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A REVIEW OF
CHILD INJURY PREVENTION IN VIET NAM

2010

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Acronyms

AIPF	Asia Injury Prevention Foundation
CI	Counterpart International
CDC	Centers for Disease Control and Prevention
CIP	Childhood Injury Prevention
HIC	High Income Countries
HSPH	Hanoi School of Public Health
IEC	Information, Education and Communication
LMIC	Low and Middle Income Countries
MOET	Ministry of Education and Training
MOH	Ministry of Health
MOJ	Ministry of Justice
MOLISA	Ministry of Labour, Invalids and Social Affairs
NGO	Non-government Organisation
NIB	National Institute of Burns
TASC	The Alliance for Safe Children
UNICEF	United Nation Children's Fund
VMIS	Viet Nam Multi-center Injury Survey
VRC	Viet Nam Red Cross
WHO	World Health Organization

Executive Summary

Child injuries are an important public health issue worldwide. The unprecedented economic and social development in Viet Nam over the past two decades has contributed to the emergence of injury as a major cause of morbidity and mortality, particularly in children.

Child injury in Viet Nam

In 2007 alone, 7,894 children and adolescents aged 0-19 died of injury. Leading causes of child injury-related death in Viet Nam include drowning, road traffic injury, poisoning, falling, burns and animal bites. Major causes of non-fatal childhood injury are falls, traffic accidents, animal bites, injury by sharp objects and burns. Similar to other low- and middle-income countries, risk factors of child injury include age, gender, hazardous environments, low socioeconomic status, which is often associated with a lack of awareness about injury risks and the lack of supervision of children, as well as limited access to safety devices and appropriate healthcare, particularly emergency and pre-hospital care. International evidence shows that all types of injuries in children are preventable. Intervention approaches based on a combination of education and training, legislation and enforcement, environmental modifications and promotion of safer products and safety devices are likely to succeed in reducing the burden of injury in children.

Injury prevention in Viet Nam: achievements and challenges

Notable achievements in child injury prevention in Viet Nam during the last decade have been observed. In this short period of time, and as a result of successive public education campaigns, injury was placed on the agenda of national and provincial/district authorities. Importantly, commune members are becoming increasingly aware of the injury risks facing their children and the need to act to prevent them. The introduction of the National Policy on Accident and Injury Prevention in 2001 provided a framework for the development of legislative changes to support various injury prevention efforts in Viet Nam. An example of these changes is the landmark legislation, introduced in 2007, that mandated the uniform use of motorcycle helmets by all motorbike riders and passengers. However, child injury prevention in Viet Nam still faces many challenges. Legislation relevant to child injury prevention, such as that applies to child helmets, child restraints, medication packaging, child resistant products, personal flotation devices as well as building standards and occupational health and safety-related regulations, are either non-existent or poorly enforced. Other challenges include lack of coordination between key players in child injury prevention, data limitation, particularly in relation to injury-related morbidity, limited research capacity and an inefficient emergency and pre-hospital care system.

Recommendations

In order to reduce the burden of injury among Vietnamese children there is a need to:

- develop a comprehensive plan of action on child injury prevention in Viet Nam that includes legislative, enforcement and environmental changes to support existing education and public awareness campaigns. This plan should be integrated into any national strategy for child survival and development;

- enhance the cross-sectoral coordination of child injury prevention efforts;

- improve the quality of data about child injury situation (both mortality and morbidity) in order to readily measure the magnitude of child injury and to plan required services/programs;

- support child injury prevention research, particularly in the areas of the efficacy and effectiveness of child injury prevention programs, and child safety related regulations;

- improve access to healthcare services for child injury prevention, particularly emergency and pre-hospital care; and

- continue to raise public awareness and mobilize community's response in child injury prevention.

Introduction

Child injury is an important public health and development issue worldwide. It is estimated globally that 830,000 children die as a result of unintentional or accidental injury every year which corresponds to approximately 2000 children per day (Peden, 2008). The top causes of child injury death include road crashes (260,000 deaths per year), drowning (175,000 children per year), burns (96,000 deaths per year) and falls (47,000 deaths per year) (Peden, 2008). However, mortality represents only the tip of the iceberg in terms of the burden of child injury as, every year, tens of millions of children present to hospitals with injuries that often result in long lasting psychological and physical sequelae and sometimes even lifelong disabilities (WHO, 2008). The impact on the child, the family and the community as a whole is often significant.

While child deaths attributed to injuries have been falling in high-income countries since the 1970s, in part as a result of successful preventive efforts, the burden in developing countries has been increasing as infectious diseases continue to decrease (Howe et al, 2006). A study carried out in Bangladesh, China, the Philippines, Thailand and Viet Nam found that injury is the leading cause of child death among those aged 1 year and older (Linnan et al, 2007). The study also estimated that, while for every 100,000 children born in high-income countries fewer than 135 die from injuries before the age of 18, this figure is well over 1000 in the South Asian countries surveyed (Linnan et al, 2007). The same study indicated that for each injury-related death of a child aged less than 18 years of age, 12 others are admitted to hospital or permanently disabled and 34 need medical care or miss school or work because of an injury (Linnan et al, 2007).

In Viet Nam, a country where about 34% of the population is aged under 19 years (General Office of Population and Family Planning, 2009), child injury is a growing public health concern, particularly since the start of the liberalisation of the economy, the 'Doi Moi', in 1986. The impact of the socioeconomic and development changes in Viet Nam was particularly significant in relation to traffic crashes, which increased fourfold within ten years of the introduction of the Doi Moi (Thanh, 2005). Currently in Viet Nam injury is a leading cause of death in children aged under 18 (Huong, 2008). In 2007 alone, 7,894 children and adolescents aged 0-19 died of injury. The abundance of rivers and lakes, which children regularly use as play areas, as well as the frequency of floods and typhoons, result in a high drowning death rate among Vietnamese children. Other injury types that result in high mortality and morbidity in children include falls, burns, poisoning and animal bites (Linnan et al, 2003). In addition, in some provinces that are seriously affected with unexploded ordnance (UXO) and mines as war remnants, children are also injured by UXO and mines.

This report provides an overview of the burden of child injury, reviews relevant prevention strategies, and makes recommendations for child injury prevention in Viet Nam. The report reviews available information related to child injuries and child injury prevention including research studies, policy documents and reports from various sources, including government agencies, research bodies and non-government organisations (NGOs). It also reports on interviews with relevant stakeholders in order to obtain information relevant to child injury prevention, and to illustrate the impact of child injury in Viet Nam. Organisations interviewed as part of this report include: the Ministry of Health (MOH), the Ministry of Labour, War Invalids and Social

Affairs (MOLISA), the Women's Union, the Youth Union, the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), the Asia Injury Prevention Foundation (AIPF), the Viet Nam Red Cross (VRC), Counterpart International (CI), the Hanoi School of Public Health (HSPH), the National Institute of Burns (NIB) and Viet Duc Hospital.

The report focuses on unintentional injuries in children aged 18 years according to the Convention on the Rights of the Child including children aged under 16 based on the Law on Child Care and Protection in Viet Nam. However, a number of the documents reviewed for the report have used different age cut-offs (under 20 or under 19) and this will be highlighted where relevant throughout the report. The report consists of seven main chapters. Chapter 1 provides the background, the epidemiology of child injury in Viet Nam and how it compares to the rest of the world. This chapter also provides an overview of the principles of prevention of child injury as well as examples of various prevention programs and their relevance within the Vietnamese context. Chapters 2 through 7 examine the six major mechanisms of child injuries in Viet Nam: drowning, road traffic injuries, burns, falls, poisoning and animal bites. Each of these chapters discusses the burden in terms of mortality and morbidity, risk factors and relevant prevention programs, and concludes with the most relevant strategies to prevent a particular type of injury in Viet Nam. Chapter 8 highlights the common issues of the previous chapters and provides recommendations on child injury prevention in Viet Nam.

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Chapter 1. Child Injury in Viet Nam

1. Background

Since the introduction of the market economy (the Doi Moi) in Viet Nam in 1986 and the associated economic and social changes, there have been major changes in disease patterns in the country with the rapid reduction of communicable diseases and the significant increase in non-communicable diseases and injuries. Despite the myriad issues related to the provision of a comprehensive understanding of the magnitude of injury in low-income settings, in Viet Nam there is sufficient information available to recognise injury as a growing public health concern and to develop and implement strategies to reduce its burden.

Information on the epidemiology and risk factors for child injury in this report is based on various sources, including the MOH annual report on injury, the MOH Statistics report on the injury mortality of children and juveniles aged from 0 to 19, various surveys on child injury, such as the survey on child injury in six UNICEF project provinces in 2003 and 2008, and the Viet Nam Multi-center Injury Survey (VMIS) in 2001. The VMIS survey is valuable as it focused on injury in children aged 0 to 19 years and had a sample size of 27,000 households from eight ecological regions across Viet Nam (Linnan et al, 2003).

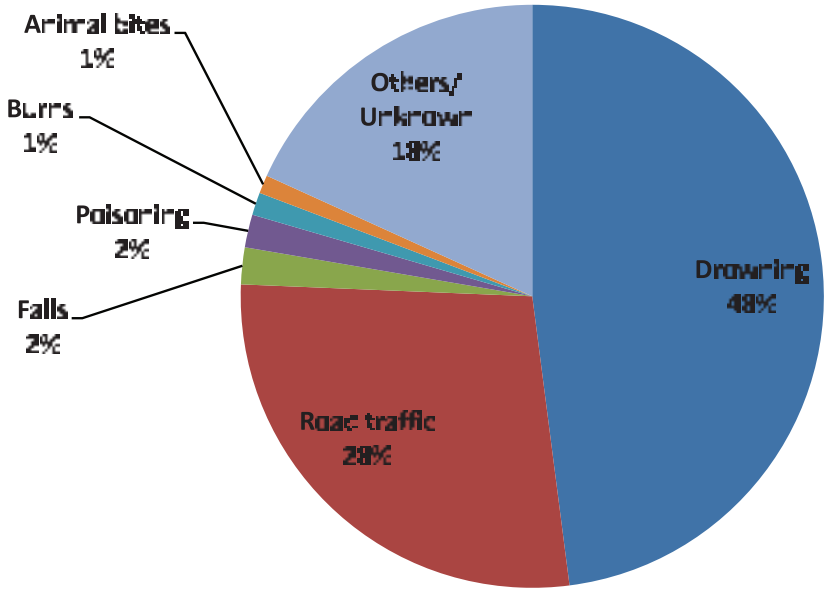
Basic national injury-related death data from communes have been regularly and systematically recorded at the communal level, compiled and analysed at the district then province levels, and centralised to the national level (the Ministry of Health) since 2005. However, an external review found major under-reporting and misclassification of deaths in this system. In addition, the data for injury-related mortality has been broken down by ages for children and adolescents aged from 0 to 19 and older. For the period of 2005 to 2007, the frequency of deaths has increased each year at the national level. However, the rate has decreased from 2006 to 2007 (Table 1). This could only be explained by a rapid population increase or by an error in the compilation of these figures (Smith and Nguyen, 2009).

Table 1. Injury mortality trends in children and adolescents 0-19, Viet Nam, 2005-2007

	2005	2006	2007
Injury death: children and adolescents 0–19 years	6,938	7,198	7,894
Rate per 100,000 children and adolescents	25.8	26.3	21.7

The same source of data shows that drowning was the leading cause of fatal injury in Vietnamese children (MOH, 2008). Other major causes included road traffic crashes, falls, poisoning, burns and animal bites (Figure 2).

Figure 2. Causes of child injury deaths among children and adolescents 0-19 years of age in 2007



Data from the VMIS shows that injury is a leading cause of child morbidity in Viet Nam. In 2001, Vietnamese children had a non-fatal injury rate of 4818/100,000. This translates to 1,500,000 or 5% of children in Viet Nam sustaining an injury that required medical attention or resulted in at least one day off school or work (Linnan et al, 2003). The VMIS also shows that falls were the leading cause of non-fatal injury in children aged less than 20 years, followed by animal bites, road traffic crashes, sharp objects, burns and poisoning (Figure 2). Two other surveys carried out in six provinces (Hai Phong, Hai Duong, Quang Tri, Thua Thien Hue and Can Tho) in 2003 and 2008 also showed similar patterns of injury in children. In comparison to 2003, the 2008 survey showed a decrease in the overall number and rate of non-fatal injuries in children aged less than 18 years of age. However, due to the variations in the methods between the surveys, it is difficult to assess whether some of the prevention strategies implemented throughout the decade might have had an impact on reducing child injury in the six provinces (Le et al, 2004; Nguyen et al, 2009).

Table 3. Rates/100,000 population of top ten non-fatal child injuries in Viet Nam by age.

<1 year		1-4 years		5-9 years		10-14 years		15-19 years		<20 years	
Burns	398	Falls	1469	Falls	1591	Falls	1416	Falls	1185	Falls	1322
Falls	265	Animals	983.3	Animals	1464	Animals	1397	Road traffic	1144	Animals	1105
Poisons	242	Road traffic	722.7	Road traffic	907.3	Sharp obj	837	Sharp obj	968	Road traffic	900
Animals	241	Burns	504.2	Sharp obj	558.8	Road traffic	688	Animals	861	Sharp obj	720
Road traffic	69.3	Sharp obj	407.4	Poisons	273.4	Burns	166	Falling obj	241	Burns	201
Falling obj	56.9	Falling obj	180.1	Burns	175.1	Falling obj	156	Poisons	151	Falling obj	176
Sharp obj	22.1	Poisons	148.8	Falling obj	123	Poisons	115	Burns	65.1	Poisons	170
Suffocation	0	Drowning	106.8	Drowning	74	Electrocution	40.3	Electrocution	24.3	Drowning	37.8
Drowning	0	Electrocution	100.5	Electrocution	17.5	Drowning	8	Drowning	6.1	Electrocution	35.4
Electrocution	0	Suffocation	0	Suffocation	0	Suffocation	0	Suffocation	0	Suffocation	0

Source: (Linnan et al, 2003).

2. The characteristics of child injury in Viet Nam

Child-related factors: age and gender

Table 3 show that the risk of sustaining a particular type of injury varies with the age of the child in Viet Nam. For instance, while burns are the major cause of injury morbidity in children aged less than 4 years, the rate of injury due to burns seems to decrease with age. Similar patterns are observed for drowning mortality rates. As they grow older, childrens' cognitive abilities, levels of independence, activities and risk behaviours change, altering their risk to various injury types (Peden, 2008). However, according to the MOH report on injury in 2008, while the number of road traffic injuries among the 0-4 age group is just 6% of the total, it increases to 13.3% among the 15-19 age group (MOH, 2009).

Injury surveys in Viet Nam show that boys have a higher risk of non-fatal injury than girls, with the rate of injury among boys being two to three times higher than that among girls in some areas of the country (Nguyen et al, 2009). This is similar to the findings in the Ministry of Health's Injury Related Mortality Report (MOH, 2008) where the rate of boys aged 0-19 died of injuries is two times higher than girls of the same group of age throughout the country. The high risk of injury among boys compared to girls was also found in other countries and is thought to be related to the higher activity levels and tendency to engage in risk-taking behaviour among boys, and that parents and the community at large are less likely to restrict boys' activities in the home as well as in the community (Peden, 2008).

Location and environment

Studies on risk factors of child injury in Viet Nam have consistently found that the home was one of the most common locations of injury in children and that the risk of injury is higher in rural compared to urban areas (MOH, 2008; Howe, 2006; Than, 2005; Linnan et al, 2003). Children from mountainous rural areas of Viet Nam live in houses built on sloping sites, with different levels and where the stairs are often of bad quality, thus increasing the risk of home injuries, particularly falls, among children living in these areas (Than, 2005).

In addition, children living in rural areas, areas that are usually agriculture-dominated and low-income areas, are often involved in family work such as cooking, the care of younger siblings and cleaning, as well as various agricultural activities which increase their risk of injury in the community (MOH, 2004; Linnan et al, 2003). The higher prevalence of injury in children living in rural areas compared to their urban counterparts has been found in other countries and is thought to be associated with the lower socioeconomic status of children living in these areas (Peden, 2008).

Socioeconomic status

Research from around the world indicates that socioeconomic status, which refers to a combination of family income, maternal education, family structure and household type, affects the risk of injury in children (Laflamme and Diderichsen, 2000; Hjern, 2001; Poulos et al, 2007; Peden 2008). Children of poor families are less likely to have appropriate parental supervision, access to safety equipment or access to safe play spaces in the home as well as in the community (Peden, 2008). Limited access to quality health and medical services among children of poor households also increases the severity of injury and the likelihood of death as a result of injury (WHO, 2004).

In Viet Nam, a survey on the economic impact of injury in rural areas showed that poverty was a significant risk factor for injury, particularly those that were sustained at home (Thanh et al, 2005). The authors found that low housing quality exposes children to a higher risk of injury, mainly due to falls and fires. In Vietnamese rural areas, poor households usually use straw in open fires for cooking, which increases the risk of burn injuries in children.

Unlike findings from high-income countries indicating higher risk of traffic-related injury among children living in low socioeconomic areas (Poulos et al, 2007), in Viet Nam the highest risk of traffic injury was in children from middle-income households (Thanh et al, 2005). The authors of this research hypothesised that children from middle-income households can afford bicycles for their children, which increases their risk of injury as cyclists are the most vulnerable road users in the local area where the study was carried out.

The findings of a longitudinal study of childhood poverty conducted in four countries – Ethiopia, Peru, Viet Nam and India – also show that socioeconomic status was a significant risk factor for fall and burn injuries among Vietnamese children (Howe, 2006). The study also found that inadequate parental supervision, often related to poverty, also increased the risk of injury, particularly due to falls in Vietnamese children. A child being regularly cared for by a non-household member was associated with an approximate doubling of odds of serious falls in Viet Nam. Similarly, leaving a child alone or with other children aged under 5 was associated with increased odds of any injury in Viet Nam (Howe, 2006).

Another consequence of low socioeconomic status is the limited knowledge about the risk of injury in children, particularly among parents. Previous research carried out in Viet Nam in 2001 showed parents and public workers had low levels of knowledge about child injury issues (Nguyen, 2002). The report found that the prevailing public community attitude was that injuries are mainly due to 'bad luck' and thus are inevitable events.

Access to healthcare

Access to healthcare, including emergency and other pre-hospital care services, as well as hospital care and rehabilitation, is critical to reducing the burden of death and disability due to injury. As with most low- and middle-income countries, including those in the Asian region, the pre-hospital care system in Viet Nam faces many challenges and can only meet a very small proportion of the emergency needs of the population (Joshipura, 2004). One of the major shortcomings of the emergency system in Viet Nam, according to a WHO representative, is that only 6 out of 64 provinces have access to the '115' emergency number, which hinders access to prompt and effective emergency care, particularly for injury victims (WHO representative).

A recent study of pre-hospital trauma care of injury cases in Hanoi showed that only 4% were transported to hospital by ambulance and that pre-hospital care was, for the most part, left to the discretion of bystanders as evidenced by the fact that more than half of the injury cases did not receive first aid at the site and were transported to hospitals by motorbikes (Huong et al, 2008). The study also found that a comprehensive emergency communication system was lacking in Hanoi despite the availability of basic infrastructure, such as telephone, computer, internet and fax services. This was confirmed during an interview with a representative from Counterpart International: 'Hanoi, a city of more than 4 million people, only has three ambulance centres and 14 ambulances, with some in poor condition. Most trauma victims go to hospital by taxi, motorbikes and whatever means are available to them' (CI representative).

Despite the existence of many programs run by a number of NGOs – particularly the Viet Nam Red Cross and Counterpart International in collaboration with the MOH, who fill the gap in pre-hospital care by educating volunteers (mainly car drivers and motorbike riders) and other members of the community in first aid, safe transportation and basic care of trauma victims – interviews with representatives from those NGOs highlighted that most of the programs are limited to a few provinces and need to be extended across Viet Nam (VRC representative; CI representative).

3. Principles of child injury prevention

It is widely agreed that the public health model is useful in preventing child injury in various countries (Peden, 2008). The model is based on a number of steps that include:

- assessment of the magnitude and risk factors of the problem by using available data sources (surveillance);

- the development of appropriate interventions based on analysis of available information on risk factors and evaluation of interventions to assess their effectiveness in reducing the burden of the problem.

Public health methods of prevention allow for a holistic approach that focuses on both individual and environmental factors and calls for the involvement of various stakeholders with an interest in injury prevention. This approach aims to assist members of the community, from individuals to the authorities, to be aware, understand and consequently take action to prevent the issue. This has been the basis of child injury prevention in Viet Nam since early 2000 with the announcement of a national policy on injury prevention, which set a milestone for the injury prevention efforts of different government ministries and organisations. It was further emphasised by the commitment of the Prime Minister, Mr. Phan Van Khai, that 'the government of Viet Nam will implement more stringent measures to reduce road traffic injuries through health promotion campaigns, consolidation of the injury surveillance system, and mobilisation of various sectors at all levels and the whole society' (Peden, 2004).

The pubic health approach is based on principles of epidemiology which consist of the study of factors that interact with each other to account for the presence or absence of disease or injury (Holder et al, 2001). In the context of injury prevention, these factors can be categorised as: the host (i.e. the person injured), the agent (i.e. the force or energy), the vector (i.e. the person or object that applies the force, transfers the energy or prohibits its transfer) and the environment (i.e. the situation or conditions under which the injury happens).

Prevention can occur at different stages and is generally categorised into:

- primary prevention: prevention of the onset of new injuries;

- secondary prevention: reduction of the severity of injuries; and

- tertiary prevention: reduction of the frequency and severity of disability resulting from injuries (Peden et al, 2008).

Another widely used tool that is based on public health principles to analyse and prevent an injury event is the Haddon's Matrix (Haddon, 1972). The matrix was developed originally to apply the principles of public health to road safety but has since been extensively used to develop strategies to prevent all types of injury (Haddon, 1972; Runyan, 1998). The matrix consists of 12 cells arranged in a table of four columns relating to the host, agent/vehicle, physical environment and social environment; and of three rows relating to the periods before, during and after the injury, corresponding to primary, secondary and tertiary prevention (Table 4). The matrix can therefore be used to analyse any type of injury event and to identify interventions that might prevent such an event from occurring again or that might reduce the severity of the injury.

Table 4. Haddon's Matrix

	Human (or host)	Vector	Physical environment	Socioeconomic environment
Pre-event	Is host pre-disposed or overexposed to risk?	Is vector hazardous?	Is environment hazardous? Does it have hazard reduction features?	Does environment encourage or discourage risk-taking and hazard?
Event	Is host able to tolerate force or energy transfer?	Does vector provide protection?	Does environment contribute to injury during event?	Does environment contribute to injury during event?
Post-event	How severe is the trauma or harm?	Does vector contribute to the trauma?	Does environment add to the trauma after the event?	Does environment contribute to recovery?

