to create entirely new data collection mechanisms.

Prevention efforts should tackle the various mechanisms of injury in children. These will include prevention or reduction of road traffic injuries, falls, burns, and drownings, among other injuries.

There is often a misperception that injuries are just due to random chance and little can be done to prevent them. However, much can be done by using the same scientific approach as with any other disease. This includes: (1) better understanding the extent and nature of the problem through surveillance and research, (2) identifying risk factors, (3) designing prevention programmes that target these risk factors, and (4) rigorously assessing the results of these prevention programmes to determine which are succeeding (and hence should be continued and expanded) and which are not succeeding (so that they can be discontinued or modified).

A useful tool to assist with designing and carrying out injury prevention strategies is the Haddon matrix. William Haddon proposed this classic matrix more than 30 years ago to determine ways to intervene to decrease morbidity and mortality from traffic injuries. Since then, the matrix has been used as a tool to help in developing ideas for preventing injuries of different types. The Haddon matrix is a grid with four columns (components) and three rows (phases of time). The rows represent different phases of an injury (pre-event, event, and post-event), and the columns represent different influencing factors (host, agent or vehicle of injury, physical environment, and social environment). If a fall from a mango tree is considered, then the pre-event is before the child climbs the mango tree to plug mangos, the event is the fall from the tree, and the post-event is what happens following the fall, which includes the first aid and/or treatment the child might (or might not) receive. One should identify, when using the Haddon matrix, the host, agent, and environmental factors that determine whether the event or injuries, along with their particular level of severity, occur during different points in time. Successful intervention in injury prevention should take all elements of the matrix into account. If these factors are understood, then appropriate intervention strategies can be developed.

Injury prevention strategies should be supported by successful interventions that include environmental changes, engineering, enforcement of legislation, and education (known as the four E's). Environmental changes are designed to reduce risk of injury; an example is well-designed roads, which can reduce the risk of head-on collisions. Engineering changes include the design of vehicles with air bags and antilock brake systems that reduce the risk of injury. Enforcement of laws requiring the nonuse of alcoholic drinks while driving, the use of seat belts for all occupants of a vehicle, and the observance of speed limits will reduce the incidence of road traffic injuries. A broad-based safety education campaign involving adults, children, and stakeholders (and supported by governments and nongovernmental organisations, or NGOs) will produce a safer environment for children.

Injury prevention strategies can also be considered as active or passive. Active interventions rely on actions taken by the child or caregiver (e.g., teaching the child not to climb or jump from high walls or tables). Passive interventions do not rely on efforts by the individual to be successful (e.g., child safety caps on medications). Most injury prevention interventions will have both active and passive elements, and the likelihood that an intervention will be successful in preventing injury is generally inversely related to the amount of individual effort required.

We next examine how these general principles of injury prevention can be applied in the circumstances of road safety and other types of injury prevention.

Road Safety

Prevention strategies for motor vehicle injuries are a complex problem and require political will to address them. Possible interventions include development of safe road infrastructure, enforcement of speed limits on all roads (both rural and urban), and enforcement of the use of restraints and protective gear such as seat belts and helmets. Specific interventions include placing children in the back seat of cars, adults serving as positive role models for children by always wearing their seat belts and obeying traffic safety regulations and laws, enforcing the use of hands-free mobile phones, and enacting laws (and rigorously implementing them) against driving under the influence of alcohol. To prevent pedestrian injuries, there is the need to modify the roads and environment to decrease motor vehicle speeds and increase the number and frequency of "zebra" crossings on busy roads that children are likely to use in going to or from school. To be most effective, such crossings can be augmented with traffic lights and crossing guards during peak times when children are crossing the roads. Measures to slow vehicle speeds can include roadway modification (such as speed bumps) and better police enforcement of speed limits.

Note that many of the strategies that have been successful are based on high-income country experiences. Some of these may be of use in the African context, but some may require considerable modification, and some completely new strategies may need to be developed. A major difference in emphasis in prevention efforts is needed, given the different aetiologies of traffic-related injuries. In high-income countries, most children who are injured are occupants in private vehicles that crash, so promoting better use of seat belts and car seats or booster seats for younger children is an important strategy. In sub-Saharan Africa, however, most children who are injured are pedestrians, so efforts to promote pedestrian safety should especially be emphasized.