Source: Haddon (1972)

Haddon also described ten strategies to complement the matrix in which he identified the methods that can be used to prevent the harmful transfer of energy (Peden, 2008). Examples of the application of these strategies to child injury prevention are described in Table 5.

Table 5. Application of Haddon's 10 strategies to child injuries

	Strategy	Example related to child injury prevention
1	Prevent the creation of the hazard in the first place	Banning the manufacture and sale of inherently unsafe products
2	Reduce the amount of energy contained in the hazard	Speed reduction
3	Prevent the release of the hazard	Child-resistant medicine containers
4	Modify the rate or spatial distribution of the hazard from its source	Use of seat-belts and child restraints
5	Separate people in time or space from the hazard and its release	Bicycle and pedestrian pathways
6	Separate people from the hazard by interposing a material barrier	Window bars, pools fencing, covering wells
7	Modify the relevant basic qualities of the hazard	Softer playground surfaces
8	Make the person more resistant to damage	Good nutrition for children
9	Counter the damage already done by the hazard	First aid treatment for scalds -- 'cool the burn'
10	Stabilise, repair and rehabilitate the injured person	Burn grafting, reconstructive surgery and physical therapy

Source: Peden (2008)

Based on the principles of injury prevention outlined above, interventions to prevent unintentional injuries have traditionally been considered in terms of the 'three Es': education, enforcement and engineering (Peden et al, 2008). In 2006, the European Child Safety Alliance and child safety researchers from around the world issued a Child Safety Good Practice Guide in which interventions were based on the 'three Es' and were listed under environmental modification, product modification, legislation, regulation and enforcement, promoting the use of safety devices, supportive home visits to families of young children, community-based interventions and education, and skills development (MacKay et al, 2006). Using the same categories, the following are examples of the main child injury prevention interventions implemented in various parts of the world, including in Viet Nam. More detailed discussion of the interventions and their impact on various injury types will be discussed in the corresponding chapters.

Environmental modification

While environmental modifications designed to prevent injury are often beneficial to people from all ages, they are particularly relevant to children who are said to live in a world over which they have little control and which is built around the needs of adults (Towner, 2001). These strategies are most effective when used in combination with legislation and educational strategies (MacKay et al, 2006).

Examples of strategies that seek to modify the environment in order to prevent injury in children include traffic calming programs aimed at reducing risk of injury to pedestrians and cyclists and those that promote better playground equipment design. A systematic review of wide area traffic calming schemes designed to slow down traffic on residential roads, including around schools, showed that such schemes reduced rates of crash-related deaths and injury among all age groups (Bunn et al, 2003). However, all the reviewed studies were conducted in high-income countries. While area-wide traffic calming has the potential to reduce road traffic injuries in low- and middle-income countries, evaluations of such schemes in these countries are needed. It is also argued that traffic calming schemes are too expensive for many low- and middle-income countries where the focus should be on other models of traffic safety, including the separation of various road users, including pedestrians, cyclists, cars, buses and animals who share the same road environment (Peden, 2008). In Viet Nam, a number of environmental modifications at the household, school and community level were promoted and implemented as part of UNICEF's Child Injury Prevention Program in six provinces, detailed in Box 1 (Doyle, 2008).

Box 1. UNICEF, Viet Nam. Environmental modification and safety devices

Environmental modifications were carried out and safety devices introduced in order to make homes, schools and communities safer for children in pilot provinces. Technical and, in some cases, financial support (for very poor households) was provided to help communities meet child safety checklist requirements:

- **Household level:** Installation of knife shelves, vacuum flask holders, covers for wells and water tanks, barriers for staircases, fences around ponds, child gates to prevent access to roads, cots for young babies, medicine cabinets, covers for moving parts on agricultural machinery and safe storage facilities for pesticides.

- **School level**: Installation of traffic signs, injury prevention signs and pictures, fencing, balcony railings and improved electrical systems.

- **Community level:** Installation of railings on bridges, fences around ponds, traffic signs, danger warning signs, road lighting, speed bumps and upgrading of public playgrounds.

Source: Doyle, 2008

Product modification

As with the environment, many products are designed for adults' needs and as a result pose greater risk for children. Strategies that aim at modifying products to improve child safety are more effective when used in conjunction with legislation and educational activities (MacKay et al, 2006). Examples of product modification interventions aimed at reducing injury in children include child resistant closures and manufacturers' set temperatures on water heaters (MacKay et al, 2006). While it is difficult to identify the impact of a particular product modification on reducing child injury, child resistant closures that reduce children's exposure to hazardous substances have been shown to reduce the risk of childhood deaths from poisoning (Peden et al, 2008). Most of these interventions, particularly child resistant closures and child resistant lighters, are feasible and applicable to high- as well as low- and middle-income countries, including Viet Nam.

Legislation and enforcement

Legislation is arguably the most powerful tool in the prevention of injury (WHO, 2004). The introduction of motorcycle helmet legislation (Resolution 32 2007/NQ-CP on 29/6/2007) and its significant impact on helmet use rates, particularly among adults in Viet Nam, is a good example of how legislation, combined with strong enforcement and educational activities, can lead to significant positive changes.

Prior to the introduction of the legislation, a number of organisations such as the Red Cross and the Asia Injury Prevention Foundation, launched several campaigns to increase public awareness on helmet wearing as well as providing free helmets for children. Since 2000, wearing a helmet became mandatory in Viet Nam for all motorcycle riders and passengers on specific roadways, including national highways and other assigned routes (Circular 312/2000/TT-BGTVT on 10/8/2000; Circular 08/2001/TT-BGTVT on 16/5/2001 on guiding the wearing of safety helmets when riding motorcycles or motorbikes).

However, due to the limited enforcement of this legislation, compliance among motorcyclists remained low at 30% (Hung et al. 2006). As a result, the Vietnamese government introduced Resolution 32 in June 2007, a decree that made it mandatory in Viet Nam for all motorcycle drivers and passengers to wear a helmet on all roads from 15 December, 2007 (Government of Socialist Republic of Viet Nam, 2007). In 2008, a survey which examined helmet wearing rates in four major centres in Viet Nam (Hanoi, Ho Chi Minh City, Can Tho and Da Nang) found very high compliance rates (90-95%) among adults (Pervin, 2009).

However, the same survey found that rates among children had remained low (15-53%) mainly due to existing legal loopholes as children aged less than 14 years in Viet Nam cannot be penalised for not wearing a helmet and existing laws do not penalise parents of children not wearing helmets (Pervin, 2009). To deal with legal loopholes, relevant ministries, in conjunction with international organisations such as the World Health Organization, UNICEF, and the Asian Injury Prevention Foundation, have made great efforts in advocating for enforcement of child helmet use. As a result, there is currently a proposal to introduce penalties for parents of children aged 6 years and older not wearing a helmet.

Other examples of legislative changes to prevent injury in children include the use of child passenger restraints, bicycle helmets, pool fencing, product standards (child resistant packaging, playgrounds, toys and playground equipment) as well as occupational health and safety regulations, particularly those pertinent to the construction industry (Peden et al, 2008). In Viet Nam, many legislations related to child injury prevention require better improvement and enforcement.

In addition, new action plans on injury prevention and child injury prevention for the current period have been approved by the Ministry of Health and the Ministry of Labour, War Invalids and Social Affairs (MOLISA), and a new action plan for Transport is under development (Smith and Nguyen, 2009). Specifically, shortly after the Minister of Labour, War Invalids and Social Affairs approved MOLISA's plan of action on child injury prevention, 53 out of 63 provincial departments of labour, war invalids and social affairs developed provincial plans of action on child injury prevention that have been either approved by their provincial people's committee or integrated into their general plan.

Finally, monitoring of law enforcement is also very critical. In Viet Nam, elected members of the National Assembly have been trained on child injury prevention. As a result, they have been participating in planning and monitoring injury and child injury prevention in various localities. In addition, the National Assembly made a formal recommendation to the Government to promote child injury prevention. This was followed by an instruction issued by the Government to all ministries on strengthening child injury prevention based on their functions and mission (Instruction# 1408/CT-TTg on strengthening child care and protection).

Promoting the use of safety devices

Safety devices play an important role in reducing the risk of injury occurrence but also in minimising the severity of an injury. Examples of safety devices that have been promoted and were effective in preventing the risk of and/or the severity of injury include smoke detectors, motorcycle and bicycle helmets, and child passenger restraints (MacKay et al, 2006).

It is important to note that the promotion of the use of safety devices needs the support of legislation and enforcement as well as education campaigns if they are to make an impact on reducing the injury burden. For example, research has shown that while programs aimed at promoting fire detectors reduce the risk of death from fires, their full effect can only be achieved if combined with legislation that regulates their use in homes and other buildings (DiGuiseppi et al, 2001). With the exception of motorcycle helmets, the use of many other safety devices has not been promoted in Viet Nam. For example, to date there has been no national regulation of the compulsory wearing of life jackets for boat passengers. In addition, though children are encouraged to wear a life jacket, many are reluctant because they are afraid that it could dirty their uniform, as shared by a MOLISA representative in a face-to-face interview.

Supportive home visits to families of young children

Home visits by health professionals and collaborators, particularly to families at high risk of injury, have been used to improve the home environment, to prevent problems in child behaviour or to supply and/or explain the correct use of safety equipment (Peden et al, 2008).

While more evaluation studies are needed to examine the full impact of home visits on preventing injury in children, they have been shown to improve the quality of the home environment (Kendrick D et al, 2000). Supportive home visits have also been found to be particularly effective if the information provided targets the appropriate age, and visits are combined with provision of free safety equipment and supported by promotional campaigns (MacKay et al, 2006). In Viet Nam, as part of UNICEF's Child Injury Prevention Program in six provinces, existing networks of community collaborators visited homes and promoted safety in the household (Doyle, 2008). Technical support, including provision of safety equipment and (in the case of very poor households) financial support was provided to assist communities to meet 'safe home' criteria as identified by the program.

Community-based interventions

These interventions use a range of strategies that include education/behaviour change, product and environmental modification as well as legislation/enforcement, and aim at changing community values and behaviours and altering the physical environment of communities to reduce the risk of injury (MacKay et al, 2006). Examples are the WHO Safe Community projects which focus on the prevention of injury at the community rather than the individual level and aim at creating local collaborations and links between various agencies, and at establishing local leadership roles which can promote a culture of safety within a community (Spinks et al, 2005).

While there is some evidence suggesting that the WHO Safe Communities model is effective in reducing injury among all ages, evaluations of this model occurred only in high-income countries where the safety culture is relatively well established (Spinks et al, 2005). Safe communities have been introduced in many provinces in Viet Nam for some time now but so far no formal evaluation of their effectiveness in reducing injury, including in children, has been undertaken (Chuan et al, 2001). 'In 2006, the Ministry of Health issued a decision (Decision No. 170/QD-BYT on 17/1/2006) on safe communities and called for "safe community" principles to be applied at the national level' (MOH representative). The impact of this decision on child injury will need to be evaluated.

Education and skills development

Pedestrian skills training programs in children are an example of educational interventions which have the potential of improving children's knowledge and behaviour in terms of crossing the road safely. However their impact on reducing pedestrian injury in children remains unknown (Duperrex et al, 2002). Similarly, a burns prevention program, based mainly on a large campaign conducted in the US (McLoughlin et al, 1982), reported knowledge gains but no reduction in the occurrence or severity of burn injuries.

While there is little evidence to support the effectiveness of educational and skill development strategies, their impact on reducing the burden of injury can be maximised if they are well designed and take into account the target population, or if they are used in combination with other strategies, such as legislation or environmental or product modification (MacKay et al, 2006). In other words, educational campaign and skill development programs play an important role in promoting and supporting other injury prevention strategies. Education is particularly important in influencing the development of policy and associated legislation by preparing public opinion before such legislation is introduced. For example, before the bicycle helmet legislation came into effect in Victoria, Australia in 1990, a ten-year campaign promoted helmet use through bicycle helmet promotion in schools and a mass media campaign (Towner, 1995). Similarly, a number of public education campaigns to increase public awareness of helmet use were implemented prior to the introduction of the motorcycle helmet legislation in Viet Nam in 2007, and campaigns designed to promote the use of helmets in children are currently under way (AIPF representative).

In addition, UNICEF, in collaboration with Ministry of Labour, War Invalids and Social Affairs and other key partners, has developed and implemented a project on advocacy and public education to raise awareness about safety in children with a focus on major injuries including drowning, traffic accidents, burns, poisoning and landmines, according to a UNICEF representative. The campaign used mass media, public events (such as UN Road Safety Week in 2007) and the distribution of print material through health and community workers as well as teachers and volunteers. Besides, mass organizations (Farmers Union, Women's Union, and Youth Union) recognized the importance of child injury prevention and, therefore, they have integrated this issue into their training curriculum and programmes. This approach has been able to mobilize cross sectoral participation to address child injury issues.

Other education and public awareness campaigns were also carried out by a number of NGOs in Viet Nam including TASC, the AIPF and Counterpart International. One important development in the area of child safety education and training is the integration of child injury prevention topics within the curricula of a number of Viet Nam's educational institutions. The Ministry of Education and Training's decision on the application of 'safe schools' ensured the integration of child safety messages into school curriculum across Viet Nam, as shared by a UNICEF representative from a face-to-face interview. Raising awareness about child safety, as well as training programs, particularly the provision of swimming lessons, has also been integrated into some of the Women's and Youth Union's core activities, as reported by representatives of a Youth Union representative, and individual interviews from the Women's Union .

Figure 1. Educational material on child injury, UNICEF Viet Nam

4. Conclusion

Despite limitations of available data on child injury in Viet Nam, available information highlights injury as a leading cause of morbidity and mortality in children aged 0-19 years. Leading causes of injury-related death include: drowning, traffic accidents, poisoning, falls, burns and animal bites. Major causes of non-fatal childhood injury include: falls, traffic accidents, animal bites, injury by sharp objects and burns. As with other low- and middle-income countries, risk factors of child injury include age, gender, hazardous environment, low socioeconomic status which is often associated with lack of awareness about injury risks and supervision of children, as well as lack of access to appropriate healthcare, particularly emergency and pre-hospital care.

International evidence shows that all types of injury in children are preventable and that the cost of intervention is justified because of the high cost of child injury, long-term disability and death. Internationally, interventions to prevent unintentional injuries in children are mainly based on education, enforcement and engineering (product and environmental modification). In Viet Nam, there is a strong emphasis on public health education campaigns, an important strategy in a country where there is low awareness about the risk and the burden of injury in children. However, many implemented environmental modifications, designed to make homes, schools and communities safer for children, are localised in only a few provinces and regulations related to child injury are either lacking or poorly enforced.

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Chapter 2. Drowning

Case study

Parents of a 2 year-old child will never forget the day in July 2003 when their son drowned. The family lived in the Lai Vung district of the Dong Thap Province. Both parents were busy and did not notice when their little boy crawled out of the door and fell into the river. Like thousands of houses in the Mekong River Delta provinces, their house was built near the river with a door that opened directly onto the water. The child was taken out of the water just two minutes after he fell in. Unfortunately, no-one at the scene could give him the basic first aid required for drowning. His parents rushed him to the nearest hospital but the transportation took 15 minutes and it was too late when doctors finally received the child. Tragically, this death could have been prevented with simple measures, like a simple secured gate or fence around the house and knowledge of basic first aid in the community.

1. Introduction

In 2007, 3786 children aged 0-19 years died as a result of drowning in Viet Nam MOH, 2008). This corresponds to a rate of 10.4 drowning deaths per 100,000 children, which is almost three times that of drowning rates in developed countries, reflecting the emergent nature of the problem in Viet Nam (MOH, 2008). According to the National Health Survey conducted in Viet Nam in 2002, drowning is the leading cause of injury mortality in the 1-14 year age group. Similar findings were reported in 2007 by the Ministry of Health (2008). In a country where rivers, lakes and ponds abound and where children regularly use these surrounds as play areas, this rate of fatal drowning is quite alarming. Frequent floods in the monsoon season and typhoons further compound the situation. Disturbingly, many Vietnamese parents refer to the summer vacation period as the 'drowning season' (Linnan et al, 2003). Not only do drowning injuries cause extreme grief to the families of victims, they also have a profound impact on the economy of low and middle-income countries countries(LMIC) such as Viet Nam. However, evidence from high-income countries proves that it is possible to bring about a reduction in these numbers through successful interventions (WHO Plan of Action, 2006).

This chapter will cover the epidemiology of drowning among children in Viet Nam and compare it with data from other parts of the world. Risk factors related to drowning in Viet Nam will then be analysed. A discussion on interventions to prevent this injury will follow, covering those that have been implemented in Viet Nam and their effectiveness, and those that have been proven to be effective in other parts of the world, especially in a developing country setting. The chapter will conclude with recommendations on feasible ways that can be implemented to reduce the occurrence of drowning in children in Viet Nam.

In the context of this report, drowning refers to an event in which a child's airway is immersed in a liquid medium, leading to difficulty in breathing (Peden et al, 2008). This definition covers all three outcomes that may result from such an event, including death, injury or no associated injury.

2. Epidemiology

According to the WHO Global Burden of Disease project, drowning was ranked at number 13 in the leading causes of death in children aged 1-15 years, with greatest risk appearing in the 1-4 year-old age group (Peden et al, 2008). There is a large disparity in the regional distribution of these rates, with low- and middle-income countries having rates up to six times higher than high-income countries (Peden et al, 2008). The low- and middle-income countries of the WHO Western Pacific Region, which includes countries in the East Asia and Pacific region have the highest rate of drowning deaths (13.9/100,000 population), followed by the African Region (7.2/100,000), the low-income and middle-income countries of the Eastern Mediterranean Region (6.8/100,000) and the South-East Asia Region (6.2/100,000) (Peden et al, 2008). It is important to note that WHO figures underestimate the actual rates for drowning because they do not take into account drowning due to floods. Additionally, non-fatal drowning can leave a child disabled for life. Globally, 1.1% of all Disease Adjusted Life Years lost for children aged 0-15 years are due to non-fatal drowning. However, this figure rises up to 4% for countries in the WHO Western Pacific region, which includes Viet Nam (Peden et al, 2008). These figures are likely to under-represent the actual number of deaths from drowning in the South and East Asian regions because of inadequate surveillance and reporting issues.

Data from reports compiled by the Hanoi School of Public Health and the Ministry of Health show that in Viet Nam, the rate of fatal drowning in boys is double that found in girls (MOH, 2008). This is consistent with findings globally where male children are over-represented in almost every part of the world with drowning fatalities, sometimes as high as twice that of female children. More recent statistics in the reports of the former provincial Family Planning

and Child Care Committees for 2004-2007 show that deaths by drowning comprised 50% of total deaths by injuries in children (MOLISA, 2007). Similar figures were reported recently by the Ministry of Health (MOH, 2008).

According to the Injury Mortality Report from the Ministry of Health the highest rates for drowning fatalities were seen in the 0-4 year age group: 17.2/100,000, which is about double that for all other age groups (MOH, 2008). This is similar to the findings in the WHO Global Burden of Disease, 2004 statistics, where the 1-4 year age group is reported as the group with the highest number of fatal drowning in low- and middle-income countries. Another survey found a very high percentage of drowning deaths (72%) in the 5-14 year age group, with almost half of the deaths accruing in the 5-9 year age group (Linnan et al, 2003). This may be explained by the fact that, in Viet Nam, most drowning episodes occur outside the home in open bodies of water where children in the 5-14 year age group are more likely to play than their younger peers. The rates of non-fatal drownings in Viet Nam were highest in the 1-4 year age group (Linnan et al, 2003; MOH, 2008).

The rates of drowning in Viet Nam vary geographically, with the highest rates of non-fatal drowning observed in the Mekong River Delta in the southern-most region of the country. The highest rates of fatal drowning, on the other hand, were observed in the Central Coast region, which is populated heavily by fishing communities fishermen. The lowest rates were observed in the North Central and Central Highland regions (Linnan et al, 2003; MOH, 2008). These patterns correlate with the abundance of bodies of open water in the regions.

In terms of location, more than half, i.e. 59%, of the drownings occurred in rivers and streams, 28.2% in ponds, 7.7% at sea and 5.1% occurred within dwellings (Linnan et al, 2003). More than half (58.25%) of these deaths occurred near the family home while playing, while a sixth of the victims were being supervised by their peers when they drowned (Linnan et al, 2003). This number is even higher (about 68%) for areas in the Mekong River Delta where houses are built very close to bodies of water (Save the Children and ECHO, 2003). Drowning occurrences were found to be much more common in rural areas as compared with urban areas due to the larger number of bodies of open water in those rural areas.

3. Risk factors

Child-related factors: developmental and behavioural factors

Different age groups present different types of risks depending on the physical and mental development stage of the child. Infants are injured, usually as the result of being left alone or in the supervision of an inexperienced caregiver. As children grow older and more inquisitive, they are more prone to become exposed to potentially hazardous situations. Children in the 5-14 year age group, which in Viet Nam has the most occurrences of drowning, are at a level of independence where they move about and play outdoors, often unsupervised.

As the statistics reflect, male children appear to be at an increased risk of drowning globally, which is consistent with the pattern that is seen in Viet Nam. This is attributed to the fact that male children generally engage in more outdoor play and exhibit higher levels of risk-taking behaviour than female children (Peden et al, 2008). Male children are also more likely to accompany adults on fishing vessels in families of fishermen while the female children stay at home. This puts these male children at greater risk for drowning in the ocean.

Inability to swim is another important risk factor for drowning in children in Viet Nam. Results of a quick assessment done by UNICEF staff in some lower secondary schools in Ha Tinh province in May 2007 showed that less than 10% of the pupils could swim a distance of 25 metres. Despite this, most children reported that they often played by or in rivers, ponds, lakes

or springs, and that their parents could swim, but did not teach them how to swim as the parents were too busy with their work (MOLISA, 2007).

Agent-related factors

Open and unprotected bodies of water that are easily accessible by children when they play are an important risk factor. The lack of supervision at these areas and non-availability of resources like life-guards puts children at great risk. When it comes to fishing, many of the vessels used in developing countries are often unsafe, resulting in many accidents and drownings. Additionally, these vessels are not supplied with flotation devices such as life jackets, etc., putting their passengers at even greater risk of drowning.

Environmental factors

Ponds, lakes, rivers and streams are found in many areas in Viet Nam, especially in the Southern region of the Mekong River Delta. These bodies of water are unprotected and pose a great threat to children as they play unsupervised in and around them.

Due to the long coastline of the country and the interlacing system of numerous rivers, streams and lakes, many houses in Viet Nam are built around rivers, lakes and ponds, or near the sea. These houses are, for the large part, unprotected by fences. Wells and water tanks used by families are also usually not covered. In many provinces of the Mekong Delta region, people live in floating houses or use floating toilets (MOLISA, 2007). All this adds up to form a very unsafe environment that poses great risk of child drowning.

Some areas of Viet Nam, like the Thap Muoi District, are built around complex networks of waterways and irrigation canals. In these areas, water transportation is a critical component of the transportation system. At present there are more than 2300 river wharfs with more than 5000 ships, boats and ferries in operation, serving over 80 million passengers every year, accounting for about 20% of the total passenger transportation load of the transport sector

(MOLISA, 2007). In these areas, children have to travel across these waterways to get to schools, and using a ferry or boat to cross the waterway is a common means of transport. However, these boats are not equipped with life jackets or flotation devices. As the results from the Ministry of Health Survey on Helmets and Life vest use indicate, collision and capsizing of boats and ferry boats is a frequent reason for drowning (48.38%). Lack of life jackets on these boats was found to be the second most common reason for drowning (41.93%). The interviews conducted in this study also revealed a misconception among people that children who can swim do not need life jackets. Other reasons include old and obsolete vessels and overcrowding (Chuc, 2006).

The waterway transport safety law was approved on 1 January, 2005, however there are still gaps in relation to its enforcement: many boat/ship pilots do not have licenses or certificates; ships/ferries are of poor quality; there is a lack of safety equipment, especially life buoys; ships/ferries are carrying more passengers than their registered capacity, especially ferries; and management and operation of wharfs are not given due attention in some provinces. These factors contribute to the increasing rates of shipwrecks, causing loss of lives for both children and adults (MOLISA, 2007).

A lack of lifeguards also makes the waterways treacherous, especially for children. According to a UNICEF representative, although there are a few lifeguards at some locations, most beaches and waterways are not patrolled by lifeguards. There is also an absence of regulation that makes the presence of lifeguards mandatory at such locations (UNICEF representative).

Climatically, Viet Nam is exposed to frequent flooding and typhoons in the monsoon season. These natural disasters cause hundreds of people to drown every year, a significant proportion of these being children. Several cases of child drowning also occur when young children fall into water holes at construction sites where there are no fences surrounding the sites, or holes were left unfilled after work was completed (MOLISA, 2007).

A critical component of survival in drowning episodes is the accessibility to treatment and rehabilitation. Early resuscitation can help prevent both mortality and disability. In LMICs, including

Viet Nam, access to treatment is often difficult, both in terms of transferring the victim to a healthcare facility as well as affordability.

Socioeconomic factors

Poverty and illiteracy, lack of proper supervision and large families have been shown to be risk factors for drowning (Peden et al, 2008). Poverty is linked to increased link in several indirect ways. Many families rely on dual incomes for survival, which means both parents are out working while children are left unsupervised at home. Children also work to support their families, and this exposes them to increased risk of drowning in cases where this work is undertaken near or in rivers, canals and the ocean, e.g. fishing. A study conducted in Viet Nam's Mekong Delta in 2003 also showed that child drowning occurred more frequently in poor areas and in families that have no grandparents to look after the children when the parents go to work (Save the Children and ECHO, 2003).

Inadequate infrastructure for accessing emergency healthcare services adds to this burden of risk (Peden et al, 2008). Rural areas in Viet Nam appear to be at a greater risk because of the higher prevalence of all these factors, as well as the presence of unprotected bodies of water, such as rivers and ponds, which are not commonly found in cities.

4. Interventions

The complexity of the nature of this injury and the circumstances that surround it often make it difficult to put in place effective interventions to prevent it, especially in low-income settings such as Viet Nam. It has been found that passive interventions, which involve improving the safety design of environments, are more effective than active interventions, such as altering behavior.

Teaching swimming and developing skills among children is an effective approach to bring about reductions in the number of drowning incidents. Research into drowning incidents in the Mekong Delta showed that 84% of the children who drowned did not know how to swim (MOLISA, 2007). Evidence from studies conducted in LMIC country settings, i.e. rural China (Yang L et al, 2007) and Bangladesh (Rahman A et al, 2005), shows that training children to swim can reduce the risk of drowning. A case-control study conducted in the US showed that

participation in formal swimming lessons was associated with an 88% reduction in the risk of drowning in the 1-4 year age group (Brenner et al, 2009). The concern in promoting swimming as a way of reducing drowning risk is that trained children may become overconfident and resort to higher risk-taking behaviour near water and may underestimate the threat posed, especially in the setting of natural water bodies like rivers, streams and oceans where the flow can be deceptive or unpredictable.

In Viet Nam, UNICEF has been working in collaboration with MOLISA in the areas of public health education and community interventions to reduce the burden of injuries. Interventions that have been put into place specifically towards reducing the risk of drowning include IEC activities in schools including drawing competitions and children's performances, training for swimming instructors and support for swimming lessons, and first aid training for school teachers and collaborators. This program was implemented in the six UNICEF project provinces, and over 3000 children were taught to swim. The Sports Committee has also had a swimming training program running from 2002-2010 in several provinces, and about 140,000 children have been taught how to swim under this program (MOLISA, 2007). However, to date, penetration of the swimming training in the community appears to be low, with only small numbers reported to have received training. In addition, intervention impact measurements are lacking for swimming and rescue training (Smith and Nguyen, 2009). It is critical that Viet Nam implements large scale child drowning prevention measures as soon as the problem definition has been adequately established. A MOLISA representative informed us that efforts are currently being made by the Ministry of Education and Training to integrate child drowning prevention skills and swimming training in the school curriculum (MOLISA representative).

Child drowning prevention education has also been carried out in the form of leaflets, posters, cartoons and short films. MOLISA, with cooperation from the Sports Committee, has organised swimming material for children and national swimming and drowning rescue competitions (MOLISA, 2007).

The MOH study on the use of life jackets in the Thap Muoi district discovered that for promoting the use of life jackets, communication through the mass media was perceived as the most effective in delivering the message. This study also found that 43% of people did not use a life jacket because they could not afford one (Chuc, 2006).

The Viet Nam Waterway Administration has conducted several activities to increase people's awareness about water transport safety. This includes the campaign to encourage ferry boat passengers to wear life jackets and the provision of 1670 life jackets, free of charge, to ferry wharves in 20 provinces. The usage rates for life jackets, however, still remain low (MOLISA,

2007). According to an interview with a MOLISA representative, 'while regulations for wearing life jackets on ferries do exist in Viet Nam, the enforcement for this regulation is still lacking' (MOLISA representative).

With the government's current focus on child drowning prevention, it is expected that efforts to enforce relevant regulations will be increased with the planned involvement of the Ministry of Public Security and the Water Transportation Administration. The MOLISA representative also highlighted plans to incorporate life jackets into school bags of children living in high risk areas (MOLISA representative).

Eliminating hazards is an effective strategy that can be cost-effective and feasible for implementation in Viet Nam. This would include eliminating hazards both within the home and outside. In the home environment the risk of drowning, especially for infants and very young children, can be reduced by ensuring that no buckets or tubs are left filled with water. Any large containers that may be used for the storage of water should be adequately covered with a heavy lid. Outside the house, any holes that are dug for construction, etc., should be filled in to prevent them from collecting rainwater. Drains and ditches need to be properly covered (Peden et al, 2008). In low- and middle-income countries, creating barriers between young children and the bodies of water to which they are exposed can be an effective measure to prevent drowning. Covering wells or open barrels with grilles, creating embankments or fenced barriers near ponds and riverbanks, and building flood-control embankments are all effective in preventing drowning (Celis, 1997). Interventions, such as promoting and assisting in making covers for open wells and fencing up or filling ponds for poor families, have also been undertaken as part of the collaborative effort by UNICEF and MOLISA in an effort to eliminate hazards (MOLISA, 2007). According to an interview with a MOLISA representative, penalties are now being considered for the violation of regulations such as leaving open holes at construction sites after work has been completed (MOLISA representative).

In Viet Nam, the Mekong River Delta region experiences serious floods in the monsoon season. For this region, Directive No. 40 from the Minister of Agriculture and Rural Development contains interventions to ensure the safety of children in flooded areas. These include engineering measures, organising specific places for child minding and boats to take the children to school and back (Directive No. 40/2007/CT-BNN).

In spite of these extensive interventions implemented by the various groups working towards preventing child injuries in Viet Nam, the mortality rates due to drowning in children continue to rise. This has prompted the development of an Interdisciplinary Plan for Child Drowning Prevention #570/KHLN-BVCSTE-CS in the period 2009-2010 by MOLISA, which was signed by representatives of nine ministries and mass organizations. This plan includes holistic and comprehensive interventions that aim to reduce annual child drowning rates, increase accessibility to drowning prevention information, involve all relevant ministries in the implementation of this plan, establish child drowning prevention models in the community, strengthen enforcement and monitoring of regulations relating to child drowning prevention, and strengthen the network for collection of child injury data.

The plan lays out a number of different types of activities to achieve its goals. These include:

- information, education and communication activities such as mass media child drowning awareness campaigns, training courses for first aid, incorporating child drowning information and skills into the extracurricular activities of schools, and implementing research into child drowning related issues;

- providing children with swimming skills and first aid knowledge and skills, with a focus in provinces with the highest drowning rates;

- building a safe living environment for children by eliminating hazards, encouraging children to wear life jackets when travelling by ferry, and promoting compliance with safety regulations at the wharves;

- reviewing and enforcing child drowning prevention legislation; and

- completing the child drowning reporting and information collection system.

Although the plan has been developed and will largely be coordinated by MOLISA as the main focal point, it also involves other ministries, which makes it a truly interdisciplinary plan. These include the Ministry of Health, the Ministry of Education and Training, the Ministry of Culture, Sports and Tourism, the Ministry of Public Security, The Viet Nam Inland Waterway Administration, the Central Committee of the Young Pioneers and Central Youth Leagues, and the Viet Nam Farmers' and Women's Union (MOLISA, 2007). A representative of MOLISA pointed out that funding will be an important aspect of the framework, since it is expected to be sourced from the provincial budgets and will depend on the priority assigned to it by the provinces (MOLISA representative).

Once drowning has occurred, the most important factor that prevents mortality and morbidity is the speed and adequacy of resuscitation. Providing training in first aid and resuscitation may prove to be of benefit in controlling the devastating effects of drowning. This training shouldn't only be directed at adults but also at older children, who are often supervising the younger children in these settings. While first aid training is undertaken mainly by Red Cross in many areas across Viet Nam, it is still limited and more efforts need to be made in this area (Red Cross representative).

5. Conclusion and recommendations

Drowning is the number one killer of Vietnamese children, comprising 50% of all injury-related deaths in children. Deaths due to drowning are so frequent that the summer vacation period is called the 'drowning season'. Fatal and non-fatal drowning rates are highest among the 1-4 year age group with a definite male predominance. Correlating with the distribution of the bodies of water in the regions, the highest drowning rates are observed in the Mekong Delta and Central Coast regions. An overwhelming 60-70% of child drownings occur near the home during play.

The fact that a large number of houses in Viet Nam are built very close to water poses an important risk of drowning. These bodies of water are often unprotected by fences and there is a great likelihood of children falling in and drowning while they play nearby. Many children do not know how to swim, and most beaches and waterways are not patrolled by. Ferries, which form a major means of transport in the country, are not fitted out with lifejackets, and are frequently in a run down state. The same applies to fishing boats, aboard which male children frequently work. In addition, the lack of first aid knowledge contributes to the high mortality related to drowning among children in Viet Nam.

Recommendations

- Eliminating hazards is one the most effective strategies of reducing the burden of child drowning. Families living in houses that are built close to the water need to be provided with the necessary education and resources to establish fences around their boundaries to prevent children from falling into the water.

- Efforts, including in terms of law and enforcement, need to be made to promote the filling of all construction holes.

- Families living in rural areas should also be supported in building cost-effective covers for wells in their areas.

- Public awareness campaigns implemented by the government agencies and NGOs to increase awareness about the risk of drowning are very important. These need to continue with a greater focus on ways to eliminate hazards. Duplicity of effort should be avoided by a joint campaign developed by various parties working in this area to develop a single, simple and effective campaign that carries the message across to the public. Resources that are freed up by achieving this can then be used for other measures such as eliminating hazards.

- First aid education in the event of drowning needs to be focused on as a part of drowning prevention campaigns. In the event of an injury, family members, including parents and older siblings, are usually called upon to provide first aid, and it is extremely important to educate and train them about the appropriate first aid and resuscitation methods required in case of drowning.

- Swimming training programs have been found to be effective in other countries to reduce deaths by drowning. Such training programs should be incorporated into the school curriculum at a very young age so that children become comfortable with water and learn the skills to save themselves.

- In communities with high levels of drowning, community involvement and empowerment should be sought by asking people to participate as voluntary lifeguards. These volunteers should then be trained in the skills of saving drowning victims and in the provision of first aid.

- The enforcement of waterway transport laws needs to be carried out in a more stringent manner with heavy penalties levied on ferry boat owners who carry passengers without life jackets. Provision of life jackets free of cost or at a subsidised cost will need to be considered to support the implementation of these laws. Fishing and transport boats should also be subject to the same stringent enforcement.

- Further research is needed to evaluate the effectiveness of drowning prevention interventions implemented in Viet Nam. Evaluative research should be made an integral part of upcoming initiatives such as MOLISA's Interdisciplinary Coordination Plan for Child Drowning Prevention.

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Chapter 3. Road Traffic Injuries

1. Introduction

Each year, about 1.2 million people are killed in road traffic crashes globally, and 50 million are injured. Around 85% of these deaths and 90% of disability adjusted life years lost occur in low- and middle-income countries. A staggering 96% of the children killed in road traffic accidents worldwide are from low- and middle-income countries (Peden et al, 2004). In these countries, the pace of development drives the construction of faster and bigger road networks, but this construction usually doesn't take into account children as one of the most vulnerable road user groups, who use the roads as passengers of vehicles, as pedestrians, as bicyclists, and who may live close to these roads (Peden et al, 2008). With the number of vehicles on the roads increasing exponentially in these countries, the number of road traffic crashes is also increasing in parallel. Similarly, traffic accidents in Viet Nam killed five times more people in 2003 than in the previous ten years (Peden et al, 2004). According to the Ministry of Transport, in mid 2009 there were more than 28 million vehicles, 1,459,892 cars and 26,869,025 motorcycles registered in Viet Nam (National Traffic Safety Committee, 2009)

In the context of this report, a road traffic crash is defined as 'a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle'. Road traffic injuries are defined as 'fatal or non-fatal injuries incurred as a result of a road traffic crash' (Peden et al, 2004). A road traffic fatality is considered to be a death occurring within 30 days of a road traffic crash (Economic Commission of Europe, 2003).

This chapter will cover the epidemiology of road traffic injuries among children in Viet Nam and compare it with data from other parts of the world. Related risk factors will then be analysed, followed by a discussion on current interventions to prevent these injuries, including those implemented in Viet Nam as well as those proven to be effective in other parts of the world. The chapter will conclude with recommendations on feasible interventions that can be implemented to reduce the occurrence of road traffic injuries in children in Viet Nam.

2. Epidemiology

According to the WHO Global Burden of Disease project, in 2004 two-thirds of all road traffic deaths took place in the South-East Asia and Western Pacific regions of the WHO. Over 20% of all road traffic deaths were among children, equalling almost 262,000 deaths (Peden et al, 2008). In the coming years, these figures are expected to go even higher. Globally, the death rate from road traffic injuries for children is estimated at 10.7/100,000. Road traffic injuries are the leading cause of death in the 15-19 year age group, and the second leading cause of death in the 5-14 year age group. These findings reflect the increase in mobility and risk-taking behaviour of growing children (Peden et al, 2008). The Child Injury and Mortality in Asia survey results also show road traffic injuries to be the second leading cause of both fatal and non-fatal injury in the five Asian countries surveyed (Linnan et al, 2007).

Similar to other South Asian countries, road traffic crashes are the second leading cause of injury-related mortality in children, with a fatality rate of 6/100,000 (MOH, 2008), and the third leading cause of injury-related morbidity in children with a non-fatal injury rate of 900.2/100,000. As in other countries in the region, both morbidity and mortality rates from road traffic injuries in Viet Nam are highest in the 15-19 year age group (Linnan et al, 2003; MOH, 2008).

According to data collected from 54 provinces and cities by the Ministry of Health, there was a total of 495,545 cases of head injuries due to traffic accidents in Viet Nam in 2008. Of those injured, victims under 14 years of age comprised about 13.4% of that figure. Nearly 50% of these children who suffered head injuries had not been wearing helmets, as shared by a MOH representative from a face-to-face interview. The same source of data also indicated that more that 21% of all hospital admissions for road traffic injuries were in children and adolescents aged 0-19 years.

Gender differences are seen globally with a mortality rate of 13.8/100,000 in boys as compared to that of 7.5/100,000 in girls (Peden et al, 2008). A similar gender difference is found in results from Viet Nam (Ministry of Health, 2008).

Pedestrians form the group that is injured most often in road traffic accidents globally, with a proportion of 30-40% in low- and middle-income countries (Toroyan et al, 2007). In Viet Nam, however, the road users who account for the highest proportion of the mortality rate are motorcyclists (57%), followed by bicyclists (22%) and then pedestrians (11.8%). These proportions differ when broken down into different age categories, with pedestrian-related injury most common among the 0-4 year age group, bicycle-related injury among the 5-14 year age group and motorcycle-related injury among those aged 15 years and older (Linnan et al, 2003).

Aside from mortality, road traffic injuries can have far-reaching consequences in the form of disability. Surveys in some Asian countries have shown that road traffic injuries are among the five leading causes of disability for children, with the rate of permanent disability in children aged 1-17 years at 20/100,000 (Linnan et al, 2007). The VMIS found that more than 50% of children who were injured as a result of a traffic crash missed school for almost two weeks. In addition it was found that about 14% of the injury victims suffered from temporary or permanent disability after the injury (Linnan et al, 2003). Since this group includes children in the 15-19 year age group, the VMIS found that 4% of these injured children were breadwinners for their families, impacting on their economic situation (Linnan et al, 2003). Road traffic injuries can also have a profound negative psychosocial impact on the children involved in these accidents, either directly or indirectly (Peden et al, 2008).

3. Risk factors

Risk factors for road traffic injuries among children are both general, i.e. those that apply to the population at large, and those that are specific to children. General risk factors include drink-driving, speeding, not using safety equipment, and factors related to the vehicle and the road environment (Peden et al, 2008).

Child-related factors: developmental and behavioural factors

Children are small in stature and their bodies are more vulnerable to injuries. Their small size also increases the risk that they will not be noticed by drivers on the road, which is a known risk factor especially for pedestrian injuries (Peden et al, 2008). Also, due to their small size, children may not be able to see surrounding traffic. Limitations of depth perception limit childrens' abilities to accurately gauge the distance between themselves and other moving objects, resulting in errors of judgement that can lead to accidents (Toroyan et al, 2007).

Children have also not fully developed the cognitive abilities that are required to synthesize environmental cues into meaningful signs of threat or danger. The cognitive processes of judgement and decision-making are not mature until a child reaches 11 years of age, which means that younger children can make serious errors while they are on the road (Peden et al, 2008). Children have short attention spans and can be very quickly distracted by other stimuli, causing them to react in sudden, potentially dangerous ways on the road (Toroyan et al, 2007). The lack of supervision in these circumstances can thus have disastrous consequences.

Among older children, an important risk factor is their risk-taking behaviour. Such behaviour has been seen to start from between the ages of 9 and 14 years, peaking in late adolescence or in early adulthood, and then declining steadily (Arnett, 2002). This type of behaviour increases the risk of injury in young pedestrians as well as in adolescent drivers (Peden et al, 2008). There is also a greater inclination among boys to show this kind of behaviour than among girls (Waylen et al, 2002), and this is reflected in the differential rates of road traffic-related injuries between genders. Research has also shown that peer pressure from fellow young passengers can cause a further increase in risky behaviour (Parker et al, 1992).

It is usual practice in many low- and middle-income countries for children to play on or near roads, or engage in work-related activities such as attending stalls next to the road side (Peden et al, 2008), selling items to vehicle occupants, washing windshields or begging at red lights. These activities increase the exposure of children to the dangers of the road environment and the risk of suffering from road traffic injuries.

Inappropriate use or lack of use of safety equipment is another important risk factor for road traffic injuries in children. Among adolescents, e.g. those who ride motorcycles, not wearing a helmet can be an important risk factor (Peden et al, 2008). Adolescents also have the lowest rate of using seatbelts when compared with other age groups (Peden et al, 2008).

The second most vulnerable user group after motorcycles to sustain road traffic-related injuries among children in Viet Nam is bicyclists. Several risk factors have been found to be associated with injuries related to riding bicycles. These include the lack of a correctly worn helmet (Thompson et al, 2005), riding in mixed patterns of traffic (Mohan, 2002), cycling on pavements (Senturia et al, 1997) and the visibility of cyclists (Rivara et al, 1997).

Lack of supervision has also been shown to increase the risk of injury to child pedestrians and bicyclists (Joly et al, 1991). A Canadian study of this issue found an increase in the risk by a factor of 2.6 (Pless et al, 1989).

Vehicle-related factors

Poor safety design of vehicles can be an important factor as well, both with regards to the risk of a child sustaining an injury, and to the severity of that injury (Peden et al, 2008). This extends to all kinds of vehicles that children may use, including cars, motorcycles and bicycles.

Motorcycles, bicycles and non-motorised vehicles make their riders especially vulnerable to injuries because of the lack of physical protection they offer (Toroyan et al, 2007).

Environmental factors

In many low-income countries the design of roads does not take into account the different types of road users, and pedestrians and users of non-motorised vehicles often share the road space with small and large motorised vehicles and even with animals, increasing the risk of road traffic crashes and injuries to these vulnerable road users (Toroyan et al, 2007). A number of specific environmental factors increase the risk for children using the road system. These factors, many of which are relevant to the situation in Viet Nam, include the following:

- sites with a volume of traffic exceeding 15,000 motor vehicles per day;

- poor planning of land use and road networks, including long, straight through-roads that encourage high vehicle speeds, together with mixed land use made up of residential housing, schools and commercial outlets (Clifton et al, 2007, Bly et al, 1999);

- a lack of playgrounds, resulting in children playing in the road;

- a lack of facilities to separate road users, such as lanes for bicyclists and pavements for child pedestrians (Kweon et al, 2005, Roberts et al, 1995);

- the existence of street vendor businesses, in which children may work;

- a lack of safe, efficient public transportation systems; and

- inappropriate speed, particularly in residential areas where children play or walk to and from school (Joly et al, 1991; Roberts et al, 1995; Mueller et al, 1990; Stevenson, 1997).