Prevention for Other Types of Injuries

Prevention of falls, which in the African subregion includes also falls from trees, will consist of advising children to use methods of harvesting fruits from trees other than climbing them, and to be supervised by adults. No child should be left alone unsupervised on the playground, in school, or places where the child is likely to fall and be injured. Playground equipment should be safe and the surface covering soft to firm to permit safe play and well-cushioned "falls". Most falls occur at home, so supervision by parents or caregivers while the child is playing will go a long way to reducing serious falls that may lead to major injury and hospital visits for either outpatient treatment or admission.

In the case of burns, strategies for prevention include never leaving children alone around open flames, stoves, and candles; keeping matches, all flammable products, and hot liquids (especially hot water for bathing) away from children; and, as much as possible, restraining children from the kitchen when cooking.

Prevention strategies for submersion or drowning include constant supervision of children around water bodies, not allowing children to cross rivers alone for whatever purpose (e.g., attending school or going to the farm); emptying water containers or using water containers with childproof lids that cannot be easily pried open by an inquisitive child; and using a fence to separate swimming pools and other water bodies from children. The use of environmental barriers has been advocated by the WHO as the most effective method to prevent submersion deaths in all countries, irrespective of the level of income. It is also advisable to start swimming exercises for children of all ages, especially after the age of 5 years. Teenagers should be discouraged from drinking and swimming.

Eliminating agricultural injuries will require that children not be used on farms for either individual or commercial purposes. Child

Table 25.2: Examples of the interactions of phases and influencing factors within the Haddon matrix.

Phase	Human/host	Vector/vehicle	Environment: social and physical
Pre-event	Driver intoxication	Condition of brakes, tyres. Window bars to prevent falls	Speed limits and related enforcement. Highway design (road curvature, intersections, road conditions)
Event	Use of safety belts and child restraints (e.g., car seats and booster seats)	Airbags Side impact protection	Highway design (guard rails, breakaway poles)
Post-event	Age	Integrity of fuel system/ fireproof gasoline tanks	Trauma care systems

labour needs to be eliminated totally; if there is still the need to employ children, measures should be taken to ensure that they use protective clothing, gloves, and footwear, and they also should be coached on how to use agricultural implements properly and safely. All hazardous agricultural chemicals should be properly stored away from children, and children should be prevented from touching them for any purpose.

In the African subregion, most children are poisoned when they inadvertently take drugs that are not properly stored out of reach, or when chemicals such as caustic soda (used in the manufacturing of soap) are placed in such a way that toddlers can gain access to them and drink them. To prevent such occurrences, all potentially poisonous household products and substances should be stored safely out of the reach of children or disposed of carefully if they are no longer needed.

It is necessary to teach children to respect stray animals, especially dogs, and prevent children from playing with stray animals, which may lead to bites or other forms of injury. Children should be discouraged from going out to the bush to hunt—either alone or even in the company of adults. The risk is high of being bitten by snakes or insects, or even holding poisonous plants or twigs, which may result in various degrees of injury.

For many of the types of injuries discussed here, we have an inadequate understanding of causative factors and there is very little experience with prevention programmes oriented for the African context. This lack of data points out the need for better research into the extent and nature of the problem, causes and risk factors, and pilot prevention programmes.

What Can Be Done? The Role of the Surgeon

To confront the growing problem of childhood injury in Africa, a range of activities are needed, as shown in Table 25.2. This includes activities to provide better information on injuries through surveillance; promote road safety, for which there are a number of well-developed strategies; undertake research to better understand the causes of other types of injuries, such as burns, drownings, and falls, in the African context; and promote better organisation and planning for trauma care services. Table 25.2 identifies factors that can lead to injuries and indicates factors that can be controlled to prevent injuries.

This book and this chapter are primarily oriented for surgeons. Although many of the needed activities noted above may be done by others, there are numerous ways in which surgeons can become involved and help to move the process along. These include, among others:

1. *Surveillance*: Promote better data gathering in hospitals so that the extent of the problem of child injury can be better understood.

2. *Prevention*: Directly counsel injured children and their parents on safe behaviours that could prevent similar injuries from occurring. There are also opportunities for surgeons to become involved with other, broader injury prevention campaigns.

3. *Research*: Collaborate with others or be the main person conducting research on causes of childhood injury.

4. *Advocacy*: Provide facts and figures on the extent and nature of the child injury problem and bear witness to the horrible toll of suffering that such injuries cause. Probably the biggest role that surgeons can play is through advocacy. This advocacy can then lead to greater societal and political commitment to injury prevention.

For all of the above activities, there is much that surgeons can do alone. There is even more that can be done by forming alliances and working in partnership with others committed to the same goal of lowering rates of child injury. As just one example of how this can be done, in Ghana, the Building and Roads Research Institute (BRRI), the branch of the government involved with gathering crash statistics and recommending safety measures for dangerous sections of the roadways, has worked closely with surgeons at the Komfo Anokye Teaching Hospital (KATH) for several years. This has involved many activities, including collaborative research on the extent and nature of the injury problem, identification of opportunities to improve injury surveillance, and advocacy. The BRRI already had statistics from police crash reports, and KATH surgeons were also able to provide data from research done at their hospital on the economic costs of injury. Such economic figures showed a huge loss to the government and the economy from road traffic crashes. These data were highlighted together by both the BRRI and KATH, which resulted in greater governmental support for finally fixing dangerous sections of the roadway that the BRRI had previously identified, but which, for lack of such governmental support, had not yet been corrected.

In conclusion, the old adage that “prevention is better than cure” is certainly the case with child injury, as with any other disease or health problem. There is much that surgeons who care for the injured child can do to help make such prevention a reality, and thus to prevent the needless suffering caused by child injuries.

Evidence-Based Research

Table 25.3 presents a review of the problem of children’s injuries in low-income countries. Table 25.4 presents research that examined the characteristics of childhood burns in Ghana.

Table 25.3: Evidence-based research.

Title	The problem of children's injuries in low-income countries: a review
Author	Bartlett S
Institution	Children's Environments Research Group, City University, New York, New York, USA
Reference	Health Policy and Planning 2002; 17(1):1–13
Problem	The absence of quality data on the issue of injuries in children in developing countries and the tendency to see injuries as random events leads to unpredictability and uncontrollability.
Intervention	An urgent need for research to guide the development of effective prevention measures.
Comparison/control (quality of evidence)	The author has shown by this review that existing research from the developing world on injuries/trauma in children is scanty and largely hospital-based and therefore cannot present a comprehensive picture of either causes or outcome.
Outcome/effect	There is an urgent need for more community-based and population-based studies that can contribute to effective analysis of the situation, increase awareness, and lead to the formulation of practical and well-targeted prevention measures.
Historical significance/comments	This is a review that should spur researchers in the field of child health to not only concentrate on communicable diseases and nutritional problems, but spread out and research into childhood injury and its prevention—a field that is not well developed in sub-Saharan Africa.

Table 25.4: Evidence-based research.

Title	Childhood burns in Ghana: epidemiological characteristics and home-based treatment
Authors	Fordjuoh SN, Guyer B, Smith GS
Institution	Department of Maternal and Child Health and Injury Prevention Center, Johns Hopkins School of Hygiene and Public Health, Baltimore, Maryland, USA
Reference	Burns 1995; 21(1):24–28
Problem	Examination of epidemiological characteristics of childhood burns in the Ashanti Region of Ghana.
Intervention	A community-based, multisite survey was used for the study, and caretakers were interviewed by means of standard questionnaires.
Comparison/control (quality of evidence)	The quality of the evidence gathered in this study is high and the analysis concentrated on children aged 0 to 5 years—the major age group that suffers burns.
Outcome/effect	Prevention implication of the study—intensification of mass education on first-aid management of burns with special emphasis on alternatives to traditional preparations used to apply on fresh burns and the need to provide play areas for children to prevent them from playing with fire.
Historical significance/comments	This study showed that a vast majority of children with burns are not seen in hospitals, and the health implications can only be imagined.

Key Summary Points

1. Surveillance: Develop and promote standards for injury surveillance systems in the subregion so that efforts to improve injury prevention and treatment can be based on solid facts and can be monitored.
2. Infrastructure/road engineering: Promote greater safety features in road design. Promote more prompt identification and correction of “black spots” (dangerous sections of roadways where many crashes occur). These factors should especially apply to speed-calming measures to reduce pedestrian injuries, the single greatest source of fatal traffic injuries to children.
3. Vehicle engineering and maintenance: Promote greater emphasis on safety-related vehicle maintenance, such as meaningful inspections by road safety authorities at the time that roadworthy certificates are issued, especially for commercial vehicles and heavy goods vehicles.
4. Driver behavior: Promote greater emphasis on decreasing overspeeding and alcohol-impaired driving, through both social marketing strategies and law enforcement.
5. Other unintentional injury: Conduct research into causative risk factors and undertake pilot prevention programmes for the many types of child injury that have not yet been well addressed, including burns, drownings, falls, and poisonings.
6. Injury treatment: Promote better organisation and planning for trauma care services, especially with regard to children, including all phases of trauma care, such as prehospital, emergency department, hospital-based care, and rehabilitation.

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