Socioeconomic factors

Following the occurrence of injury, the lack of good emergency transport systems to transfer patients to the appropriate healthcare facility is another risk factor in low- and middle-income

countries. A lack of first aid services and trained paramedics, of proper referral systems and triage, and of proper infrastructure, all lead to delays between the times of injury and of reaching the hospital (Peden et al, 2008). Lack of good rehabilitation services may also play a role in limiting recovery from injury (Peden et al, 2008).

In terms of socioeconomic distribution, traffic injuries are usually seen to be more prevalent among children from more deprived socioeconomic areas (Laflamme et al, 2000). The socioeconomic status of a family has been shown to be related to the risk of the child being injured in a road traffic accident, with the greatest risk posed to those with the poorest socioeconomic background (Toroyan et al, 2007). Hence poverty can affect risk in many ways: by influencing the family's choice of transport (Toroyan et al, 2007), by requiring children to work on or near roads, and by lacking the means to take victims for urgent treatment or rehabilitation once injury has occurred. However, an interesting finding from a study conducted in Viet Nam showed that the highest risk for road traffic injuries was seen in the middle-income group. One explanation for this, as already mentioned in this chapter, was that this group could afford bicycles for their children and motorcycles for their youth, two of the most vulnerable road users in the Bavi district where this study was carried out (Thanh et al, 2005). The study did find, however, that for pedestrian injury the risk was greatest in the low-income families (Thanh et al, 2005).

4. Interventions

Road traffic injuries are a result of an interaction between the child, the vehicle, the road environment and other socioeconomic factors. Due to their complex nature, interventions to prevent these injuries will need to adopt a multilevel approach and be targeted towards alleviating major risk factors.

Engineering

These include changes made to the infrastructure of road networks to include pedestrian facilities and methods for traffic calming, especially in residential areas (MacKay et al, 2006). It has been noted that engineering modifications are more effective when combined with educational activities and enforcement (MacKay et al, 2006). Community-based education/advocacy programs to prevent pedestrian injuries in 0-14 year-olds have been shown to be effective in reducing injuries by 12–54% (Turner et al, 2004). This can be combined with pedestrian skills training to improve child pedestrian road-crossing skills further. In such skills training programs, involvement of parents improves success, and practical roadside experience is an essential component (MacKay et al, 2006). Kerbcraft in Scotland is one such pedestrian training program where children are taught skills like recognising safe versus dangerous roadside locations and crossing safely at junctions (Thomson, 2002). Since training programs such as these can be run with the help of community volunteers, they can be very cost effective.

Education and training

In terms of community education interventions aimed at raising awareness about road traffic injuries and their prevention, UNICEF in Viet Nam has conducted several IEC activities in various communities around the country including dissemination of the message through nationwide TV programs, radio channels, newspapers and billboards, and the design and distribution of IEC materials throughout the country. Also, the 2004 World Health Day was dedicated to the issue of road safety and was celebrated with the slogan 'Road Safety is No Accident'. The activities also promoted environmental modifications such as warning signs at railway crossroads and speed bumps for the calming of traffic. The AIPF has also implemented major public awareness campaigns as part of their strategy to prevent traffic injury in children. These campaigns made use of concerts, celebrity performances and mass media to spread the message about child road safety. The AIPF is also working with MOET to develop a curriculum for child safety to be implemented in schools. According to an AIPF representative (Interview 27 August, 2008),

teachers and staff in schools are trained in child road safety skills so they can pass them on to the students. Other training methods also include mock traffic scenarios such as mock traffic signals and intersections where students practise safe traffic behaviours so as to make these behaviours a part of their everyday lives' An e-learning program is also being developed by the Foundation to be a supplement to the mock traffic plan. The environment modification aspect of this program consists of traffic calming around school zones using speed bumps, the modification of school parking and the creation of safe pick-up and drop-off zones.

Although education and training programs have been in place in Viet Nam for a number of years, there is a need to standardise various campaigns across provinces and to evaluate the actual effectiveness of these interventions on traffic-related deaths and injury in children.

Enforcement

Enforcement can consist of measures like implementing speed limits in residential areas. Studies have shown that enforcement of such legislation can reduce the incidence of injuries and can also bring about changes in driver behaviour (Highways agency 1997). The Road Transport Laws currently contain an article on child pedestrian safety (Article 30) which states that a child under seven crossing a road in a town, or crossing a road of busy traffic, must be accompanied by an adult (Road Transport Laws, 2001).

Enforcement in more general areas of road safety such as speed restrictions have implications towards reducing road traffic injuries in children. Setting speed restrictions has been shown to be effective in reducing the risk of crashes on the road, and it is recommended that in areas with a high number of pedestrians and bicyclists, especially children, the speed limit should not exceed 30km/hr (Toroyan et al, 2007).

Restrictions on drink-driving also have important implications for young drivers. Speed-related crashes frequently occur at night and the presence of young passengers may encourage a driver to speed. Restrictions on alcohol consumption by youth who are driving, on driving at night, and on passengers carried while driving are seen as additional measures that complement enforcement on speed restrictions (Toroyan et al, 2007). In Viet Nam, these would apply not just to cars but more importantly to motorcycles, since it is motorcycle crashes that kill the largest number of youth in Viet Nam. The Ministry of Health in Viet Nam, in conjunction with the WHO and supported by the Bloomberg Family Foundation, is currently implementing a host of interventions under the Road Traffic Safety Initiatives project in Viet Nam. These interventions are mainly targeted towards improving the use of helmets and decreasing the incidence of drink driving among road users in Viet Nam, and are taking a comprehensive approach from a national to provincial level. The interventions include enforcement measures, capacity building, community education and advocacy for safer road policies. It is expected that the results of these interventions will improve road safety outcomes in all vulnerable road user groups, including the adolescent and youth group.

There is now a large body of evidence that indicates that motorcycle helmets can reduce the risk of injuries in the event of a crash. A recent Cochrane review showed that helmet use reduces the risk of injuries by 69% and motorcycle fatalities by 42% (Liu et al, 2008). In Viet Nam, the government has taken several measures to implement helmet use by motorcycle riders. However, before the legislation was brought into effect, non-government organisations, such as the Red Cross and the Asia Injury Prevention Foundation, had launched several campaigns to increase public awareness on helmet use as well as providing free helmets for children. The Asia Injury Prevention Foundation has been very active in this area in Viet Nam. The Foundation works on the basis of social entrepreneurship, with their helmet factory, PROTEC, serving as the commercial arm of the Foundation. An AIPF representative highlighted the importance of the 'Helmets for Kids' project which had been implemented in schools in 64 provinces for delivering traffic safety education for children (see case study) (AIPF representative). In

addition, the AIPF has been instrumental in changing the helmet standards for Viet Nam, and in facilitating the model for a standard helmet design for a tropical region. The Foundation also works on advocacy for legislation for helmet use. A representative stated the Foundation's working focus as 'We view helmets as a vaccine for the epidemic of child road traffic injury' (AIPF representative).

Case Study: 'Helmets for Kids'

An initiative of the Asia Injury Prevention Foundation, Helmets for Kids is a non-profit program that provides quality helmets, free of cost, to primary school children whose families cannot afford them. Launched in 2000, this program was the catalyst to draw together government, non-profit and corporate organisations to work towards saving children from road traffic injuries. The program components include crash investigations, monitoring and surveillance, and daily traffic safety instruction.

The program is implemented through a series of public awareness campaigns that make use of print advertisements, outdoor media, television commercials and events, along with the distribution of free helmets. The program has also made extensive use of celebrities acting as ambassadors of the helmet-wearing cause. The most recent campaign is running under the slogan 'Wear a Helmet – There are No Excuses'.

To date, the AIPF has distributed over 300,000 helmets to children in primary schools across Viet Nam.

The helmet legislation was first brought into place in 2000, with amendments in 2001 making it compulsory on certain roads. However, despite the legislation, due to weak enforcement the percentage of motorcyclists who wear a helmet was still quite low with one population-based estimate indicating the prevalence as low as 30% (Hung et al, 2006). In 2007, compliance with helmet use among adults increased significantly as a new resolution (Government Decree # 146/2007/ND-CP and Government Resolution # 32/2007) was passed enforcing the wearing of helmets on all roads (Government of Socialist Republic of Viet Nam, 2007). However, this enforcement does not specifically address helmet use by children under 14 years of age, only calls for a warning for those aged 14-16 years, and enforces a financial penalty only half that for adults for those aged 16-18 years (Pervin et al, 2009). According to the statistics, it is the 15-19 year age group that has the highest morbidity and mortality rates from road crashes (Linnan et al, 2003). The enforcement also does not provide penalties against the carers of children not wearing helmets (Pervin et al, 2009).

Moreover, after the introduction of the law in 2007 (Resolution 32 2007/NQ-CP on 29/6/2007) , community concerns about neck injuries in children as a result of wearing helmets, although unsubstantiated, deterred many parents from ensuring their children wear helmets (Pervin et al, 2009). A roadside survey conducted in four main cities of Viet Nam reported an estimated helmet use figure of 38% among children up to 14 years of age (Pervin et al, 2009). Clearly myths

such as these will need to be addressed in order to increase the prevalence of helmet wearing in Vietnamese children. Agencies such as the WHO, UNICEF and the AIPF are already addressing these issues in their advocacy campaigns and the Viet Nam Helmet Wearing Coalition is now focusing its efforts on helmet use by children as well (Pervin et al, 2009). Further advocacy is needed to close these loopholes in the legislation and to introduce penalties against carers of children who are not wearing helmets, as can be found in other Asian countries such as Cambodia (Government of Cambodia, 2007) and Malaysia (Rajam Krishnan, 2008).

In this respect, the WHO and UNICEF have been very active in working with the Ministry of Health and the Ministry of Transport in Viet Nam. According to a WHO representative from a face-to-face interview, with support from the WHO and UNICEF, the Ministry of Transport recently hosted an international consultation workshop where child helmet experts were invited from different countries to present and meet with officials from various Vietnamese ministries and law-making officials (WHO representative). The consultation aimed to present a range of information to counter general 'misinformation' about child helmets in Viet Nam. This includes community concerns regarding potential neck injury in children wearing helmets. After this consultation, a decree was drafted to introduce penalties for adults carrying children 6- 16 years of age who are not wearing a helmet. For children older than 16 years, a legal penalty already exists for riding without a helmet. This particular age-range (6-16) was chosen as it represents children of school-age who are more frequently transported using motorcycles. The decree is currently in its final stages of review by the authorities and is expected to be approved in November-December 2009.

Organisations working in the area of road safety for children in Viet Nam, such as the WHO and the AIPF, express concerns about the enforcement of this law, as it will be difficult in some instances to determine the age of children. These organisations will, therefore, continue to advocate for mandatory helmet use for children of all ages. It is widely accepted that without enforcement, education and awareness campaigns are not very effective. This view was also expressed by an AIPF representative: 'Without legislation and enforcement, education and public awareness campaigns may not work – like now you can see on the streets that, thanks to legislation and enforcement, almost 95% of adult riders are wearing helmets – it's unbelievable!' (AIPF representative).

A representative from the MOH confirmed in a face-to-face interview that the health sector will be working closely with the transport sector and police to propagate road safety measures through national TV, schools and government institutions (MOH representative). This is, however, not a nationwide event and will be observed in some areas of Viet Nam only.

According to a WHO representative, the organisations will also working closely with UNICEF, Ministry of Labour, War Invalids and Social Affairs and Ministry of Transport during the Road Safety Month in September towards providing information about transporting children safely to schools, and supporting the government in educating children about road safety (WHO representative). As part of the Bloomberg Road Safety Initiatives project in Viet Nam, the WHO is currently supporting three schools in three provinces of Viet Nam. As part of this project, helmets were procured for the children in these schools, and the teachers were provided training in educating children about the correct use of helmets and the benefits of wearing one. A process evaluation to monitor the change in usage of helmets by these children is planned for when the schools re-open in September after the summer break.

The bicycle is a very popular mode of transport among school children in Viet Nam. The Child Injury Prevention Project by the Ministry of Health in 2006 found that up to 40% of lower secondary and 63% of higher secondary students travel to school on bicycles (Chuc et al, 2006). This survey also showed that the awareness among children about the necessity of wearing a

helmet was quite high (98%). The use of bicycle helmets has been shown to reduce injuries and correctly fitted helmets have been shown to reduce the risk of head and brain injuries by 63-88% (Towner et al, 2001). Parental knowledge and helmet availability, accessibility, cost and ease of use impact both on helmet use and proper use (Karkhaneh et al, 2006). Reducing the cost of helmets through give-away programs and discounts facilitates uptake and use (Royal et al, 2005).

Again, legislation relating to the use of bicycle helmets leads to an increased use (Karkhaneh et al, 2006) and evaluation of mandatory bicycle helmet laws in Canada show a 45% reduction in the rates of bicycle-related head injury in provinces with legislation, while in New Zealand there was a 19% reduction in head injuries among cyclists during the first three years of legislation (Peden et al, 2004).

The bicycle helmet campaign in Denmark is a good example of a community-based education campaign directed at changing children's knowledge, attitude and behaviour in relation to bicycle helmets. The campaign aimed at removing the stigma that wearing bicycle helmets was 'not cool'. The campaign showed both an improvement in the rate of wearing helmets, and in children's satisfaction with their helmets (MacKay et al, 2006). Another good example of a program to increase helmet use among bicycle riding children is the intervention 'On Bikes Only with Helmets' in the Czech Republic. This program was implemented in 2002 in one town, and since its success has been expanded to other regions in the country. The program consists of educational campaigns in schools, and spot-checks by police to ensure children are using helmets and bicycle paths, and those who do are rewarded with gifts. Bicycle helmet-wearing rates have almost doubled, with an almost four-fold reduction in head-injury admission rates, compared to areas without the program (Sedlak et al, 2006). Similar programs need to be implemented in Viet Nam in order to increase the use of helmets by children riding bicycles.

Another challenge pointed out by a representative of the AIPF (Interview 27 August, 2009) is that in Viet Nam, although standards are available for the manufacturing and import of helmets, these standards are not always enforced. This results in many cheap, low quality helmets being available to people who purchase them to avoid being fined. It is difficult for quality standard-compliant helmet manufacturers to compete with the prices that non-standard helmet manufacturers introduce to the market. It is, therefore, important to enforce existing regulations and standards regarding the manufacture and import of helmets in Viet Nam.

Conspicuity is another factor that is important in terms of road traffic collisions for pedestrians, bicyclists and motorcyclists. At night or in situations of low light, these road users may not be detected by other road users, especially drivers, thus resulting in crashes (Toroyan et al, 2007). While in some parts of the world, e.g. Colombia, there is legislation for motorcycle riders and passengers to wear light-reflective jackets (Toroyan et al, 2007). This may not be feasible in the Vietnamese setting because of cost implications and weather conditions. A more cost-effective method would be to promote the use of reflective stickers on the backs of motorcycles and bicycles, helmets and on clothing for pedestrians. Pedestrians should also be advised to cross roads in well-lit areas and walk facing on-coming traffic (Toroyan et al, 2007).

Secondary prevention

Once injury has occurred, first aid and early transport to treatment centres forms an important part of reducing morbidity and mortality. Access to first aid and emergency transport for victims of traffic crashes in Viet Nam is very limited. According to a representative of Counterpart International in Viet Nam (Interview 28 August, 2009) only around 5% of trauma patients are transported to hospital by an emergency vehicle. A number of initiatives are currently being developed and implemented to address this problem in Viet Nam. For instance a WHO representative (Interview 25 August, 2009) highlighted the organisation's role in the government's program to improve pre-hospital care, specifically in road traffic injuries. This program aims to

develop a model for Viet Nam for better first aid and response time. The program will train 3000 volunteers in basic first aid provision, evaluation of the crash scene, and clearing away further dangers from the scene. The program will be implemented in five provinces initially and will be evaluated for effectiveness. Although the program covers road traffic injuries in the general population including both adults and children, if successfully implemented it is expected to have a positive impact on child injuries sustained through road traffic accidents. Similar programs have been implemented for all trauma victims by the Red Cross and Counterpart International in a number of provinces and need to be extended to other parts of the country to have a significant impact.

5. Conclusion and recommendations

With the increase in vehicles on the road over the past ten years, and unmatched by a parallel increase in the quality of the road networks, there has been a four-fold increase in road traffic crashes in Viet Nam. Currently, traffic crashes are the second most important cause of mortality among Vietnamese children, and the third most important cause of morbidity. The highest rates are seen in the 15-19 year age group. Head injuries account for a significant proportion of injuries related to traffic crashes and motorcyclists are the most vulnerable road user group.

While physical characteristics put children at higher risk of road traffic accidents, in a low- and middle-income setting like Viet Nam, other factors also add considerably to this risk. These include lack of supervision, lack of proper playgrounds and children working on or near road sides, among others. The 15-19 year age group remains at an even higher level of risk because of their predilection for risk-taking behaviours on the road and for non-compliance with wearing helmets.

Despite the enforcement of the helmet law in Viet Nam, which has resulted in helmet-wearing rates for adults reaching 95%, the rates of helmet-wearing in children remain low. This is a result of the loophole in the current legislation that does not penalise children below the age of 16 or their carers for not wearing helmets. Many non-government, non-profit organisations have been working in conjunction with the Vietnamese government to increase the use of helmets through extensive public awareness campaigns. A decree has recently been drafted, extending the age of compulsory helmet wearing to children who are 6 years of age or more.

Recommendations

- Despite the multitude of public awareness campaigns for road safety that have been running in Viet Nam for a number of years, evaluations of the effectiveness of these campaigns are lacking. Without such evaluations it is difficult to estimate the actual impact of these campaigns on road safety in children.

- At present, different stakeholders working towards the same goal of improving road safety in children are implementing their own curricula in schools. There is a need for the merging of these different curricula into one standardised curriculum that delivers best practices in road safety in a simplified way that can be implemented across all the schools in the country. The Ministry of Education and Training would be the ideal leader in the development of such a curriculum in conjunction with the other major stakeholders.

- The new decree that makes wearing helmets compulsory for children who are 6 years of age and above is a way forward towards increasing helmet use in that demographic. However, difficulties in enforcement are foreseen due to the difficulty of determining the exact age of young children on simple visual observation. Additionally, children below the age of 6 years will remain at a higher risk. The extension of the compulsory helmet law to cover all ages should be pursued in order to improve road safety outcomes in all Vietnamese children.

- Addressing the issue of helmet quality needs to occur in parallel with enforcing the helmet legislation. The importation and manufacture of low quality, cheap helmets that do not provide adequate protection undermines the effectiveness of efforts being made towards encouraging use of helmets. Although standards relating to the quality of helmets do exist, at the moment the enforcement of these standards is, at best, patchy. There is a need to enforce quality standards for imported, as well as locally manufactured, helmets in Viet Nam.

- Although there is currently a great focus on increasing the use of helmets among children, other causes and risk factors of road traffic crashes also need to be addressed.

- Enforcement of other restrictions like speed limits in residential and school areas and drink-driving also need to be brought into effect as stridently as the helmet legislation.

- A graduated licensing system based on those in use in some high-income countries, like Australia, might be considered, especially since the 15-19 year age group is at highest risk of road traffic injury among children.

- Continued efforts to enhance traffic management and public transport development is needed. For example, providing central pedestrian barriers on major streets and roads, as well as safe crossings for pedestrians on major roads and streets by means of traffic lights and other adequate infrastructure.

- Pedestrians, motorcycle and bicycle riders may be encouraged to use reflective stickers on their clothes and helmets to improve their visibility at night.

- The emergency transportation and first aid system needs to be improved substantially to be able to reduce the risk of death and disability in those who are injured.

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Chapter 4. Poisoning

1. Introduction

Poisoning can be defined as a chemical injury to body organs or a chemically induced disturbance of the functions in biological systems as a result to the exposure to environmental substances (Persson, 2000). Acute poisoning is the exposure of the body to a toxic substance in a high dose, on one occasion, over a short period of time with symptoms developing relatively quickly following exposure (Persson, 2000). Examples of acute poisonings include that caused by contaminated food, therapeutic substances and an array of chemical products such as pesticides, petroleum and household cleaning products. The time between the exposure to poison and the appearance of clinical symptoms is crucial as it is during this period that action can be taken to minimise absorption by neutralising the poison or administering agents that prevent damage to the organs (Peden et al, 2008).

Children, particularly the very young, are vulnerable to poisoning due to their propensity to explore and the fact that their cognitive and affective skills are not fully developed (Schmertmann et al, 2008). Worldwide, acute poisoning accounts for an estimated 45,000 deaths annually in children and young people under the age of 20 years (WHO, 2008). While comparison between countries is often difficult as the definition of poisoning used varies from one country to another, the death rate related to acute poisoning is higher in low- and middle-income countries such as Viet Nam (Peden et al, 2008).

This chapter focuses on acute poisoning among children in Viet Nam – predominantly unintentional poisoning. It covers the magnitude of poisoning in children, risk factors and prevention strategies, particularly those that can be implemented in Viet Nam and have the potential to prevent this type of injury in children. Food poisoning will be included in this chapter as most data from Viet Nam covers this type of poisoning. This will need to be taken into account, particularly when comparing the burden of poisoning in Viet Nam to that in other countries which do not include this type in their child poisoning statistics. The chapter does not cover chronic poisoning that results from prolonged exposure to toxic agents such as lead poisoning.

2. Epidemiology

Poisoning mortality rates among children aged less than 20 years vary between countries according to average income. For high-income countries the poisoning mortality rate in children is around 0.5/100,000 while for low- and middle-income countries it is estimated to be four times higher, at 2.0/100,000 (WHO, 2008). In Viet Nam in 2007, the mortality rate from poisoning in children aged 0-19 years was 0.4/100,000 (MOH, 2008). This figure is likely an underestimate of the true incidence as the VMIS found a much higher mortality rate (almost ten-fold the current figure) in 2001. The case fatality rate for poisoning, or the ratio of deaths within poisoned children, was equally high at 3.3% (Du, 2001). The VMIS also shows that the non-fatal rate of poisoning in children was 168.1/100,000 and varied with age, with the highest rates found among infants aged less than 1 year, and the lowest among children aged 10-14 years. Food poisoning accounted for more than two-fifths of poisoning cases, gas or smoke accounted for more than 15%, pharmaceutical poisoning accounted for over 10% and liquid poisons for over 4%. In addition, the VMIS found that more than 60% of poisoned children were hospitalised with

an average length of stay of 5.2 days (range 1-30 days). Over two-thirds (68.2%) of poisoned children missed school for an average of 6.2 days. Despite the high case fatality rate, there were no permanent disabilities resulting from poisoning in children.

3. Risk factors

Child-related factors: age and gender

The VMIS found that, generally, child poisoning rates were highest in infants aged less than 1 year and decreased with age until 14 years before they increased again in children aged 15-19 years (Linnan, 2003). Similar patterns were found in the Ministry of Health mortality data (2008) as well as in different parts of the world (Peden et al et al, 2008). It has been argued that the high rates of poisoning in very young children might be due to the fact that their motor skills develop faster than their cognitive and affective skills (Schmertmann et al, 2008). As a result, young children, who have a higher propensity to explore and put everything in their mouth, are physically capable of accessing a substance without understanding that the substance is dangerous. In addition, the risk of poisoning among young children is also influenced by their size and physiological development as the toxicity of many substances is related to body mass and some toxins are eliminated by the body's defense system that develops with age (Persson, 2000).

While mortality data show higher rates among males compared to females (MOH, 2008), the VMIS shows no significant gender difference for either morbidity or mortality associated with poisoning in all child age groups. The gender differential in relation to poisoning varied across the world with boys having higher rates than girls in most regions of the world with some exceptions, mainly in low- and middle-income countries of the Western Pacific region (Peden et al, 2008).

Agent-related factors

The type of poisoning and causative agents varies between different parts of the world depending on the educational status, local beliefs and customs of that country (Akhtar et al, 2006). In Viet Nam, the VMIS found that food poisoning accounted for more than two-fifths of poisoning cases (44.1%), with poisoning from fruits/vegetables accounting for almost a quarter (24.7%), pharmaceutical poisoning accounting for about a tenth (11.8%), and liquid poisons accounting for 4.3% of poisonings.

The survey also showed that the nature of the poisoning agent varied by age, with poisoning from plants occurring mostly in children aged under 10 and pharmaceutical poisoning seen at the highest rates in the young and very young age groups. A retrospective study of poisoning cases presenting to the Poison Control Centre in Hanoi also found that food poisoning accounted for just over 40% of these cases, 30% were due to pharmaceutical poisoning and 7% were due to pesticides (Hung, 2008). VIMS also found that 15% of cases of poisoning in children were due to gas or smoke from indoor cooking with poor ventilation, which leads to the production of gas or carbon monoxide as the result of incomplete combustion.

A study of childhood poisoning in Thua Thien Hue and Dong Thap provinces in Viet Nam also found that food poisoning was the most common type of poisoning among children, followed by chemical poisoning, and medical and biological poisoning. Poisoning from venomous bites was rare (Tran, 2007). The study also found that bacterial contamination, as a result of unhygienically preparing, cooking and storing food, as well as a result of the use of illegal substances such as Borax and boric acid in producing, preserving and processing foods, were the main causes of food poisoning. Residues of chemicals used in agricultural production and animal breeding also accounted for a number of food poisoning cases. In relation to chemical poisoning, including pesticides and other household products, the main reasons behind poisoning

cases were unsafe storage and the use of fake and out-dated chemical products. Unsafe storage, as well as misuse and overdose were the main reasons behind pharmaceutical and biological poisoning. Other cases of poisoning in this category were due to use of traditional herbal medicines (Tran, 2007).

Access to treatment

Prompt access to appropriate healthcare facilities is vital to prevent serious complications and even death as a result of poisoning in children. It is argued that poison control centres are the most appropriate facilities to manage cases of poisoning and to advise the public when poisoning is suspected, as they rely on regularly updated databases (Peden et al, 2008). While one similar facility, the Hanoi Poison Control Centre, has been established in Viet Nam and is currently operating (Hung, 2008), the level of accessibility for the majority of the population to it is likely to be low. Access to any type of healthcare service for the treatment of child poisoning in Viet Nam remains low, with the study in Thua Thien Hue and Dong Thap districts indicating that only 48% of child poisoning cases went to hospitals for treatment and were reported in the public routine information system (Tran, 2007).

Socioeconomic factors

While no information is available for Viet Nam, socioeconomic status has been found to be associated with injury and deaths as a result of poisoning, not only between countries, as mentioned above, but also within countries (Casey et al, 1994; Roberts, 1996, Akhtar et al, 2006). Children from poor households are more likely to consume food at home as well as in the community that is unhygienically prepared, cooked and preserved, which increases the risk of bacterial contamination and is a major source of poisoning in Vietnamese children (Tran, 2007). Poor households are also more likely to have limited storage space to keep potentially harmful substances away from children.

Poverty, and associated malnutrition, can also increase the risk of poisoning in children by forcing them to consume unsafe but cheaply obtained foods, thereby lowering their physiological ability to neutralise toxins (Peden et al, 2008). In addition, as is the case with other types of

injury, children from poor households are more likely to have limited access to prompt healthcare which is vital in the case of acute poisoning.

4. Interventions

Legislation and enforcement

While there are laws regulating the preserving, processing and storage of food in Viet Nam (Decree 03/2000/ND-CP; Decree 49/2003/ND-CP) it seems that the level of enforcement of these laws is limited, particularly for food outlets in public markets across Viet Nam. A Vietnamese study which indicated that half of food poisoning cases in children were due to eating unsafe street food, also found through observing a sample of food vendors that foods on sale were not hygienically prepared, cooked or stored (Tran, 2007). The same study also found that the majority of food poisoning cases in children remain unreported, and therefore not investigated by health authorities, increasing the risk of contamination and poisoning for other children. It is important that an integrated health information system, which includes relevant healthcare facilities and health authorities, be developed in order to improve reporting of food poisoning cases, a vital step in investigating and containing food poisoning outbreaks. Poisoning indicators should also be integrated into the current health information system. It is also important that existing regulations regarding food preparation and storage are strengthened and enforced through a hygiene inspection system of all commercial food producers, including food outlets in public markets. Currently, the issue of food safety involves at least three ministries: the Ministry of Agriculture and Rural Development, which is involved with the origin or the quality of food, for instance vegetables grown by banned fertiliser or pesticide; the Ministry of Trade, which is involved with the process of the distribution of food products; and the Ministry of Health, which is involved with the human health aspect of food. Clear designation of responsibility and good coordination among the ministries are necessary for better strengthening and enforcement of regulations of food safety.

In relation to the other most common causes of child poisoning in Viet Nam -- chemical and therapeutic poisoning -- laws relating to packaging and child-resistant closures have been shown to be effective in a number of high-income countries. The introduction of child-resistant packaging as part of the Poisons Prevention Packaging Act in the United States has resulted in a decrease in morbidity and mortality related to the ingestion of substances listed as part of the legislation in children aged less than 5 years of age (O'Brien, 2008).

Similar laws regulating child-resistant closures and proper packaging and labelling of products to indicate their potential toxicity and to distinguish them from other harmless products were also introduced in other high-income countries (MacKay et al, 2006). It is important to note that child-resistant packaging or 'special packaging' is designed or constructed to be significantly difficult for children under 5 years of age to open within a reasonable time but not difficult for normal adults. However, such packaging is called child-resistant, rather than childproof, because some children will be able to open it. For this reason, regulation needs to be complemented with education for parents with the message that resistant packaging is not an alternative to adequate supervision and safekeeping of therapeutic products and hazardous material out of the reach of children (Mathieu-Nolf, 2008).

In Viet Nam, MOLISA and other stakeholders are currently reviewing the legislation related to child injury, including poisoning, in order to determine the need for legislative changes as well as strategies to improve enforcement of existing legislation related to child safety in Viet Nam as shared by a MOLISA representative from a face-to-face interview. The lack of specific regulations regarding child-resistant packaging in low- and middle-income countries, including Viet Nam, has led to calls for international standards and laws needed to play a role in regulating multinational companies that often apply lower standards when operating in low-income coun-

tries compared to their country of origin (Peden et al, 2008).

In addition, the use of appropriate labelling and warning stickers is not likely to have a substantial impact in low- and middle-income countries where literacy levels are relatively low. Even in high-income countries where literacy levels are higher, parents' perceptions of the toxicity of some substances were sometimes inaccurate, despite proper labelling (Patel et al, 2008).

Another example of successful legislative changes, relevant to Viet Nam, is legislative regulation and the gradual withdrawal of a number of highly toxic pesticides in Sri Lanka (Roberts et al, 2003). The changes, along with an education campaign to train farmers, distributers and the public, including school children, in the safe handling, use and storage of pesticides, resulted in a fall in case fatality for poisonings due to pesticides in the country.

Engineering

The manufacture of child-resistant packaging for medications, fuels, household chemicals and pesticides is one of the most successful interventions in preventing injury and death related to poisoning in children from high- as well as low- and middle-income countries (Krug A, 1994; O'Brien, 2008). Despite the cost associated with the manufacture and distribution of these products, it is important that potentially harmful products, particularly drugs sold over the counter, should only be available in child-resistant packaging in Viet Nam. The cost to households should be reduced by government subsidies which are, in turn, likely to be outweighed by healthcare costs related to the treatment of affected children (Peden et al, 2008).

Other engineering interventions designed to prevent unintentional poisoning in children include those that lower the level of the toxicity in some products (i.e pesticides), as well as those that modify the packaging and or the colour of the product in order to make it less attractive for children. For instance, changing the colour of the commonly used fuel paraffin, which can be confused with water as they share the same appearance and viscosity, has shown improved outcomes in terms of preventing poisoning than traditional educational campaigns that aim at encouraging adults to store their paraffin away from children (Schwebel and Swart; 2009).

Communication and Education

Education interventions to prevent child poisoning should aim to raise awareness about the issue, increase knowledge and skills regarding poison prevention, change attitudes and behaviours as well as influence policy and legislation (Peden et al, 2008). Some key messages of poisoning education in the community centre around identification of potentially harmful products, safe handling of food in the case of food poisoning, safe storage of poisons in the home in secure locations, as well as secondary prevention messages about the most effective ways of seeking help in order to reduce the severity and fatality of poisoning cases.

Education interventions to prevent food poisoning usually target children, parents and those working in the food industry. A study that examined the impact of providing food safety education through the use of an interdisciplinary curriculum in five US schools shows that the curriculum was highly effective at raising student knowledge and improving students' food handling behaviours (Richards, 2008). A review of education and training interventions among food sector workers indicated that while some studies show some improvement in knowledge and practice in terms of handling food, particularly when interventions are repeated at regular intervals, there was no evidence to show their impact on the incidence of food poisoning (Egana, 2007). Such educational interventions should be used in combination with legislative and enforcement activities in order to maximise their impact.

Similarly, a systematic review of studies evaluating the effect of home safety education and the provision of safety equipment to prevent poisoning in children showed improvement in safety practices, including safe storage of medicines and cleaning products as well as having access

to poison control centres and other emergency numbers (Kendrick et al, 2008). However, the review found no evidence that such interventions have an impact on poisoning rates.

While regulatory or technological approaches that require little or no individual action are generally more effective in reducing poisoning than attempts to change people's behaviour (Mathieu-Nolf, 2008), education campaigns are very important in supporting these interventions. For instance, educating parents about the purpose as well as the limitations of child resistant packaging is important in ensuring their effectiveness in reducing the risk of unintentional poisoning in children. Education campaigns can be very effective in raising awareness about the toxicity of various products and substances as evidence shows that parents' perceptions of the toxicity of substances is not always accurate (Patel, 2008). In Viet Nam, key messages about issues related to poisoning in children were conveyed to parents, health workers, staff and members of various sectors and mass organizations and the community as part of UNICEF's national education campaign on childhood injury prevention (UNICEF representative).

UNICEF in conjunction with the Ministry of Labour, War Invalids and Social Affairs developed a number of IEC materials on poisoning prevention in the form of leaflets and cartoons with a special focus on common issues of poisoning for ethnic minority children. These IEC materials have been distributed to sectoral staff, collaborators, parents, child care takers and children. Training on child injury prevention including poisoning prevention has been conducted for staff of the Ministry of Labour, War Invalids and Social affairs and other relevant sectors by trainers from Poisoning Control Centre (Bach Mai Hospital).

Secondary prevention, management of poisoning in children

A study of child poisoning in Viet Nam indicated that most food poisoning incidents (63%) were unreported and therefore not investigated by the authorities to prevent further contamination (Tran, 2007). This points to the need for the development of an integrated health information system which includes relevant healthcare facilities and which is geared towards community investigations of food poisoning to prevent outbreaks.

The same study also shows that half of the poisoning cases investigated (52%) were taken directly to the district or provincial hospitals without first aid; 34% of cases were taken to the commune health centre for first aid before being taken to higher levels of care; while 14% of the children with poisoning were treated at home or by a private doctor before reaching the hospital (Tran, 2007). It is important to educate the community about first aid in the event of poisoning, including the use of water to reduce toxicity, the importance of keeping the label/container of the poison, and access to an emergency number. In Viet Nam, while some efforts have been made by a number of NGOs to educate and train community collaborators, health workers and volunteers, particularly in relation to first aid and poisoning control, the scale of these programs remains limited to a few provinces and will need the support and resources required to be expanded to the rest of the country.

Poison control centres have been shown to be cost-effective facilities in the treatment and the reduction of the severity of poisoning cases in children as they reduce reliance on more expensive healthcare services (Peden et al, 2008). Poison control centres provide advice to individuals and health-care institutions, direct first aid where needed, and refer more severe poisonings to appropriate health services. While poison control centres were initially established in high-income countries, they have increasingly been set up in many low- and middle-income countries. In Viet Nam, the first poison control centre was set up at Bach Mai Hospital in Hanoi in 1998 (Box 2). While there is no available study on the cost-effectiveness of the centre, studies from high-income countries indicate such centres lead to great savings of resources required to deal with and manage poisoning cases (Miller, Lestina, 1997), which suggests the need to establish similar centres in other areas of Viet Nam.

Box 2. Hanoi Poison Control Centre

In Viet Nam, the first poison control centre (PCC) was established at Bach Mai Hospital in Hanoi in December 1998. The PCC consists of a poison information unit, a clinical department unit with 20 beds, a toxicology laboratory and an anti-venom research unit.

The number of poisonings presenting to the center increased five-fold between 1999 and 2003, reflecting an increasing awareness of the existence of the PCC and the need for specialised care for poisoning cases and training among members of the medical society and the community at large. Food poisoning accounted for just over 40% of cases admitted to PCC, 30% were due to pharmaceutical poisoning and 7% were due to pesticides

The poisoning-specific treatments most commonly used between 1999 and 2003 were decontamination measures, such as the administration of cathartics, activated charcoal, gastric lavage and skin decontamination. Intensive care measures, such as mechanical ventilation and dialysis, were used less frequently. Specific antidotes were given in approximately 5% of all cases.

A free-of-charge and around-the-clock telephone service (hotline) to provide poisoning-related information and advice to all of Hanoi and its surrounds is yet to be fully developed.

5. Conclusion and recommendations

Child poisoning is an important public health problem in Viet Nam with relatively high morbidity and mortality. Compared to other countries, the child poisoning case fatality rate in Viet Nam is high, indicating the lack of access to appropriate treatment for many poisoning victims. Food poisoning is the leading cause of poisoning in Vietnamese children followed by gas or smoke, pharmaceutical poisoning and other chemical products. Risk factors include age (child poisoning rates were highest in infants aged less than 1 year), low socioeconomic status, low hygiene, easy access to harmful products as well as limited access to prompt and appropriate healthcare.

Programs that aim at educating the community about identification of potentially harmful products, safe handling of food in the case of food poisoning, safe storage of poisons in the home in secure locations as well as first aid have the potential to raise awareness about the issue, change attitudes and behaviours as well as influence policy. Regulation and enforcement, namely those related to preserving, processing and storing food, and the manufacture of child-resistant closures and proper packaging and labelling of potentially harmful products, as well as the withdrawal of a number of highly toxic pesticides, have been shown to play a crucial role in preventing child poisoning in many countries around the world. In Viet Nam, while there is a certain level of community education about risks of poisoning, relevant regulations are either lacking or not enforced stringently.

Recommendations

In order to reduce the burden of child poisoning in Viet Nam there is a need to:

- Maintain and reinforce the education of the community about key messages related to the prevention of poisoning in children, including the identification of potentially harmful products, safe handling of food, and safe storage of poisons in the home in secure locations.

- Develop an integrated health information system with includes relevant healthcare facilities and which is geared towards community investigation of food poisoning to prevent outbreaks.

- Strengthen and enforce existing regulations regarding food preparation and storage through the development of a hygiene inspection system of all commercial food producers including food outlets in public markets.

- Work with other countries in order to regulate and enforce the manufacture of child-resistant packaging for medications, fuels, household chemicals and pesticides.

- Legislate to reduce the use of highly toxic pesticides.

- Increase the communication, education and training of the population about first aid in the case of poisoning.

- Establish and evaluate the impact of more poison control centres across Viet Nam, as the most cost-effective healthcare facilities to deal with and manage poisoning cases.

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Chapter 5. Animal Bites

1. Introduction

Animal bites are a major cause of injury in children in high-income as well as low- and middle-income countries, including Viet Nam (Overall, 2001; Linnan et al, 2003; Linnan et al, 2007). The vast majority of these injuries are caused by dogs. Children are particularly vulnerable to dog attacks as a result of their small size and the fact that their face is usually close to that of the dog, but also because children are more likely to trigger aggression in dogs due to their high-pitched voices, sudden movements, and sometimes inappropriate behaviours (Gilchrist, 2003; Reisner et al, 2007).

Animal bites can cause severe physical damage, internal injuries, and can be potentially fatal because of the risk of rabies. Most human deaths due to rabies occur in Asia and Africa (more than 95%) and dogs continue to be main carriers of the virus and are responsible for most of the human rabies deaths worldwide (WHO, 2008).

In Viet Nam, where the economy is agriculturally oriented, children are particularly exposed to animal bites as families living in rural areas frequently own or use animals for agricultural work, and often raise dogs and other animals for food consumption and to supply the local market (HSPH representative). This has become increasingly common as a result of the economic development in Viet Nam during the last two decades. Children living in urban settings are equally exposed to this type of injury through contact with domestic animals and pets.

This chapter will examine the epidemiology of animal bites among children in Viet Nam and compare it to the relevant international data in this area. Risk factors related to animal bites will also be examined. The best available evidence on interventions to prevent this type of injury, particularly in Viet Nam, will also be presented and recommendations of the most feasible methods to prevent animal bites in Viet Nam will be proposed. As the vast majority of animal bite injuries in children are caused by dogs, the chapter will focus mainly on dog bites.

2. Epidemiology

The Viet Nam Multi-center Injury Survey (VMIS) shows that the rate of animal bite-related injury in children aged 0-19 years was 1105.2/100,000, the second highest injury rate after falls (Linnan et al, 2003). Based on this rate it is estimated that almost 360,000 children were bitten by an animal in 2001, or almost 1000 each day. A similar picture emerged in a survey conducted by UNICEF in a number of Asian countries (Bangladesh, China, the Philippines, Thailand and Viet Nam) where animal bite was one of the three leading causes of child morbidity in every country surveyed, and resulted in fatalities mainly due to contact with rabid dogs and poisonous snakes (linnan et al, 2007). In Viet Nam, the rate of animal bite-related deaths among children aged 0-19 years in 2007 was 0.22/100,000 (MOH, 2008). While the VMIS revealed no fatalities in children as a result of animal bites in Viet Nam, four-fifths of animal bites required hospitalisation and 4% resulted in permanent disability. This represents almost 800 hospitalisations and 40 permanent disabilities per day as a result of animal bites in Vietnamese children.

The VMIS also shows that almost four-fifths (79.5%) of animal bite injuries in Viet Nam were caused by dogs, with snakes, catfish and bees accounting for most of the rest (HSPH, 2003). A study carried out in India also showed that dogs caused over 90% of animal bites (Ichhpujani et al, 2008). Two reviews of the epidemiology of dog bite injuries have estimated rates of dog bites to humans to be between 160 and 1800 per 100,000 with a death rate between 0.004 and 0.05 per 100,000 (Overall, 2001; Ozanne-Smith, 2001). However, most of these estimates are from high-income countries. Death rates as a result of dog bites are estimated to be much higher in low- and middle-income countries due to the added complication of rabies transmission (Peden et al, 2008). The UNICEF survey reported a death rate from animal bites of 2.5/100,000 children in the five Asian countries surveyed, most of them resulting from dog bites (Linnan, 2007).

3. Risk factors

Most of the available information on the risk factors of animal bites, particularly dog bites, is related to the age and gender of the victim, the circumstances of the injury and the behaviour of both the victim and the dog. There is a lack of information about environmental determinants, such as socioeconomic factors, housing factors and the number of people living in the home.

Child-related factors: age and gender

The VMIS shows that the rate of injury related to animal bites in males (1200.7) was significantly higher than in females (1006.6). It also shows that the 5-14 years age group had the highest rate of non-fatal animal bites (Linnan et al, 2003). Most studies of risk factors of dog bites, conducted mainly in high-income countries, showed that boys and children aged 5-9 years old had the highest injury rates, with those aged less than 5 years having the highest rates of severe injury and death (Overall 2001, Ozanne-Smith 2001, Gilchrist et al, 2008). In Viet Nam, the high rate of animal bites among children aged 5-14 years is perhaps due to high daily exposure to animals, and dogs in particular, among this age group both in urban and rural areas.

Exposure and circumstances of injury

Living with animals, dogs in particular, seems to increase the risk of animal injury. Having a dog in the household was shown to be associated with a significantly increased incidence of dog bites, with increasing incidence also related to increasing numbers of dogs in the household. An American study found that dog bite rates among children with no dogs in the household were 8.3 per 1000, with one dog 16.1, and with two or more 26.6 per 1000 (Gilchrist et al, 2008). While research indicates that three out of four victims are more likely to be bitten by dogs they know (Overall 2001, Ozanne-Smith 2001; Schalamon, 2006), the findings might also suggest that children who live around dogs in the household are more comfortable with dogs and thus more likely to interact with and be bitten by dogs from other households or in the local environment. While no data is available from Viet Nam on childrens' levels of exposure to various animals, including dogs, the VMIS shows that 83.3% of animal bite injuries in Vietnamese children occurred when animals were being fed (linnan et al, 2003). Food or resource guarding is a common cause of behavioural problems in dogs and results in the majority of cases of aggression against children (Guy et al, 2001, Reisner et al, 2007).

There is little information regarding the behaviour of dogs or children that results in aggression and injury. A study examining the circumstances of human-directed aggression by dogs presenting to a behaviour clinic in the United States found that the circumstances of aggression varied according to the level of familiarity of children with dogs (Reisner et al, 2007). Familiar children were most commonly bitten in relation to food or resource guarding (approaching, reaching for or touching the dog while the dog is near or eating/chewing food, a bone or a toy) and 'benign' interactions such as petting, hugging, kissing, bending over, or speaking to the dog. Only a minority of incidents occurring with children who are familiar with the dog resulted from aversive painful acts (stepping on the dog, pulling on hair or body, falling on to the dog, punishment by hitting or use of leash correction) or aversive, non-painful acts (restraint/pulling by collar, grooming, towelling feet, bathing, lifting and verbally scolding).

On the other hand, presence in or entering the dog's territory was the most common situation in which children unfamiliar with dogs were bitten, regardless of whether the child was actively interacting with the dog (Reisner et al, 2007). In some cases, children unfamiliar with dogs were also bitten away from the dog's home, yard or territory, regardless of interaction.

The study also found that younger children, aged less than 6 years old, were significantly more likely than older children to be bitten in relation to food guarding or other resource-associated aggression or as a result of aversive, potentially pain-eliciting interactions such as stepping or falling on the dog. While these circumstances might be different in the Vietnamese context where there are a larger number of stray dogs, the findings indicate that young children should not be left unsupervised in the presence of a dog.

Animal characteristics

A number of studies have found that certain breeds of dogs are more likely to cause severe injury and even death when attacking children. Pure breed pit bull terriers and pit bull terrier cross-breeds were most frequently involved in severe incidents, followed by Rottweilers and Rottweiler cross-breeds, and German shepherds and German shepherd cross-breeds. Other identified high risk pure breeds included the husky, Alaskan malamute, Doberman, chow-chow, Great Dane, Saint Bernard, and the Akita (Centers for Disease Control and Prevention, 1997; Ozanne-Smith 2001; Schalamon, 2006). It is important to note that although these breeds of dogs have been identified as being more aggressive than other breeds, any dog may attack, particularly when threatened (Presutti, 2001). Dogs with a previous history of aggression were also more likely to attack children and cause injury (Gilchrist et al, 2008).

A number of studies have also found that male dogs were almost three times more likely to

cause injury to children than females (Gershman et al, 1994, Ozanne-Smith 2001, Reisner et al, 2007). Furthermore, although aggressive behaviour towards humans, including children, tends to be observed mainly in mature dogs (starting at 1–3 years of age), aggression related to food or pain may be seen in juvenile dogs (Reisner et al, 2007).

The study by Reisner et al, 2007 also indicated that anxiety screening identified abnormalities in 77% of dogs who were aggressive towards children. According to the authors, dogs that react with anxiety to threatening stimuli (loud noises and thunderstorms) may be more likely to react aggressively to children, who, particularly when very young, are at risk because of their high-pitched voices, sudden movements, and inappropriate behaviours towards dogs.

In addition, associated medical or painful conditions in dogs were suspected to increase the risk of aggression towards humans, including children. Medical conditions were identified or suspected in 50% of dogs who presented to a behavioural clinic as a result of attacking children (Reisner et al, 2007). These included orthopedic, dermatologic, and other diseases. The presence of such conditions in dogs should be an indication to separate the dog from young children until the disease has been treated or the pain reduced.

4. Interventions

This section summarises some of the interventions to prevent animal, particularly dog, bites and their complications among children. The three broad approaches for prevention are described, namely: education of children, parents and animal owners; secondary prevention of animal bites; and preventative action on animals.

Education of children, parents and dog owners

Most interventions in high-income countries focus on providing advice to school children, parents and dog owners. A summary of this advice is summarised in Box 3.

Box 3. Education messages to prevent dog bites

Advice for parents/owners:

Before you bring a dog into your household:

- Consult with a professional (e.g., veterinarian, animal behaviourist, or responsible breeder) to learn what breeds of dogs are the best fit for your household.

- Dogs with histories of aggression are not suitable for households with children.

- Be sensitive to cues that a child is fearful or apprehensive about a dog. If a child seems frightened by dogs, wait before bringing a dog into your household.

- Spend time with a dog before buying or adopting it. Use caution when bringing a dog into a household with an infant or toddler.

If you decide to bring a dog into your home:

- Spay/neuter your dog (this often reduces aggressive tendencies).

- Never leave infants or young children alone with a dog.

- Don't play aggressive games with your dog (e.g., wrestling).

- Properly socialise and train any dog entering your household. Teach the dog submissive

behaviors (e.g., rolling over to expose the abdomen and giving up food without growling).

- Immediately seek professional advice (e.g., from veterinarians, animal behaviorists, or responsible breeders) if the dog develops aggressive or undesirable behaviors.

Safety tips for children:

To help prevent children from being bitten by dogs, teach the following basic safety tips and review them regularly:

- Do not approach an unfamiliar dog.
- Do not run from a dog or scream.
- Remain motionless (e.g., 'be still like a tree') when approached by an unfamiliar dog.
- If knocked over by a dog, roll into a ball and lie still (e.g., 'be still like a log').
- Do not play with a dog unless supervised by an adult.
- Immediately report stray dogs or dogs displaying unusual behaviour to an adult.
- Avoid direct eye contact with a dog.
- Do not disturb a dog that is sleeping, eating, or caring for puppies.
- Do not pet a dog without allowing it to see and sniff you first.
- If bitten, immediately report the bite to an adult.
- Wash bite wounds with soap and water and seek medical attention immediately

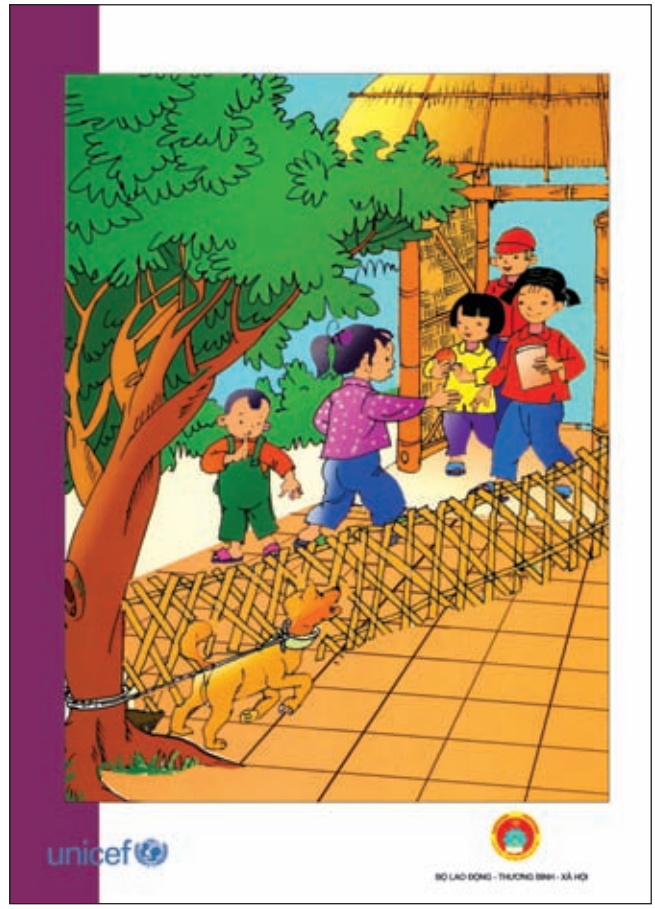
Source: CDC. Dog Bite Prevention. 2009 http://www.cdc.gov/HomeandRecreationalSafety/Dog-Bites/biteprevention.html

However, to date there is no evidence pointing to the effectiveness of education programs, particularly among school children, in preventing dog bites. While at least two randomised controlled trials indicate that educational interventions for preventing dog bites could change the knowledge, attitude and observed behaviour of children, none of the studies focused on dog bite rates as outcome measures (Chapman et al, 2000; Wilson et al, 2003). A recent Cochrane systematic review of interventions aimed at educating children and adolescents in order to prevent dog bite injuries found that while there is strong evidence indicating that education programs contribute to changes in children's behaviour towards dogs, the evidence is not sufficient to conclude that they can reduce dog bites, as the link between the appropriate behaviour of children and the risk of being bitten by a dog is unknown (Duperrex et al, 2009). As a result, the authors concluded that public health policies should not rely only on educating children and adolescents as a primary measure to reduce the burden of dog bites in this population.

In addition, as the studies reviewed were conducted mainly in urban settings in a high-income country (Australia) and as the environment seems to influence the level of exposure to dog bite, the applicability to other countries, such as Viet Nam, is limited. In low- and middle-income countries, children are more likely to be in contact with stray dogs (Peden et al, 2008; Ichhpujani et al, 2008), which might suggest that the effect of educational programs could be different in such environments. It is therefore important to conduct and evaluate studies in Viet Nam where

educational programs may contribute to the protection of children and adolescents. In Viet Nam, UNICEF, Ministry of Labour, War Invalids and Social Affairs, other ministries and sectors developed simple booklets in the form of frequent questions and answers, and poems on child injury prevention including prevention and first aids of animal bites. These materials were distributed to parents, child care takers and children throughout the country. However, so far no assessment has been made yet to measure impacts of this form of communication.

Figure 2. Educational poster aimed at raising awareness about injury, including dog bites, in the community



Secondary prevention: treatment of animal bites and the rabies vaccination

One of the most serious complications of animal bites is rabies, a fatal viral disease that spreads to people through close contact with infected animal saliva. Most human rabies deaths occur in Asia and Africa (more than 95%) and dogs continue to be the main carrier of rabies and are responsible for most of the human rabies deaths worldwide (WHO, 2008). However, there have been cases of human rabies deaths following exposure to wild animals and livestock.

Once the signs and symptoms of rabies start to appear, there is no treatment and the disease is almost always fatal. Therefore rabies immunisation should begin within 48 hours after the bite, but it can be subsequently discontinued if the animal is shown to be free of the virus (WHO, 2008). The rabies immunisation consists of an active immune response with a vaccine and a passive immune response with rabies immune globulin (Presutti, 2001). Wound cleansing and immunisations, done as soon as possible after suspect contact with an animal and following WHO recommendations, can prevent the onset of rabies in virtually 100% of exposures (WHO, 2008). WHO Guidelines for the treatment of animal wounds and rabies immunisation are given in Box 4.

Box 4. Summary of WHO guidelines on the treatment of animal wounds and rabies immunisation

Recommended treatment to prevent rabies depends on the category of the contact:

- Category I: touching or feeding suspect animals, but skin is intact.

- Category II: minor scratches without bleeding from contact, or licks on broken skin.

- Category III: one or more bites, scratches, licks on broken skin, or other contact that breaks the skin; or exposure to bats.

Post-exposure care to prevent rabies includes cleaning and disinfecting a wound or point of contact, and then administering anti-rabies immunisations as soon as possible. Anti-rabies vaccine is given for Category II and III exposures. Anti-rabies immunoglobin, or antibody, should be given for Category III contact, or to people with weaker immune systems.

When humans are exposed to suspect animals, attempts to identify, capture or humanely destroy the animal involved should be undertaken immediately. Post-exposure treatment should start right away and only be stopped if the animal is a dog or cat and remains healthy after 10 days. Animals that are destroyed or have died should be tested for the virus, with results sent to responsible veterinary services and public health officials so that the situation in the area is well documented.

The WHO guide on preventive immunisations against rabies is aimed to ensure that effective and potent treatment is provided, even where vaccines are in very short supply, as is the case in many developing countries. Alternative, more economical vaccination approaches have been successful in developing countries where funding for vaccines and vaccine supplies are limited. Health staff must be well trained in techniques and vaccines must be stored appropriately for effectiveness.

Rabies immunoglobulin (antibody) vaccines – which are recommended for use in Category III cases and for exposures in immunosuppressed people – are expensive and can be in short supply or non-existent in most developing countries. Purified equine (horse) rabies immunoglobulin provides at least a partial solution to current problems of insufficient quantities and the high cost of human immunoglobulin in developing countries.

Source: World Health Organization. Fact Sheet N•99, 2008.
http://www.who.int/mediacentre/factsheets/fs099/en/

In Viet Nam, the need for the rabies vaccine is still high and efforts need to be made in coordination with international agencies, such as the WHO, to ensure adequate supply of the vaccine to deal with the significant number of dog and other animal bites in the country, particularly among children (Towards the Elimination of Rabies in the ASEAN Member States and the Plus Three Countries, 2008). In addition, pre-exposure or prophylactic vaccination is recommended for high-risk groups, such as animal handlers, veterinarians and other workers (CDC, 1999). In the context of Viet Nam, a similar strategy could be implemented among children engaged in feeding and caring for dogs and other animals being raised for food consumption. Wearing of appropriate protective clothing, such as cut-proof and bite-proof clothing, could also be promoted among these children.

Preventative action in animals

There is an ongoing debate regarding the merits of introducing legislation that limits the ownership of specific breeds of dogs which are found to be more aggressive towards children (Ozanne-Smith, 2001; Duperrex et al, 2009). Such legislation is less likely to be effective in Viet Nam, where there is a high exposure to stray, non-domesticated dogs.

However, there is a consensus that the vaccination of dogs is crucial to preventing rabies in animals and is the single most important factor in rabies prevention in humans, particularly children. According to the WHO, elimination of rabies in dogs through vaccination has led to the elimination of the transmission of the virus to people and to other animals (WHO, 2008). Preventing human rabies through control of domestic dog rabies should be a realistic goal in Viet Nam.

Rabies elimination efforts that focus on mass vaccinations of dogs are financially justified by the future savings of discontinuing post-exposure preventative treatment for people (WHO, 2008). While there is still a long way to go for the vaccination of dogs against rabies in Viet Nam, efforts are currently being made with Viet Nam leading the ASEAN Plus Three Countries initiative that aims to eliminate rabies from the region by 2020 (Towards the Elimination of Rabies in the ASEAN Member States and the Plus Three Countries, 2008).

Box 5 The rabies and dog bite prevention project in Viet Nam

According to the Viet Nam Rabies Control Program, rabies deaths are on the rise in recent years. In 2007, there were 125 deaths nationwide compared with 34 cases in 2003. However, unofficial estimates by the Ministry of Health suggest that the total number of deaths per year could be closer to 500, more than half of which are children less than 18 years of age.

The goal of this project is to reduce the number of people, particularly children, who are bitten by dogs and are dying of rabies in Viet Nam. The project has the following specific objectives:

- to educate 2000 school children in three schools in the selected districts;
- to increase the number of dogs vaccinated by 100%;
- to decrease dog-bite cases by 90% compared with the previous years; and
- to increase prevention efforts and resources for rabies control in Viet Nam at the local and national levels.

As of July 30, 2009 the activities that have been carried out are:

- organised workshop for authorities, education professionals, veterinary and health staff of prevention centres;
- organised a training course for teachers in three communes where there are schools;
- printed leaflets and distributed to pupils in three schools;
- propaganda on airwaves of three communes;
- statistics gathered on the dog population in three communes; and
- statistics gathered for humans bitten by dogs in three communes in 2008, and from January to June 2009.

Source: Alliance for rabies control Viet Nam. http://www.rabiescontrol.net/EN/Programs/Projects-Overview/Viet Nam.html

5. Conclusion and recommendations

Animal bites are the second most common cause of injury-related morbidity in children and adolescents aged 0-19. One of the most serious complications of animal bites is rabies, a fatal viral condition that occurs as a result of close contact with infected animal saliva. Once the signs and symptoms of rabies start to appear, there is no treatment and the condition is almost always

fatal. As with other parts of the world, the vast majority of animal bite injuries and deaths in children in Viet Nam are caused by dogs. While there is a lack of information on risk factors of dog and other animal bites in Viet Nam, children are particularly exposed to animal bites, as families living in rural areas frequently own or use animals for agricultural work and to supply the market with various animals for food consumption. More than 80% of animal bite injuries in Vietnamese children occur when animals are being fed. The issue is compounded in Viet Nam due to the high number of stray dogs, particularly in rural areas.

International evidence suggests that the behaviour of both child victims and animals, particularly dogs, are two important risk factors for this type of injury. Education programs to inform children and dog owners on how to approach and deal with dogs have shown improvement in knowledge and behaviour. In terms of secondary prevention, while wound cleansing and immunisations carried out as soon as possible after a suspect contact with an animal can prevent the onset of rabies in virtually 100% of exposures, elimination of rabies in dogs through vaccination has led to the elimination of the transmission of the virus to people and the eradication of rabies in many countries.

Recommendations

- Support research into the circumstances and risk factors of animal bite injuries in Vietnamese children.

- Develop and implement education campaigns to improve knowledge and awareness about the risk of animal bites, and educate animal owners, parents and children on how to approach and deal with animals, particularly dogs, and on the importance of seeking immediate medical care when bites occur.

- Improve urgent post-exposure care to prevent rabies and ensure an adequate supply of anti-rabies immunisations.

- Promote pre-exposure or prophylactic vaccination in high-risk groups, including children engaged in feeding and caring for dogs and other animals raised for food consumption.

- Develop a comprehensive program of mass vaccinations of dogs. The prevention of human rabies through the control of domestic and stray dog rabies should be a realistic goal in Viet Nam.

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Chapter 6. Falls

1. Introduction

Falls form a normal part of a growing child's life as he or she learns to walk, run and to explore the surrounding environment. However, injuries caused by falls can range from a small cut or bruise to broken bones, permanent disability or even death. The fact that serious falls are not distributed in the population in a random fashion (Peden et al, 2008) makes it important to study the risk factors and the situations within which these injuries occur so that steps can be taken to prevent them. In Viet Nam, falls are the leading cause of non-fatal injury in children. In 2001, 1200 children sustained fall injuries in Viet Nam each day, making a total of 430,000 children injured by falls in that year (Linnan et al, 2003).

In the context of this chapter, a fall is defined, according to the WHO definition, as 'an event which results in a person coming to rest inadvertently on the ground or floor or other lower level' (Peden et al, 2008). This definition excludes falls due to assault, intentional self-harm, falls caused by animals, burning buildings and vehicles, and falls into water and machinery (Peden et al, 2008).

This chapter will cover the epidemiology of falls among children in Viet Nam and compare it with global data on this injury. An analysis of the associated risk factors will be followed by a discussion on current interventions to prevent this injury. The discussion will address interventions already implemented in Viet Nam and those proven to be effective in other parts of the world. The conclusion will be followed with recommendations on feasible interventions to reduce fall-related injuries in children in Viet Nam.

2. Epidemiology

According to the WHO Global Burden of Disease project for 2004, falls were ranked as the 12th leading cause of mortality among 5-9 and 15-19 year-olds, and the 13th leading cause of Disability Adjusted Life Years lost among children less than 15 years of age (Peden et al, 2008). In developing countries, falls are usually the most common cause of injury seen in hospitals, accounting for 25–52% of all treated child injuries (Khambalia et al, 2006).

A systematic review of the incidence of childhood falls in LMICs, requiring medical attention or resulting in death, found that in Asia, falls accounted for 43% of all injuries in the population aged under 18 years with an incidence of 170/100,000, (Peden et al, 2008). Fall-related mortality data from the LMICs of South-East Asia showed an average rate of 2.7/100,000 in this region (Peden et al, 2008). This is almost three times that reported from high-income countries in the Americas, Europe and Western Pacific region, with rates of 0.2-1.0/100,000 (Peden et al, 2008). However, misclassification and reporting errors must be taken into account while interpreting these rates (Peden et al, 2008).

In Viet Nam, falls are the leading cause of non-fatal injury in childhood, with a rate of 1.218/100,000 (Nguyen et al, 2009). Even though the fatality rate from falls is much lower at 0.4/100,000 (MOH, 2008), falls are the leading cause of permanent disability in Vietnamese children, mostly due to brain and spinal cord injuries (Linnan et al, 2007).

Although fall injury rates for children across the 0-20 age group in high-income countries are similar, in LMICs a much larger proportion of injuries is seen among infants less than 1 year old (Peden et al, 2008). However, this trend is not seen in Viet Nam, where infants (i.e. the under 1 year age group) have the lowest proportion of fall-related injuries (Linnan et al, 2003; Nguyen et al, 2009). Male children appear to be at greater risk of fall-related injuries throughout the world (Peden et al, 2008) and the trend continues in Viet Nam with males having greater rates of injury than females in all age groups (Linnan et al, 2003; Nguyen et al, 2009).

Over half of the fall injuries were serious and required hospitalisation, and two-thirds were serious enough to cause missed school days for over two weeks. Permanent disability was observed in 4% of children who sustained a fall-related injury (Linnan et al, 2003). These numbers have a significant economic impact on the families involved (Linnan et al, 2003) both in the form of short-term treatment costs and hospitalisation as well as the long-term costs related to permanent disability in injured children, especially those who were earning members of the family before the injury. This does not include the psychological trauma that families face as a result of serious injuries to their children, which is much harder to quantify.

3. Risk factors

The most consistent independent risk factors for fall injuries include age, sex and poverty, according to a systematic review of published literature (Khambalia et al, 2006). This review also highlights a lack of research in relation to risk/protective factors for falls in children aged 0-6 years.

Child-related factors: developmental and behavioural factors

As for other injuries, the developmental stage of a child – his motor and cognition skills – plays an important role towards determining his risk of falls (Peden et al, 2008). Falls are an integral part of the growing process of any child and result from a combination of the need to explore the surroundings and the inadequate understanding of threats and danger (Peden et al, 2008). The kind of opportunities available to children at various ages and the amount of supervision provided also affects this (Peden et al, 2008). As they grow older, children are allowed greater freedom to explore the environment outside the home and engage in outdoor play. They also start to display risk-taking behaviour at this age (Peden et al, 2008), and this accounts for the increase in fall injuries that are seen in these age groups. The Young Lives study also found that older children were at a greater risk of falls in Viet Nam (Howe et al, 2006).

The risk of both fatal and non-fatal fall-related injuries is also much higher in male children as compared to females universally and across all age groups (Peden et al, 2008). This can be a result of both the personality differences among the genders, with boys exhibiting more risk-taking, aggressive and impulsive behaviours than girls (Peden et al, 2008), and the cultural environment, which allows for greater exploratory behaviour among boys (Peden et al, 2008).

There is evidence that children who are physically or mentally disabled, or have impaired mobility, are at greater risk of suffering from falls (Peden et al, 2008). Long-term health problems in children were also found to be a risk factor for falls in Viet Nam in the Young Lives study (Howe et al, 2006).

A common practice around the world, including Viet Nam, is that of children sleeping in the same beds as their parents. Especially in the case of infants, this is a key risk factor for falls off the bed. Due to the shape of their head, infants usually fall onto the top of their skull, and since

the skull is soft for the first months of life, they are very vulnerable to serious injury (Linnan et al, 2007).

Agent-related factors

Consumer-related products such as prams, baby walkers and bouncers, cots and bunk beds, etc., are associated with a high incidence of falls throughout the world among younger children. Playing equipment such as rollerskates, skateboards and swing ropes are also often responsible for causing injuries that require medical attention (Peden et al, 2008). The main concern is that, in developing countries, these products may not be compliant with the same safety standards as in developed countries and hence may be dangerous for use (Peden et al, 2008). Similarly, playgrounds, especially those that are not built according to safety standards, also act as risk factors for fall injuries in children (Peden et al, 2008).

Environmental factors

The structures within which children live and play can be an important risk factor for falls if proper protective features are not included or if other dangerous features are present (Peden et al, 2008). These can include inadequate maintenance of buildings in low-income rented housing, lack of window and balcony guards in highrise buildings, and poor lighting in buildings and streets (Peden et al, 2008).

In low socioeconomic settings like Viet Nam, it is common to find children working to support their families. The work environment can also put children at risk of falls because they are not usually designed with children in mind. Studies have shown that agriculture is one common setting for non-fatal serious falls, followed by the construction industry, which is are common areas of work for children in developing countries (Peden et al, 2008).

Studies in low- and middle-income countries including Mexico, India, Bangladesh and Turkey have found unprotected staircases and easy access to unprotected rooftops are important risk factors for fall injuries among children (Hijar et al, 1993, Mohan 1986, Yagmur et al, 2004). Given the lack of enforcement of building regulations in Viet Nam, a similar situation is found, posing a particular risk to children who reside in urban settings.

Another important environmental risk factor in the Vietnamese context is the terrain in which rural communes are built. The rough and slippery surfaces in these areas predispose children to falls. Communes where houses are built on mountain slopes can be dangerous, especially because stairs in these homes tend to be of bad quality (Thanh et al, 2005). These factors combine to increase the likelihood of falls among children living in these areas.

Socioeconomic factors

Poverty has been shown to be a consistent risk factor for fall-related injuries in a systematic review (Khambalia et al, 2006). It is thought to be linked and to interact with other risk factors of falls. These include overcrowded housing conditions, hazardous environments, single-parenthood, unemployment, a relatively young maternal age, a relatively low level of maternal education, lack of adequate supervision, stress and mental health problems on the part of caregivers, and lack of access to healthcare (Peden et al, 2008). In Viet Nam, the wealth index was found to be inversely proportional to the risk of falls in children (Howe et al, 2006).

Lack of adequate supervision is an important risk factor for all types of injuries. In Viet Nam, being regularly cared for by a non-household member was related to an approximate doubling of the risk of serious falls in children. Leaving a child alone or under the supervision of other children under the age of 5 years was also found to be associated with an increased risk of falls (Howe et al, 2006).

Several surveys from LMICs have shown that a large number of children do not receive medical treatment after suffering from falls (Peden et al, 2008). There are several reasons for this, including distance to the hospital, cost issues related to transferring the victim, and unawareness on the part of the caregiver that medical care is needed (Peden et al, 2008). Results from the Jiangxi Survey show that when children fall, they are often not in the supervision of an adult. In other cases, when adult caregivers are present, they are unaware of first aid techniques that are needed (Jiangxi, 2006). This leads to a lack of recognition of serious, life-threatening conditions and delays in the administration of medical treatment for victims, and hence has implications in the form of disabilities and death (Peden et al, 2008).

4. Interventions

Interventions that address the various risk factors for fall injuries are needed to bring an effective reduction in these injuries. These include a combination of engineering, educational and legislative approaches. There is a lack of evidence for the effectiveness of interventions that have been employed in developing countries, and those in place in developed countries may not be entirely feasible for the LMIC setting (Peden et al, 2008). However, there are still lessons that can be learnt from successful interventions to reduce falls in HICs and some of these interventions can be adapted to suit the needs and resources found in Viet Nam.

Engineering interventions address environmental- and agent-related factors. These include the inclusion of safety features in products such as baby walkers and prams, rollerblades and skateboards, etc., that are associated with a high rate of fall injuries among children. This involves the establishment of safety standards that the manufacturers of this equipment must follow, either voluntarily or on a mandatory basis (Peden et al, 2008). However, compliance with these standards is often a problem in developing countries such as Viet Nam.

Other engineering measures include improving the safety of buildings and houses. Building regulations that address safety features like protective railings on balconies and staircases are important in terms of making the environment safer for children. The ‘Children Can’t Fly’ program in the US in the 1970s is a good example of a combination of educational and engineering approaches. In addition to mass media messages about the dangers of windows in highrise buildings, the program also provided free window guards for these buildings in low-income areas (Peden et al, 2008). Window guards have proven effectiveness and have been used in Africa and other developing countries (Forjuoh et al, 1996), and are likely to be a feasible intervention in Viet Nam, perhaps with the provision of free or subsidised window guards to people living in highrise buildings in low-income areas.

The use of stair gates is another way of protecting children from unintentional falls. Home counselling on the use of these safety features has the potential to reduce the risk of injury inside the house (MacKay et al, 2006). Moreover, these interventions are cost-effective and can be adapted for use in LMIC settings like Viet Nam. Enforcement of legislation related to these interventions is important to ensure effectiveness (Peden et al, 2008). Advocacy efforts therefore need to be directed towards promoting and enforcing legislation that ensures interventions like safety standards for buildings, playgrounds and playing equipment are put into effect and made mandatory. In Viet Nam, in 2008, Ministry of Construction with the support from Ministry of Labour, War Invalids and Social Affairs issued Viet Nam Building Code for Dwelling and Public Buildings #05/2008/BXD together with the Decision # 09/2008/QD-BXD made by the Minister of Construction focusing on child safety. At present, the Ministry of Construction is monitoring this Code’s enforcement. In addition, Ministry of Labour, War Invalids and Social Affairs is finalizing guidelines on Child Safe Home with specific criteria for falling prevention at home.

Although there is a general lack of evidence showing that educational and awareness-raising interventions have an impact on changing behaviour and reducing injury by themselves (Peden et al, 2008), they are considered to be an important part of the public health intervention triad with engineering measures and enforcement (Forjuoh et al, 1996). It is also important to ensure that educational interventions are targeted towards the most vulnerable groups, are delivered through culturally appropriate media, are in line with the developmental and cognitive stages of children, and are relevant to the setting in which they are delivered (Peden et al, 2008).

One strategy that uses a combined approach is home visitation, which addresses reducing the risk of several types of injury by improving safety in the home environment. Recent studies have shown that home visits, especially those focused on low-income households, are effective in reducing the risk of injury and injury rates to some extent. The effectiveness of these programs increases when combined with the provision of safety equipment (Peden et al, 2008).

Community-based intervention is another strategy that applies multiple approaches towards reducing risk of injury. The American 'Children Can't Fly' program, which was mentioned earlier, was a community-based approach which combined strategies of surveillance and follow up, community education and media campaigns, as well as the provision of window guards to families (Peden et al, 2008). WHO Safe Communities projects implemented in Viet Nam used education and home visits to promote modifications to the home environment in order to prevent falls. However, the effectiveness of these projects are yet to be evaluated. Home visits were also part of UNICEF's intervention in 72 communes in Viet Nam. The intervention was aimed towards making these communes safe for children by promoting environmental modifications to reduce the risk of injury, including falls. Educating children about the dangers of climbing trees and other unsafe places and teaching caregivers about basic first aid management of fall injuries were part of the educational component of this intervention (UNICEF, 2008).

5. Conclusion and recommendations

In Viet Nam, falls are the most important cause of non-fatal injury to children, with a rate of 1218/100,000, which is almost two times higher than the second most common cause of non-fatal injury (road traffic). Although fatality rates from fall injuries are low compared with those for other types of child injury, falls cause a significant burden as a result of permanent disability in

children. Over half of fall-related injuries in Vietnamese children were serious enough to require hospitalisation, causing missed school days and having a significant economic impact.

Age, gender and poverty are known to be the three most consistent risk factors for fall injuries. In low- and middle-income settings such as Viet Nam, environmental factors such as unsafe playgrounds, insecure buildings, windows and staircases without guard rails and easily accessible roof tops pose an important threat to children, who are at risk due to their natural curiosity and impulse to explore. Children of poor families tend to work in the agriculture and construction industries, both of which are known to be high-risk for fall-related injuries. Lack of adult supervision, inadequate knowledge of first aid and emergency transport facilities compound the risk of serious injury as a result of falls in children.

Recommendations

- Safety regulations need to continue to be developed and enforced for buildings and houses. These regulations should address the inclusion of safety features such as railings in the design of buildings and warning signs and fences surrounding holes in and around construction sites.

- Public awareness campaigns need to focus on the education of children and their carers about identification of the risk of falls in their environment. Simple solutions should be encouraged, such as homemade safety gates for stairs, and guard rails for windows should be provided.

- Home visitation programs should be expanded to various communities across Viet Nam to educate members about the hazards in their environment and to provide simple, cost-effective solutions to eliminate these hazards.

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Chapter 7. Burns

1. Introduction

A burn can be an extremely painful, debilitating and disfiguring injury that can have serious long-term consequences and cause distress, not only to the victim but also to the family. According to the MOH report on injury, burns are the cause of 1.7% of the total non-fatal injuries and 1.9% of the total of fatal injuries in 2008 (MOH, 2009). Among children there were over 65,000 cases in 2001, making it the fifth leading cause of morbidity in the country (Linnan et al, 2003). Although this type of injury does not usually result in death, it can have significant consequences, such as permanent disability and disfigurement. The main cause of burns in Viet Nam is scalding caused by hot liquids, accounting for up to 83.5% of burn injuries (Linnan et al, 2003). Most of these injuries take place inside the home, and there are several economically feasible measures that can be adopted to prevent them (Linnan et al, 2003).

In the context of this report, a burn refers to an injury to the skin or other organic tissue caused by thermal trauma. It occurs when some or all of the cells in the skin or other tissues are destroyed by hot liquids (scalds), hot solids (contact burns), flames (flame burns), radiation, radioactivity, electricity, friction or contact with chemicals (World Health Organization, 2006). They are classified by mechanism or cause, degree of tissue damage, affected region and extent of burn (Peden et al, 2008).

This chapter will cover the epidemiology of burns among children in Viet Nam and compare it with data from other parts of the world. Related risk factors will then be analysed, followed by a discussion on current interventions to prevent this injury including both those implemented in Viet Nam and those proven to be effective in other parts of the world. The chapter will conclude with recommendations on feasible ways that can be implemented to reduce the occurrence of burns in children in Viet Nam.

2. Epidemiology

Fire-related burns are ranked 11th by the WHO for causing deaths among the 1-9 year age group, and seventh in the 15-19 year age group in 2004 (Peden et al, 2008). The global burn death rate in children aged 0-19 years old is estimated at 3.9/100,000. However, there is great disparity in the distribution of these injuries among low- and high-income countries, with low- and middle-income countries making up to ten times the burden with a rate of 4.3/100,000 versus that of 0.4/100,000 for HICs (Peden et al, 2008).

Burns, however, are a significant cause of non-fatal injury in children in many countries, and other forms of burns like scalding are far more common than fire-related burns, especially in the low- and middle-income-countries. The UNICEF Child Mortality and Injury Survey in Asia found that burns are the second most common cause of non-fatal injury in Bangladesh and the Philippines, and among the five most common causes in Thailand, China and Viet Nam (Linnan et al, 2007).

In Viet Nam, according to the Ministry Of Health, the burn injury mortality rate for children over-

all was 0.27/100,000, with the highest rate, 0.78/100,000, observed in the 0-4 year age group (MOH, 2008). These rates were found to be highest in the Ha Giang and Thanh Hoa provinces (Nguyen et al, 2006). The burn injury rate for children, however, was several times higher at 201/100,000, placing burns as the fifth most important cause of morbidity in children in Viet Nam (Linnan et al, 2003). A rate of 258/100,000 cases of non-fatal burn injury was noted by the survey in six UNICEF project provinces in 2008, once again with almost 50% of the cases in the 1-4 year age group (Nguyen et al, 2009). The peak of injury occurence is seen in the 1-4 year age group with a rate of 504.2/100,000, as toddlers in this group are most actively exploring the household surroundings and are in danger of coming into contact with hot objects and liquids (Linnan et al, 2003). This reflects results from other low- and middle-income countries where infants and toddlers from birth through to the fourth year are found to have a disproportionately higher rate of burn injuries (Forjuoh, 2006).

In infancy, burn injury rates are similar for both sexes due to similar exposure. These rates differ markedly in the 15-19 year age group, reflecting the difference in exposure due to the differentiation of roles in the household where girls spend more time in the kitchen and boys more time outside the home. This pattern of gender distribution for burn injuries is similar to that found in other developing countries (Forjuoh, 2006).

As alluded to earlier, the most common type of burns are those caused by scalding (83.5%), with hot water as the main agent (Linnan et al, 2003). This is also the most common mode of burn injury in other low- and middle-income countries, with scald injuries accounting for up to one-third to half of all burn injuries (Forjuoh, 2006). In Viet Nam, this may be accounted for by the fact that most households keep hot water available throughout the day for making tea, and this is usually kept in tall containers that are easy to tip. The containers are kept on surfaces that are just within the reach of toddlers; they are able to grasp and tip the container onto themselves, resulting in a scald injury. These causal factors are reflected in the fact that a majority of these burns are shown to take place inside the home, especially for the 1-4 and the 15-19 year age groups, both in Viet Nam and in other low- and middle-income countries (Linnan et al, 2003; Forjuoh, 2006). The survey in six UNICEF project provinces also reflects this finding with all cases of burns reported as having occurred inside the home (Nguyen et al, 2009). Burns from open flames accounted for only 8.7% of the total burn injuries documented in the VMIS (Linnan et al, 2003).

Although the VMIS did not report any deaths due to burn injuries, there was a large number of hospitalisations, and up to one-third of the burn victims were hospitalised for an average of 12 days, with an average of 16 days of school missed. About 5% of children suffered from permanent disability due to extensive scarring or blindness (Linnan et al, 2003). These outcomes have an impact on the socioeconomic state of the victim's family since scalding injuries create an economic burden in terms of direct medical costs as well as short-term and permanent disability (Linnan et al, 2003).

3. Risk factors

Different studies around the world have identified a range of risk factors for burn injuries. However, the risk factors differ widely among populations. Also, due to coding and reporting inconsistencies between countries, there is a dearth of data on the mechanisms that cause burns. In Viet Nam, since burns due to scalding are most common, risk factors most pertinent to this cause will be discussed in this section, along with some common risk factors that apply to burns in general.

Child-related factors: developmental and behavioural factors

Young children, especially infants and toddlers in the 1-4 year age group, are especially vulnerable to burn injuries, as reflected in the epidemiology. They have just gained the mobility required to move around independently, exploring their environment, which puts them at a high risk of encountering dangerous items around the home. Motor skills in these children have not yet fully developed, and they do not understand the risk posed by hot objects, therefore they often sustain burn injuries to the palms as they reach out to touch (Peden et al, 2008).

The risk is further compounded if children are unsupervised, or left in the supervision of other children, which is often the case in many Vietnamese households when both parents leave the house to earn a living (Peden et al, 2008; Howe et al, 2006). Similarly, children who are regularly cared for by a non-household member were also found to be at an increased risk of burn injuries. Children who suffer from long-term health problems had a higher risk of burn injuries as well (Howe et al, 2006).

Agent-related factors

Hot water is commonly found stored in thermoses and flasks in Vietnamese homes for the preparation of tea. The shape of these containers makes them easy to pull down and tip over and are a hazard for children, who are most commonly scalded by hot water on the face, arms and upper torso. Injuries caused in this way often cover a large surface area. One serious consequence related to such scald injuries is blindness caused by scarring of the cornea (Linnan et al, 2003).

Environmental factors

In many rural Vietnamese homes, the kitchen is not separated from other areas of the house, and children can freely wander into the cooking area. In many of the kitchens in houses in urban areas, platforms used to support the stove and to hold pots and jugs full of hot liquids tend to be at around the height of 1 metre, making them just within arm's-length of any young children in the home (Linnan et al, 2003). Children can thus reach up and pull down these vessels, causing severe scald injuries (Linnan et al, 2003; Peden et al, 2008).

Cooking on open fires using straw is a practice that can be found in many rural areas and communes in Viet Nam (Thanh et al, 2005). This creates a fire hazard for these poor households. However, the relatively low incidence of fire-related burns in Viet Nam may be attributed to the construction of single-storey houses in rural areas (Linnan et al, 2003). These rural dwellings, although at an increased risk of fire, are easy to escape from, as opposed to multi-storey buildings which are not found frequently in these communes (Linnan et al, 2003).

Socioeconomic factors

As for other injuries, poverty and illiteracy are risk factors for burn injuries (Peden at al, 2008; Forjuoh 2006; Howe et al, 2006). Lack of education manifests itself in the form of a lack of safety awareness among parents and the fact that they do not feel the need for implementing safety interventions to prevent burn injuries (Linnan et al, 2003). Additionally, there are many misconceptions about how a burn should be managed. For example, the practice of applying household remedies on burns, such as toothpaste, fish oil, fish sauce and grass among others, is fairly common (Peden et al, 2008; Nguyen et al, 2002; Nguyen et al, 2008), however these remedies can actually be harmful because they can cause the sloughing off of the affected skin, making it more vulnerable to infection (Peden et al, 2008).

Once a burn injury has occurred, appropriate initial management, such as the administration of effective first aid, plays a very important role in minimising both the mortality and the morbidity

caused by the burn injury. The standard recommended first aid management is to run clean, cold water on the burnt area continuously for 20 minutes. One study conducted in Viet Nam showed a significant difference in mortality between victims who did not receive adequate initial treatment after injury, and those who did (Nguyen et al, 2002). In Viet Nam, many children do not get transferred promptly to hospitals and burn units because of inadequate infrastructure and emergency transfer services. One study that looked at the burn patients brought to the National Institute of Burns (NIB) in Hanoi from peripheral hospitals reported a median transfer time of 15 hours (Nguyen et al, 2002). The lack of burn units that are equipped and trained to treat burn injuries further adds to the gravity of the problem. This study also found that only half the patients had received adequate fluid resuscitation at the hospital prior to being transported to the NIB and that adequate initial management had been provided in only 14% of the cases (Nguyen et al, 2002). This contributes to the mortality and serious sequelae that are caused by burn injuries.

4. Interventions

Evidence indicates that childhood burns are largely a result of preventable environmental risk factors. Therefore, preventing burns in low- and middle-income countries should focus on a combined strategy of environmental modifications and parental education, with special attention paid to kitchen areas where an overwhelming majority of these injuries take place (Forjuoh, 2006).

There are a number of low cost measures that have the potential to be effective in prevention of burn injuries. One such strategy is to separate the cooking area from the rest of the house. This factor has been shown to have a protective effect in the case of burn injuries (Peden et al, 2008). This can be done using small bamboo gates or barriers that can be placed at the entrance to the

kitchen, barring toddlers from coming in.

Also, the height of the platforms where stoves and vessels containing hot food and liquids are kept can be increased so that they are beyond the reach of small children (Linnan et al, 2003). For the thermoses that have narrow bases and are easy to tip over, wide-based bottle-holders can be used, and homemade ones can be made by cutting rings out of bamboo to provide stability to these vessels (Linnan et al, 2003). However, according to a Cochrane review in 2003, there is insufficient evidence to determine the effectiveness of such interventions that alter the home environment (Peden et al, 2008), and further research into evaluating their impact in Viet Nam is needed.

Increased supervision always has a role to play in preventing most types of injuries in children. In the case of burn injuries, it is imperative to make parents and carers aware of the hazards around the house and of the necessity of close supervision to protect children from injury. Knowledge of the risk of burns and of health-care services is another factor shown to have a

shock (if available/applicable)
- Regularly check the safety of electric devices.
- Keep children away from electric posts, electric station, high voltage line.
- Do not let children go out of the house when it rains.

Actions and first aid for burnt children:

Things should be done by an adult when a child gets burn

* **Get him/her out of the source of burn:**
- Carry him/her out of the hot pot, iron, exhaust pipe, and other area of burning risks.
- Cut off electricity.
- If the child catches fire, put out the fire by covering him/her with a wet blanket/cloth or ask him/her to lie down on the ground and roll till the fire is out
* **Comfort and check the status of the child:** If he/she loses consciousness, make artificial respiration. If the child comes around, follow the steps bellow:

1. Dip the burn/ scald into cool and clean water or put it under a cool running tap within 20 minutes (do not use icy water)
2. Take off clothes of the child at the burning area (attn: if the cloth stick on the child's skin, using a scissors to cut the cloth out but do not try hard if you can not do that).
3. Bandage the burn area with clean cloth and try to avoid breaking blisters.

protective effect in several studies (Peden et al, 2008). Educational interventions to improve awareness among parents and children about burns and to improve supervision have been promoted and implemented in several places as a primary intervention to reduce these injuries; however these programs have yet to be evaluated for changes in outcomes (Peden et al, 2008). In Viet Nam, UNICEF's intervention in 72 communes was aimed towards making these communes safe for children and for reducing the risks of injuries. Educating children about the dangers of hot objects and the risks of burn injuries was a part of the educational program of this intervention (UNICEF, 2008).

Another strategy, yet to be tested, is being implemented in Bangladesh where children are placed in nursery care for part of the day while the mothers finish household chores and can supervise their children more effectively (Peden et al, 2008).

As has been noted before, initial management of the burn such as the provision of first aid is extremely important with regards to decreasing the morbidity and mortality once the injury has occurred. One study reports that in 70% of burn cases, family members were the first to give aid (Le et al, 2004). This fact highlights the importance of training families with children in relation to first aid steps that should be taken in the event of a burn injury. Although there is a lack of data that evaluates interventions in this area, there are a few studies that have shown the efficacy of cooling the injured area with water (Nguyen et al, 2002; Nguyen et al, 2008). A study conducted in Viet Nam showed that there was a 32% reduction in the need for skin grafts in children who had received immediate cooling after the burn, as compared to those who hadn't (Nguyen et al, 2002). Along with imparting knowledge about avoiding the application of home-made remedies that can be potentially harmful, families also need to understand the importance of treating a burnt area with cool, clean water as soon as possible after the burn has occurred.

Case Study: National Institute of Burns, Viet Nam

The National Institute of Burns (NIB) is the leading institute of Viet Nam specialising in burns. It aims to provide high quality research, treatment and education for burn prevention nationwide. The Institute was established on 1 December, 1964 as the Department of Burns at the Militant Hospital 103. On 25 April, 1991 it was renamed Le Huu Trac National Institute of Burns after one of the greatest doctors in Viet Nam's history. The Institute admits up to 4000 patients for burns treatment every year.

The main responsibility of the National Institute of Burns is to treat burn patients at a national level. The Institute has been working in collaboration with, and has received funding support from, various NGOs including the Asia Foundation and Give2Asia. About 60% of patients in the institute are children and they are treated in the Department of Paediatric Burns. This department is funded by various agencies, including UNICEF. The Institute provides free treatment to children less than 6 years of age.

The Institute is also involved in various educational activities. It runs a 'Burn Prevention for the Community' workshop that focuses on children and other high risk groups for burns. The staff of the Institute have developed different IEC materials such as leaflets, videos and other training materials for child patients as well as their family members. The Institute also collaborates with UNICEF and the Ministry of Health to run training courses and IEC programs for all Central, Northern and Southern regions at the community level. Training courses are organised for doctors working in the burns units at different hospitals who are then expected to be able to train other colleagues.

The Institute also has a hotline for the consultation of burn emergencies. This hotline provides technical assistance for treatment of burns and emergency care for burns. The Institute can also send out doctors and other medical staff to help, if needed.

In a resource challenged LMIC setting like Viet Nam, the National Institute for Burns provides a good model for burns care in Viet Nam. It is a model that needs to be duplicated in other hospitals, especially those that are more accessible to rural populations. The Burns Hotline has the potential to be a good initiative towards dispelling myths about household remedy use on burn injuries. The main challenges facing the Institute are the rising number of burns victims in Viet Nam and the issue of sustainability of its programs once funding runs out.

For effective prevention of burn injuries, a community-based approach to interventions and campaigns is often promoted. Several such campaigns have been put in practice in different countries, with varying results. One study reviewing these campaigns looked at four such programs and their outcomes (Turner et al, 2004). These programs consisted of a variety of components including guidance and group training sessions, first aid for burns, and distribution of reading materials and dissemination of knowledge about preventing burn and scald injuries. A significant reduction in burn injuries was shown in two studies, Peleg 2005 in the US and Ytterstad 1995 in Norway (Turner et al, 2004). Similarly, home visitation programs to inform families about burn injuries have yet to show proven effectiveness (Peden et al, 2008).

5. Conclusion and recommendations

As the fifth most common cause of injury among children, burns account for an important proportion of the burden of childhood injuries in Viet Nam. With over 80% of burns caused by scalding, and a majority taking place inside the home, there is great potential for prevention by taking some simple and relatively cheap measures. The peak of injury occurrence is seen in children aged 1-4 years whose physical and cognitive abilities are still underdeveloped. In addition to the physical trauma and economic impact that burns can have on victims and their families, these injuries can result in long-term disfigurement and disability.

The main risk factors for this injury are comprised of child-related factors such as young age and inability to understand the risks posed by different threats in the environment, as well as the natural curiosity to explore, reach out and touch things. One specific risk factor to the Vietnamese household is related to the culture of keeping hot water available all the time in flasks to make tea. The tipping over of these flasks causes a significant number of scald injuries among toddlers. In rural areas, cooking on open fires using straw increases the risk of houses catching fire.

Lack of awareness about the appropriate first aid to be provided in the event of a burn further complicates the issue. The use of homemade remedies and the delay in transporting burnt children to hospital often cause an increase in the severity of the injury. The lack of dedicated, accessible and well-equipped burns units also adds to the burden of morbidity and mortality associated with burns.

Recommendations

- First aid education is of utmost importance. Families need to be educated about the benefits of cooling the burnt area and the right way to administer first aid in the event of a burn injury. The Burns Hotline information of the National Institute of Burns should be included in this education so that carers of burn injury victims have a reliable source of information that they can contact in the event of an emergency.

- Childhood injury awareness campaigns need to include a focus on burn injuries, especially burns due to scalding and how they can be prevented. These campaigns need to address children themselves, explaining how burn injuries can be caused, and how to keep themselves safe from these injuries. Several myths related to current practices in the community about the treatment of burns with homemade remedies need to be dispelled. A clear and simple communication needs to be produced that explains the harms these remedies can cause to an already burnt area of the body.

- Simple solutions like separating the cooking area from the living area of the home should be promoted and supported.

- Other simple measures that can be introduced and encouraged include raising the heights of platforms in kitchens on which stoves, hot pots and pans are placed, and using flasks that are stable and fitted with tight lids.

- Home visitation by community workers can have an important role to play in preventing burn injuries. These workers can point out danger areas in the dwelling and assist families in employing simple measures that can make the home safe for children.

- There is a need for more burns units in major hospitals around the country which will improve the management and outcomes of burns in children. Burns units need to be easily accessible to people living in rural as well as urban areas, since the delay in transportation to more specialised care often results in severe complications, including death.

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Chapter 8. Conclusions and recommendations

The unprecedented economic and social development in Viet Nam over the past two decades has contributed to a significant improvement in the overall health and wellbeing of its children. This is mainly due to reduction in infant mortality rates, malnutrition and infectious diseases following better access to immunisation programs and primary healthcare services. However, socioeconomic development and rapid industrialisation has led to the emergence of injury as a new 'epidemic' and the major cause of morbidity and mortality in Vietnamese children today. In 2007, nearly 8000 children aged between 0-19 years died as a result of an injury. The true figure is likely to be higher because of under-reporting and issues related to coding of injury-related deaths (MOH representative. Interview 27 August, 2009). Mortality data represents only the tip of the iceberg in terms of the real burden of injury: it is estimated that for every child injury-related death, 12 children are admitted to hospital or permanently disabled and 34 children require medical care or miss school or work because of injury.

Leading causes of child injury-related death in Viet Nam include drowning, road traffic crashes, poisoning, falls, burns and animal bites. Major causes of non-fatal childhood injury include falls, road traffic crashes, animal bites, injury by sharp objects and burns. As with other low- and middle-income countries, risk factors of child injury include age, gender, hazardous environment, low socioeconomic status which is often associated with lack of awareness about injury risks and supervision of children, as well as lack of access to safety devices, counseling and appropriate healthcare, particularly emergency and pre-hospital care. International evidence shows that all types of injuries in children are preventable by the combination of a number of strategies, including education and training; legislation and enforcement; environmental modification and promotion of safer products and safety devices, particularly through home visits made by collaborators.

In Viet Nam, major achievements have been attained in terms of a growing awareness of child injury prevention at all levels in the community and the creation of an injury prevention policy framework, both within a relatively short period of time (since 2001). This includes the development of the 2001-2010 National Policy on Accident and Injury Prevention, the 2006 Ministry of Health decision to implement safe communities at the national level, the 2007 Ministry of Education and Training decision on the application of 'safe schools', the 2007 landmark resolution on traffic safety and compulsory helmet use for all motorbike drivers nationwide,Ministry of Construction's Building Code for Dwelling and Public Buildings in 2008, Ministry of Labour, War Invalids and Social Affairs' Plan of Action on Child Injury Prevention, and Interdisciplinary Plan on Child Drowning Prevention in 2009. However, child injury prevention in Viet Nam still faces many challenges and with the exception of relatively successful education and training campaigns, many proven child injury prevention strategies are yet to be fully implemented across the country (Table 6).

Table 6. Major child injury prevention strategies and the level of their implementation in Viet Nam.

	Implemented	Limited/in progress	Not in place
Drowning			
Education/awareness	X		
Swimming training		X	
Barriers (fences and well coverage)		X	
Flotation devices (laws, enforcement)		X	
Road traffic crashes			
Education/awareness	X		
Helmet use (laws, enforcement)		X	
Child restraint use (laws, enforcement)			X
Drink driving (laws, enforcement)		X	
Safer play spaces, safer routes to school		X	
Falls			
Education/awareness	X		
Home modification of hazards		X	
Building standards, occupational regulations		X	
Burns			
Education, including first aid		X	
Home modification (separating cooking areas, closed fires)		X	
Smoke alarms (laws, enforcement)			X
Animal bites			
Education, awareness		X	
Prophylactic vaccination against rabies		X	
Animal (dogs) rabies control		X	
Poisoning			
Education, including first aid		X	
Food handling and processing (laws, enforcement)		X	
Child resistant, safe packaging (laws, enforcement)			X

1. Recommendations

Government agencies and national and international organisations involved in child injury prevention efforts in Viet Nam are encouraged to consider the following recommendations.

Recommendation 1: Develop a comprehensive plan of action for child injury prevention in Viet Nam that includes legislative, enforcement and environmental changes to support existing education and public awareness campaigns.

Since the late 1990s, major inroads have been made in raising awareness about the risk of injury to children in Viet Nam and to change to some degree the prevailing community attitude that injuries are due to 'bad luck'. This was achieved through the implementation of intensive public education campaigns using mass media, printed material and direct communication by teachers, health and community workers as well as trained volunteers. There has also been some implementation of environmental modifications designed to make homes, schools and communities safer for children in some provinces.

However, to date, little has been achieved in terms of the development and enforcement of laws and regulations related to child injury prevention in Viet Nam. Where laws are in place to prevent children from injuries, weak enforcement or legal loopholes limit their effectiveness. For example, in December 2007, the uniform use of helmets by all motorbike riders and passengers became mandatory under the Vietnamese government's landmark legislation (Resolution 32 2007/NQ-CP). While this legislative change had remarkable outcomes in terms of increasing helmet use in adults to around 95%, according to an AIFP representative 'the figure for children is only around 39% because legislation on road traffic penalties in Viet Nam does not penalise children under 14 or their parents for not wearing a helmet' (AIFP representative). According to a number of stakeholders interviewed, after months of strong advocacy and negotiations, relevant ministries have drafted a decree, introducing penalties for parents of children aged 6-16 years not wearing a helmet, and sent it to the prime minister's office for review and approval. While it is not perfect, as it does not cover children of all ages, most stakeholders agreed that it is a step in the right direction.

Other legislation relevant to child injury prevention which applies to child restraints, drink driving, medication packaging, child resistant products and personal flotation devices, as well as to regulations related to building standards and occupational health and safety, are either non-existent or poorly enforced. In 2008, UNICEF Viet Nam formed a partnership with the Ministry of Justice to identify and compile all existing child injury prevention regulations in the country (Doyle, 2008). 'Currently, MOLISA and MOJ, along with other stakeholders, are reviewing the compiled list of legislations in order to determine the need for legislative changes as well as strategies to improve enforcement of existing legislations related to child safety in Viet Nam' (MOLISA representative).

In order to achieve a comprehensive plan of action for child injury prevention in Viet Nam there is a need:

- to continue education and training of the public and policy-makers on the importance of child injury as a major public health issue in Viet Nam through sustained campaigning and advocacy;

- to implement necessary environmental modification to support child injury prevention efforts. The main changes required include the creation of child-friendly infrastructure, safer

roads and safer play spaces for children;

- to advocate for better enforcement of existing relevant laws as well as the introduction of legislative changes designed to prevent injury in Vietnamese children. Areas which need consideration include helmet and child restraint use, drink driving, medication packaging, child resistant products, personal flotation devices as well as building standards and occupational health and safety-related regulations. A relevant agency needs to be nominated to take the lead in coordinating the implementation of various initiatives in this area; and

- to integrate this plan of action into a comprehensive child survival and development strategy which can be adopted by the Government and the UN system

Recommendation 2: Enhance the coordination of child injury prevention efforts.

While the last decade saw the development and the implementation of a number of child injury prevention programs by various NGOs and key government agencies in Viet Nam, there has been a certain amount of duplication, particularly regarding education and training programs. This was mainly due to the lack of coordination between all key players in initiating and implementing child injury prevention programs. For example, a number of stakeholders interviewed expressed ambiguity about the body responsible for the implementation of the 2001-2010 National Policy on Accident and Injury Prevention. The key policy framework for the development of the injury prevention strategy and interventions was designed to operate at the ministerial level of relevant ministries (MOH representative). However, coordination of injury and child injury efforts was reported and observed to be lacking in the provinces. There is no inter-sectoral national plan of action on child injury prevention. Some stakeholders expressed the view that the responsibility of developing and implementing the next injury prevention plan should lie with one single ministry (for example MOH or MOLISA) which can act as a focal point and work with other relevant ministries and NGOs to implement the policy and associated programs. In addition, resource mobilization (including human and financial resources) from central to local levels is also very critical. Particularly, policy advocacy is needed for resource allocation for child injury prevention. In order to undertake this important task, leaders of relevant sectors (especially the focal point ministry) play a crucial role in policy advocacy and coordination with other ministries.

Others expressed their interest in reviving the 'Injury Prevention Working Group', or the 'Injury Prevention Steering Committee' as some stakeholders called it, in order to better coordinate injury prevention efforts. The group, which was established in 2002 following the issue of the 'National Policy on Accident and Injury Prevention', included all major stakeholders who would meet regularly to coordinate various injury prevention interventions and discuss technical issues regarding the implementation of programs and the collection and access to relevant data. However, for various reasons, this collaborative group ceased to meet about two years after its establishment, which may have contributed to the observed duplication of a number child injury prevention programs. In a country where there are limited resources for prevention, duplication of efforts should be avoided and better coordination should be promoted.

In order to improve the coordination of child injury prevention program in Viet Nam:

- responsibility for the coordination of efforts to implement the National Policy on Accident and Injury Prevention should lie with a designated government body/ministry with the necessary resources, including effective delivery across government agencies; and

- the 'Injury Prevention Working Group' or an inter-sectoral national steering committee should be reestablished. This group should have an executive core, including all major players in child injury prevention, to coordinate prevention efforts, drive implementation, exchange ideas and expertise, and advocate as one voice for child prevention in Viet Nam (especially advocacy for resource allocation at both central and local levels).

Recommendation 3: Improve the quality and quantity of morbidity and mortality data in order to readily measure the magnitude of child injury and to plan required services/programs.

An external review (Smith and Nguyen, 2009) indicated that there is a major lack of injury and child injury-related data consistency between agencies, and over time within agencies. Furthermore, completeness of data is inadequate in case capture and data item completion, and conciliation of data between sources does not occur. There are also major concerns about the lack of detail in data collected. Currently, it is inadequate for injury problem definition.

An important improvement in injury surveillance in Viet Nam occurred in 2006 when a decision issued by the Ministry of Health made the inclusion of injury data mandatory within standard health reporting forms across Viet Nam's 64 provinces (MOH representative). Since then, the Ministry of Health has been able to produce annual reports with national statistics on injury mortality, including those related to children. However, the A6 system, on which mortality data is based, has a number of limitations, including under-reporting and problems with the classification of cause of fatality (MOH representative). In addition, this set of data is disaggregated for children and adolescents aged 0-19 but not for those under the age of 18 according to international conventions and Vietnamese law.

Information on child injury morbidity in Viet Nam is limited and has similar problems and limitations. While there is a number of community and hospital-based injury surveillance projects in Viet Nam, as a WHO representative pointed out, 'the information recorded is often incomplete, including that related to the age of the victim, the mechanism and the agent of injury'. The missing information is vital to informing child injury prevention strategies and to measure the impact of various programs. According to an MOH representative 'the A1 data collection system, which records non-fatal injuries at commune health centres, level also suffers from under-reporting' (MOH representative).

Overall, hospital injury surveillance systems in Viet Nam lack champions or leaders to promote them at the local level, seem to compete with other systems set up for other conditions, and fail to efficiently use pre-existing data collection systems. According to a WHO representative: 'An important issue with injury surveillance in Viet Nam hospitals is that there are always new systems for collecting data on various conditions but there is never enough people who are responsible for the systems to work properly. It is often left to hospital staff to deal with the extra work. The stress should be on strengthening existing systems of collecting data. At the moment, the way the system is set up raises questions about its sustainability' (WHO representative).

To date, the VMIS remains one of the only reliable sources of information on child injury morbidity in Viet Nam. However, the VMIS was not a national survey, as it covered only 24 out of 64 provinces, and the findings are becoming outdated as it was carried out in 2001. According to a Hanoi School of Public Health representative: 'Negotiations are currently taking place in coordination with UNICEF and other stakeholders to secure funds to reproduce another VMIS by 2010-2011 with plans to extend it to other provinces' (HSPH representative).

In order to improve information and data on child injury in Viet Nam there is a need to:

- integrate child injury mortality and morbidity as part of the Health Management and Information System;

- strengthen collection and analyses of child injury related data and information in MOLISA's child information system to support coordination of the efforts in child injury prevention;

- standardise injury recording systems, both within the health sector as well as in other sectors (such as police crash data), in order to ensure uniform reporting and allow any future linkage of various data sets;

- increase details on mechanism, place, activity, and intent in the MOH's A6 - injury-related mortality at the point of collection;

- develop standardised guidelines for attributing cause of death for commune data collectors, including clear determination of the inclusion of people from elsewhere who die within the commune, and the exclusion of people from their commune whose death occurs and may be recorded elsewhere;

- provide training and ongoing in-service training to commune data collectors;

- reconcile data from various sources regularly;

- undertake another Viet Nam Multi-center Injury Survey which will provide a more up-to-date picture of child injury in Viet Nam and allow for the assessment of the impact of various injury interventions that have been carried out in the country since 2001, the date of the last VMIS; advocate for the inclusion of relevant child injury questions in the national survey, the Viet Nam Household Living Standards Survey;

- improve the current hospital surveillance system by maximising efficient use of the existing infrastructure and systems already in place, providing training and incentives for staff involved in data collection, and empowering local champions responsible for the collection of this information. There is also a need to centralise, analyse and disseminate data on a regular basis and in a timely fashion; and

- identify clear and relevant indicators on various types of injury in children for reporting and monitoring.

Recommendation 4: Support child injury prevention research, particularly in the areas of the efficacy and effectiveness of child injury prevention programs.

One common characteristic of most child injury prevention programs implemented in Viet Nam is the lack of formal evaluation. While efforts have been made to monitor program activities, and to some extent undertake some level of process evaluation, the impact of most programs on reducing the burden of child injury in Viet Nam is still unclear. Evaluation is very important as it indicates components of a particular intervention that work, and those that need to be modified in order to achieve better outcomes. It is also important from an advocacy point of view, as funding bodies are more likely to support projects that have been shown to be effective in reducing the burden of a particular injury. Some of the reasons behind the lack of evaluation of most child

injury programs in Viet Nam are summarised in the following statement of a representative of Hanoi School of Public Health:

'Evaluation needs to be an integral part of the activity or the program itself rather than something that is separate or additional, but I think that lack of funds, lack of awareness about the importance of evaluation, and sometimes the fact that the impact might not be seen until some time after the implementation of a program, are the reasons why evaluation is not happening as it should be.' (HSPH representative).

While there is acknowledgment that many child injury prevention programs need to be evaluated within the context of Viet Nam as the economic conditions as well as the political and social context is different to other countries', at least one other stakeholder expressed the view that for some interventions, strong international evidence is sufficient to instigate action: 'Evaluation is very important, but at the same time there is no need to evaluate international evidence in relation, for example, to the risks of drink driving and using a mobile phone while driving or riding your bike' (WHO representative).

One area of research that is lacking in Viet Nam is that related to economic analysis of the burden of child injury. 'While there have been a couple of small sized localised studies, there is a need for a comprehensive study on the economic impact of child injuries in Viet Nam' (UNICEF representative). Economic analysis of the burden of child injury is extremely important in terms of advocacy as it has the potential to convince government agencies and other funding bodies of the importance of investing in child injury prevention as a way to reduce government expenditure in terms of treatment, rehabilitation and loss of productivity associated with injury in children.

Research in all the main areas related to child injury in Viet Nam should be strengthened, such as:

- capacity building of local researchers in all areas of child injury prevention, including epidemiology, economics, engineering, sociology, behavioural and developmental psychology and policy analysis;

- the implementation of well designed risk factor studies;

- economic analyses, including the cost of child injuries and the cost of interventions; and

- large-scale intervention trials to assess the effectiveness of interventions.

Recommendation 5: Improve access to healthcare services, particularly emergency and pre-hospital care.

Access to healthcare, particularly emergency and other pre-hospital care services, is vital to reducing the burden of death and disability due to injury in children. However, the emergency and pre-hospital care system in Viet Nam, even in the major cities and most developed areas, faces numerous difficulties and challenges. These include inefficient emergency systems, with the '115' emrgency number available only in a small number of provinces; shortages of equipment and vehicles (the capital Hanoi has only 14 operating ambulances) and a lack of health professionals properly trained in emergency and trauma care.

There are many programs in existence in Viet Nam that aim to improve pre-hospital care by educating volunteers (mainly car drivers and motorbike riders) and other members of the com-

munity in first aid, safe transportation and the basic care of trauma victims, as well as the training of heath professionals in trauma care. Such programs are implemented by a number of NGOs, particularly the Red Cross, Counterpart International and the WHO, in collaboration with the MOH. However, most of these programs are limited to a few provinces, and funding constraints are often cited by major players in the emergency care of injury as the major impediment to meeting the needs of the community in this area (Red Cross and Counterpart International representatives).

There is also limited capacity in terms of hospital beds for trauma victims in Viet Nam. According to a representative from Viet Duc hospital: 'Viet Duc hospital, which is the largest and highest level hospital specialising in the treatment of trauma in the country, has a capacity of 430 beds, but in reality the average number of patients at one time is approximately 900' (Viet Duc representative).

In order to improve access to healthcare services, particularly emergency and pre-hospital care, there is a need to:

- move towards the extension of the '115' emergency number and all supporting services to all areas across Viet Nam;

- extend existing programs that provide first responder training, including first aid and victim assistance, among volunteers, professionals working with children as well as in the community as a whole;

- extend trauma care training of doctors, nurses and other health professionals to cover all provinces of Viet Nam. This includes the integration of trauma care training programs, piloted by NGOs such as Counterpart International, into the formal undergraduate medical and health curriculums; and

- increase the number of hospital trauma beds and provide appropriate rehabilitation programs to address the long-term consequences of injuries in children.

Recommendation 6: Promote public awareness raising and mobilize community's responses to child injury issues

In the last few years, the Government of Viet Nam, with support from international and non-governmental organizations, have made substantial efforts to raise public awareness about child injury risks and preventive measures. It is important to continue initial work to raise the general public's awareness throughout the country about child injury issues. In addition, calling for community response and action is critical together with active engagement of all relevant line ministries and mass organizations. Coordination of a focal point ministry such as Ministry of Labour, War Invalids and Social Affairs in child injury efforts needs to be further strengthened.

2. Conclusion

There have been many notable achievements in child injury prevention in Viet Nam during the last decade. In this short period of time, injury was placed firmly on the agenda of national and local authorities and community members are becoming increasingly aware of the injury risks facing their children and the need to act to prevent them. The introduction of the National Policy on Accident and Injury Prevention in 2001 saw the development of a national policy framework to govern various injury prevention efforts in Viet Nam. These efforts culminated in 2007 with

the introduction of a landmark legislation (Resolution 32) which mandated the uniform use of helmets by all motorbike drivers and passengers. However, child injury prevention in Viet Nam still faces many challenges as much needs to be done in terms of maintaining and improving awareness levels, particularly in rural and remote areas, and making the necessary environmental and legislative changes required to reduce the burden of various types of injury in children. For example, efforts needs to be made to address existing legal loopholes to increase the use of helmets in children to the levels already observed in adults.

Lack of funding is often cited by many interviewed stakeholders as one of the main barriers facing child injury prevention efforts in Viet Nam. However, many prevention programs referred to in this report, including in the proposed recommendations, are relatively low cost and cheaper than the cost of injury in terms of medical treatment, rehabilitation and the impact on family and the community. Building upon previous achievements in child injury prevention and translating many of the recommendations into reality will require continuous involvement and commitment of international organisations, government and non-government agencies, community leaders, the media, the burgeoning private sector and the community as whole. A better coordination of efforts made by all stakeholders will ensure better use of resources available to reduce the burden of injury and improve the overall health and wellbeing of children in Viet Nam.